APPENDIX D
UTILITY SERVICE PLANS


Existing boundary hedge to be retained and augmented with additional planting to landscape specialists' details.
STOCKWITH LANE
Acoustic fence or brickwork wall across end of service yard
UPPER HOTLAND ROAD
Existing boundary hedge to be retained and augmented with additional planting to landscape specialists' details.
Service Yard for Building 2 with 50 Spaces including 6 Disabled
Service Yard for Building 1 with 51 Spaces including 6 Disabled
Gabion structure retaining 1.0m max.
Existing slope to regraded locally t
SHORTWOOD WAY
unrestricted discharge
ons from manhole
ose of the overall
anging into existing
Surface water drainage to have a discharge restricted to 55 litres/second by flow control to existing stub connections from manholes provided to drain this phase of the overall development, before discharging into an existing balancing pond and subsequently into existing public sewer.
New junction to Local Highway Authority approval.
Existing highway landscaping be retained
Gabion structure retaining 1.5m max.
Existing slope to be regraded locally to 1 in 3.
AS LAID TEMPLAT
REVISED
APPROX END
LOCATION


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AS LAID TEMPLAT
REVISED
APPROX END
LOCATION

APPROVED
By FPL at 5:02 pm, Sep 25, 2013

ALL MAINS LAID ON THIS PROJECT COMPLY WITH THE LATEST EDITION OF IGE / TD / 3

ALL SERVICES LAID ON THIS PROJECT COMPLY WITH THE LATEST EDITION OF IGE / TD / 4

VERY IMPORTANT - INFORMATION FOR CUSTOMER

TRENCH DEPTH GUIDELINES

All trenches to be in accordance with N.J.U.G. guidelines

MINIMUM DEPTHS OF COVER:-

MAINS: (a) Carriageway - 750mm (b) Other ground - 600mm
SERVICES: (a) >63mm - As above (b) <=63mm - 450mm
*All pipes laid in agricultural land - 1.1m

All ducts (if used) must conform to BS4962, Yellow in colour, convoluted and perforated.

VERY IMPORTANT - INFORMATION FOR CUSTOMER

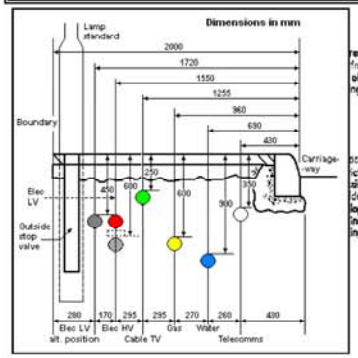
MINIMUM PROXIMITY DISTANCES

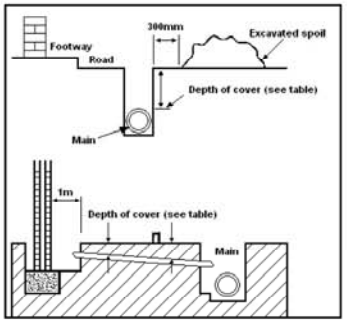
The permissible proximities to normally occupied buildings vary depending upon construction material and operating pressure show in the tables below

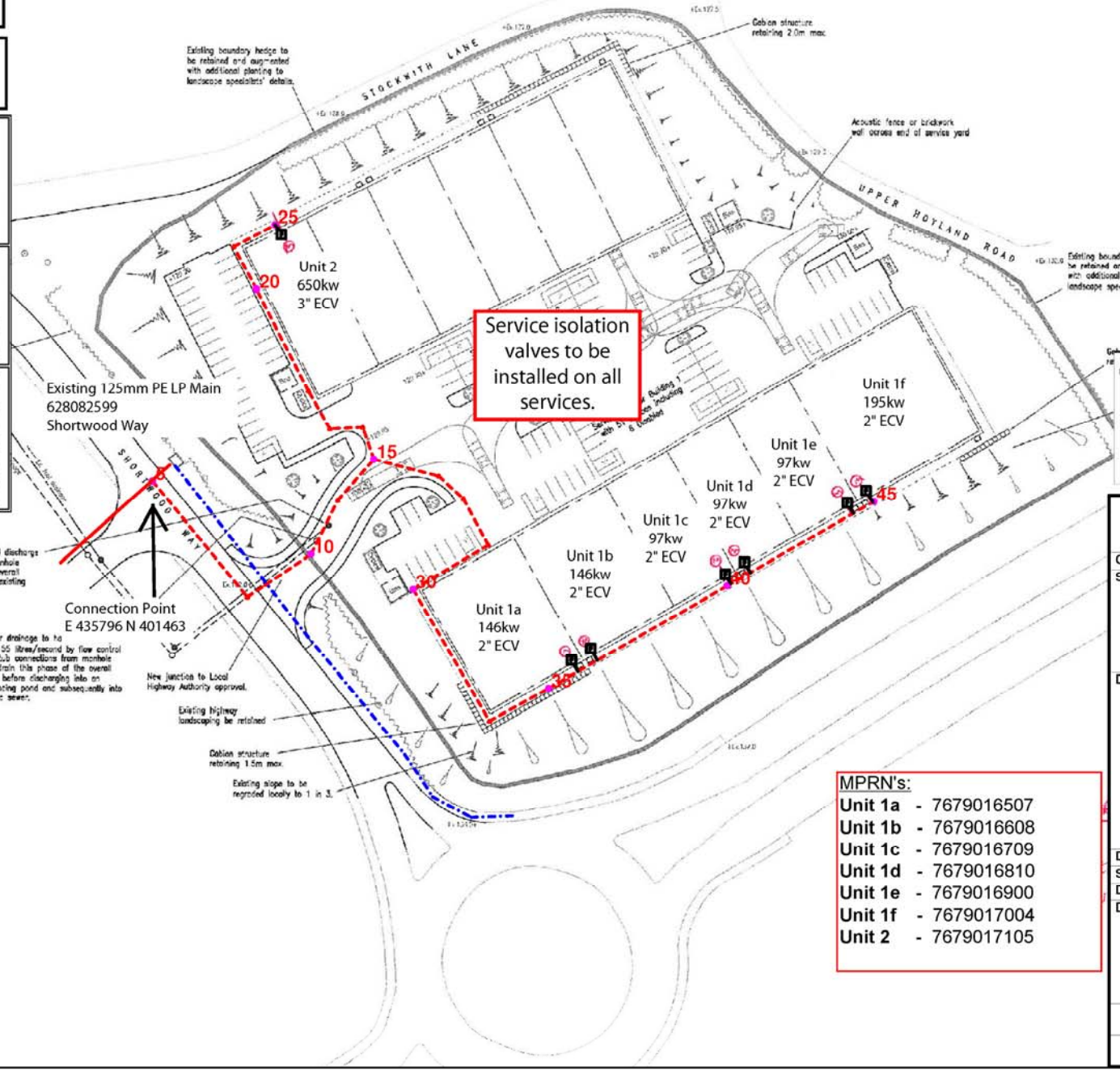
STEEL MAINS

Operating Pressure	Minimum Proximity to Premises (m)
LP	0.25
MP	1
IP	3

PE MAINS O.D (mm)	Material PE Grade	Maximum Operating Pressure <=75mbar (LP)	>75mbar <=2Bar (MP)
		Minimum Proximity to Premises (m)	
<=140	PE80 SDR17.6	0.25	3
	PE80 SDR11	0.25	3
	PE100 SDR11	0.25	3
160 to 250	PE80 SDR17.6	1	3
	PE80 SDR11	1	3
	PE100 SDR11	1	3
315	PE80 SDR17.6	1	3
	PE80 SDR11	1	3
	PE100 SDR11	1	3







MPRN's:

Unit 1a	- 7679016507
Unit 1b	- 7679016608
Unit 1c	- 7679016709
Unit 1d	- 7679016810
Unit 1e	- 7679016900
Unit 1f	- 7679017004
Unit 2	- 7679017105

GIRS ACCREDITED DESIGNER

DATE 22.07.13

SIGNATURE KA Littlewood

FULCRUM

2 Europa View, Sheffield Business Park, Sheffield, S9 1XH

QUOTE REF: 9012738 (5017861)

SITE ADDRESS:
Units 1A-1F and Unit 2
Shortwood Business Park
Shortwood Way
Hoyland
Barnsley
S74 9NR

DESCRIPTION OF WORKS:
Lay new 180mm/125mm/90mm PE LP mains. Lay 6 x 63mm services to terminate internally and 1 x 90mm service to terminate internally. Fulcrum to provide all excavation and reinstatement in public, customer to provide all excavation and reinstatement within site boundary.

DESIGNED BY: Karen Littlewood

SCALE: 1:1000 @ A3 **DATE:** 22/07/2013

DRAWING:

DRAWING KEY:
Proposed LP Main
Proposed MP Main
Proposed IP Main
Proposed Service
Proposed Meter Position
Pipes To Be Abandoned

Change Of Diameter — Governor
Change Of Material — Valve

x:\live\5017861\5017861_kl090_01 - Approximate Scale 1 mm = 1.000 metres

ALERT

Appendix 1

Safe working practices in the vicinity of metallic valves

All operatives are required to adhere to the following precautionary measures when working on or near metallic valves.

Where the valves are likely to be encountered?

In any location above or below ground, for example (please note this list is not exhaustive):

- Buried line valves
- Governor installations
- Meter installations
- ECVs / Construction valves
- Valve associated with outlet pipe work
- Metallic valves installed by other utilities (e.g. water)

REQUIRED ACTION

Below Ground

- DO NOT use hand held power tools or mechanical excavator within 0.5m (500mm) either side of the valve, or above the valve position.
- When excavating to expose a valve, dig down at the side of the marked position, and not directly above. Use an air lance, spades and shovels rather than grafts, forks or picks.
- DO NOT position yourself directly over or in front of the valve bonnet at any time, as should the valve fail catastrophically, parts of it and/or escaped gas and other materials could be ejected out. Should anything unusual become evident e.g. smell of gas, noise or ejection of material from the excavation – STOP, withdraw and contact National Gas Emergency Service on 0800 111 999
- DO NOT attempt to operate valve or remove any protective coatings.

In the Event of an Emergency

If there is a smell of gas you must take the following actions IMMEDIATELY:

- Stop work and get everyone away from the immediate vicinity of the escape
- Inform the National Gas Emergency Service on 0800 111 999
- DO NOT attempt to stop the escape by filling the excavation as gas may enter buildings

Issued by: Fulcrum Pipelines Limited
Date: June 2016
Version: 1.0

Design it well, Build it Correctly, Do it Safely

Mrs Jessica Western
RSK Environment Ltd
18 Frogmore Road
Hemel Hempstead Hertfordshire
HP3 9RT

2 Europa View
Sheffield Business Park
Sheffield S9 1XH

Web: fulcrum.co.uk
Email: enquiries@fulcrum.co.uk

Our Reference: 16658368
Your Reference: 322638

Dear Mrs Jessica Western,

Asset Network Plans

Thank you for your request regarding the position of our pipelines received through the LinesearchbeforeUdig service.

We can confirm that Fulcrum Pipelines Limited currently has or is planning to have gas pipes in the vicinity of your proposed works. I have enclosed a copy of our drawings and site location to help you to locate them.

If you are proposing to carry out an excavation on or near a valve, please refer to the "Appendix 1 - Safe working practices in the vicinity of metallic valves" attached.

We will do everything we can to assist you in your safe working procedures, however, it's worth bearing in mind that we are not responsible for any incidents or accidents that may occur whilst working around our pipe network.

With this in mind, we'd recommend the following practices are adhered to maintain the integrity of the pipeline:-

- Trial Holes to find our pipes.
- Hand Digging to find our pipes and their vicinity once found.
- Adequate protection of the pipe if exposed and once your work is completed i.e. sand covering

It is essential to refer to the HSE document HSG47 for information regarding trial holes and safe digging practice when working near our pipes. A copy of this document can be downloaded from the following HSE website link - http://www.hse.gov.uk/pubns/books/hsg47.htm

Additional costs may be incurred if our plant has to be relocated due to your proposed works.

Please note that other gas transporters may have plant in the area which could be affected by your proposed works.

If you need any help or information simply contact Fulcrum on 03330 146 455.
In case of an emergency please phone 0800 111 999.

Yours Sincerely,

Fulcrum Pipelines Limited
03330 146 455
FPLSupplyPointEnquiries@fulcrum.co.uk

Disclaimer

Plans provided by Fulcrum Pipelines Limited only primarily show those pipes owned by Fulcrum Pipelines Limited in its role as a Licensed Independent Gas Transporter ("iGT"). The plan may show future pipework, plant or other assets or existing pipework, plant or other assets which may be removed or abandoned by Fulcrum Pipelines Limited from its gas network at any time in the future. Apparatus installed within the last 90 days and other apparatus including (but not limited to) service pipes, valves, siphons and stub connections may be present in the area but may not be shown on the plan, however, their presence should be anticipated. Gas pipes owned by any other Gas Transporters, or otherwise privately owned, may also be present in this area but may not be shown. Areas of operation or facilities operated by any other Gas Transporter may be shown on the plan, however, such information is based on information provided by such Gas Transporters. Information with regard to such third party pipes, operations or facilities should be obtained from the relevant owners.

The information shown on this plan is given without warranty or representation by Fulcrum Pipelines Limited as to its completeness, accuracy or as to its up to date representation of any geography or pipework or other assets. Save for any matter for which it is not permitted by law to exclude or limit its liability, neither Fulcrum Pipelines Limited nor its affiliates, nor any agents, servants or contractors of the same, shall have any liability arising out of or in connection with the information provided in the plan (whether present or future), whether in contract, tort, misrepresentation (excluding fraudulent misrepresentation), under statute or otherwise, howsoever caused including (without limitation) by negligence. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.


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SHOBTWOOD WAY
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APPROX END
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APPROVED
By FPL at 5:02 pm, Sep 25, 2013

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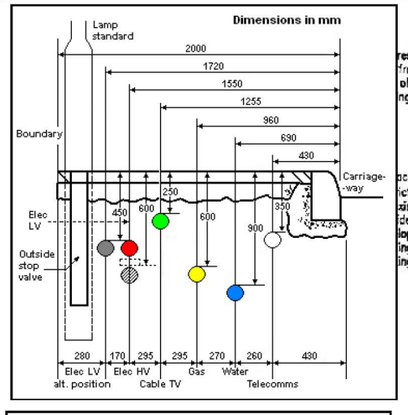
MINIMUM PROXIMITY DISTANCES

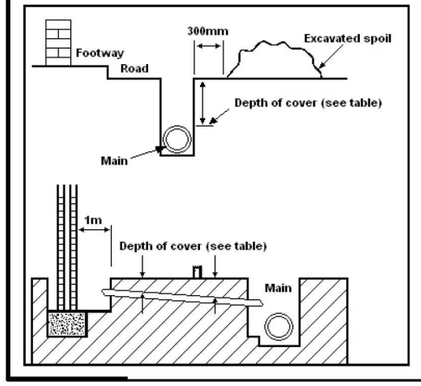
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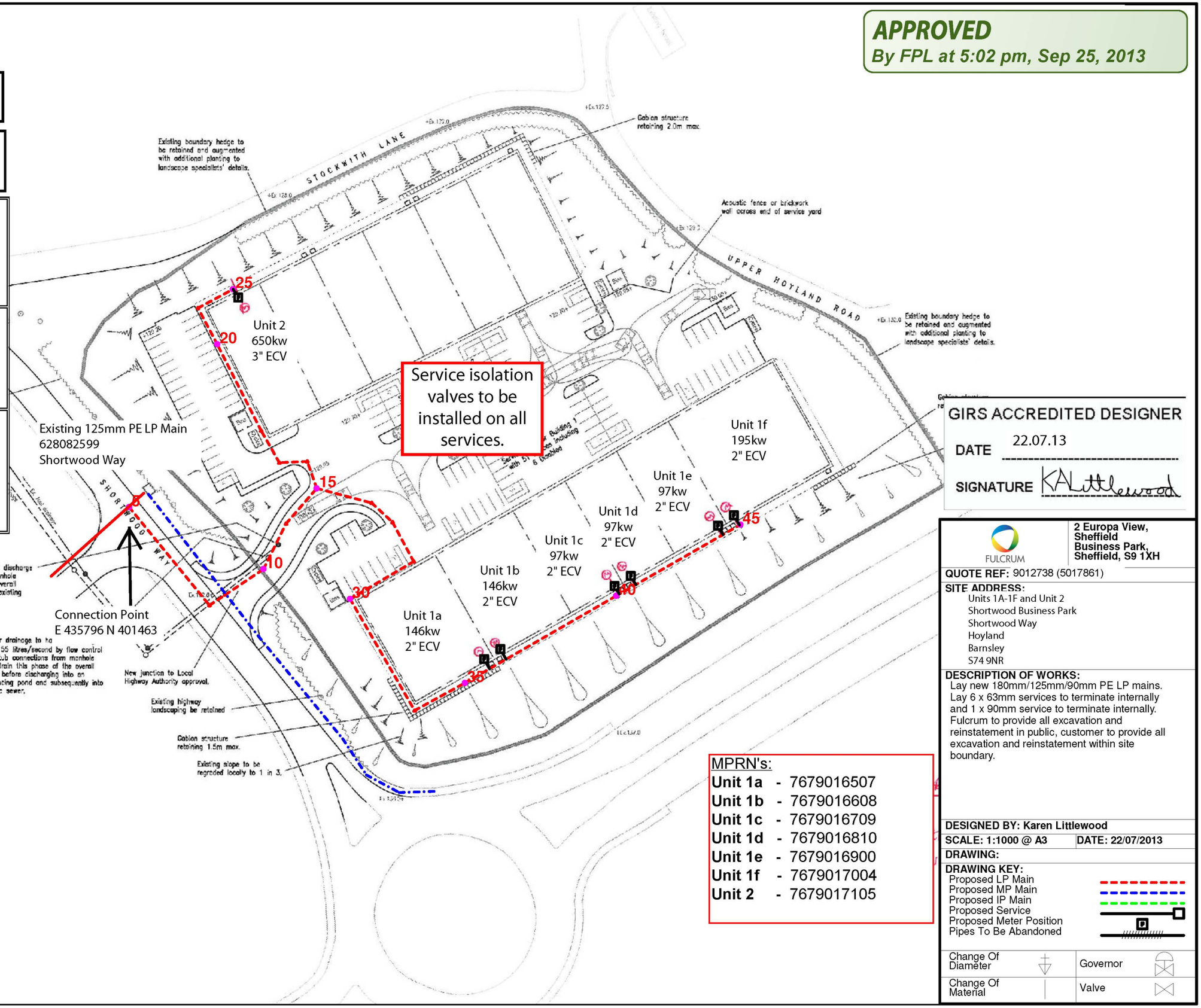
STEEL MAINS

Operating Pressure	Minimum Proximity to Premises (m)
LP	0.25
MP	1
IP	3

PE MAINS	Material PE Grade	Maximum Operating Pressure	
O.D (mm)		<=75mbar (LP)	>75mbar <=2Bar (MP)
		Minimum Proximity to Premises (m)	
<=140	PE80 SDR17.6	0.25	3
	PE80 SDR11	0.25	3
	PE100 SDR11	0.25	3
160 to 250	PE80 SDR17.6	1	3
	PE80 SDR11	1	3
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Unit 1e	-	7679016900
Unit 1f	-	7679017004
Unit 2	-	7679017105

GIRS ACCREDITED DESIGNER

DATE 22.07.13

SIGNATURE KALittlewood

FULCRUM

2 Europa View, Sheffield Business Park, Sheffield, S9 1XH

QUOTE REF: 9012738 (5017861)

SITE ADDRESS:
Units 1A-1F and Unit 2
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DESIGNED BY: Karen Littlewood

SCALE: 1:1000 @ A3 **DATE:** 22/07/2013

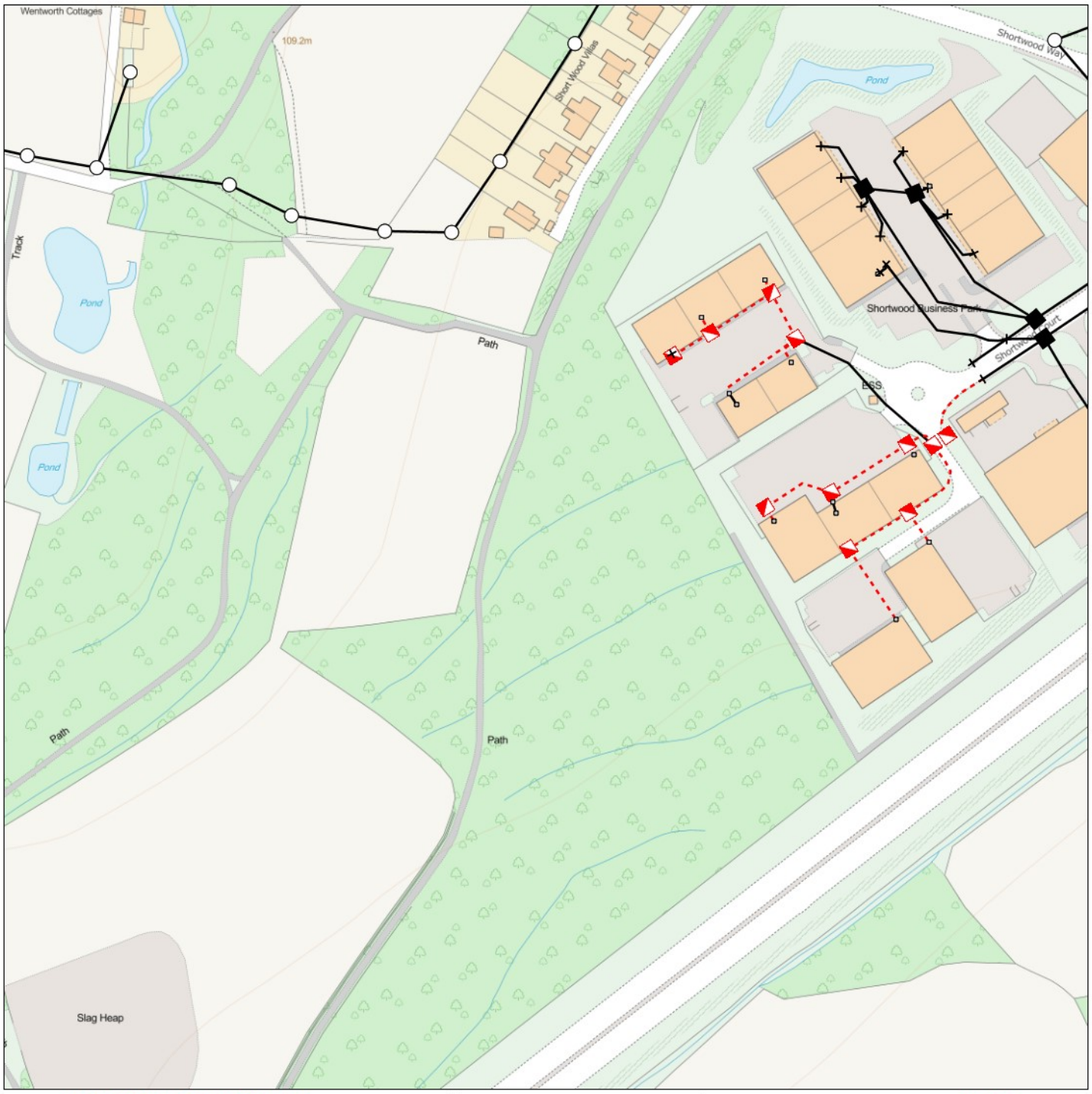
DRAWING:

DRAWING KEY:
Proposed LP Main
Proposed MP Main
Proposed IP Main
Proposed Service
Proposed Meter Position
Pipes To Be Abandoned

Change Of Diameter
Governor
Change Of Material
Valve

x:\live\5017861\5017861_kl090_01 - Approximate Scale 1 mm = 1.000 metres

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

openreach

CLICK BEFORE YOU DIG

FOR PROFESSIONAL FREE ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS INCLUDING LOCATE AND MARKING SERVICE

email cbyd@openreach.co.uk

ADVANCE NOTICE REQUIRED
(Office hours: Monday - Friday 08.00 to 17.00)
www.openreach.co.uk/cbyd

Accidents happen

If you do damage any Openreach equipment please let us know by calling 0800 023 2023 (opt 1 + opt 1) and we can get it fixed ASAP

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KEY TO BT SYMBOLS

	Planned	Live
PCP		
Pole		
Box		
Manhole		
Cabinet		

Change Of State	+	Hatchings	
Split Coupling	×	Built	
Duct Tee	▲	Planned	
Building		Inferred	
Kiosk	K	Duct	

Other proposed plant is shown using dashed lines.
BT Symbols not listed above may be disregarded.
Existing BT Plant may not be recorded.
Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.

	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : QVA02105G
Map Reference : (centre) SE3548801297
Easting/Northing : (centre) 435488,401297
Issued : 07/10/2019 14:11:10

WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk

Maps by email Plant Information Reply



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KEY TO BT SYMBOLS

	Planned	Live
PCP		
Pole		
Box		
Manhole		
Cabinet		

Change Of State	+	Hatchings	
Split Coupling		Built	
Duct Tee		Planned	
Building		Inferred	
Kiosk	K	Duct	

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	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : DCP11242J
Map Reference : (centre) SE3548001097
Easting/Northing : (centre) 435480,401097
Issued : 08/10/2019 11:24:41

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KEY TO BT SYMBOLS

	Planned	Live
PCP		
Pole		
Box		
Manhole		
Cabinet		

Change Of State	+	Hatchings	
Split Coupling		Built	
Duct Tee		Planned	
Building		Inferred	
Kiosk	K	Duct	

Other proposed plant is shown using dashed lines.
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Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.

	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : PNZ11256T
Map Reference : (centre) SE3560701032
Easting/Northing : (centre) 435607,401032
Issued : 08/10/2019 11:25:14

WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk

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PCP		
Pole		
Box		
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Change Of State	+	Hatchings	
Split Coupling		Built	
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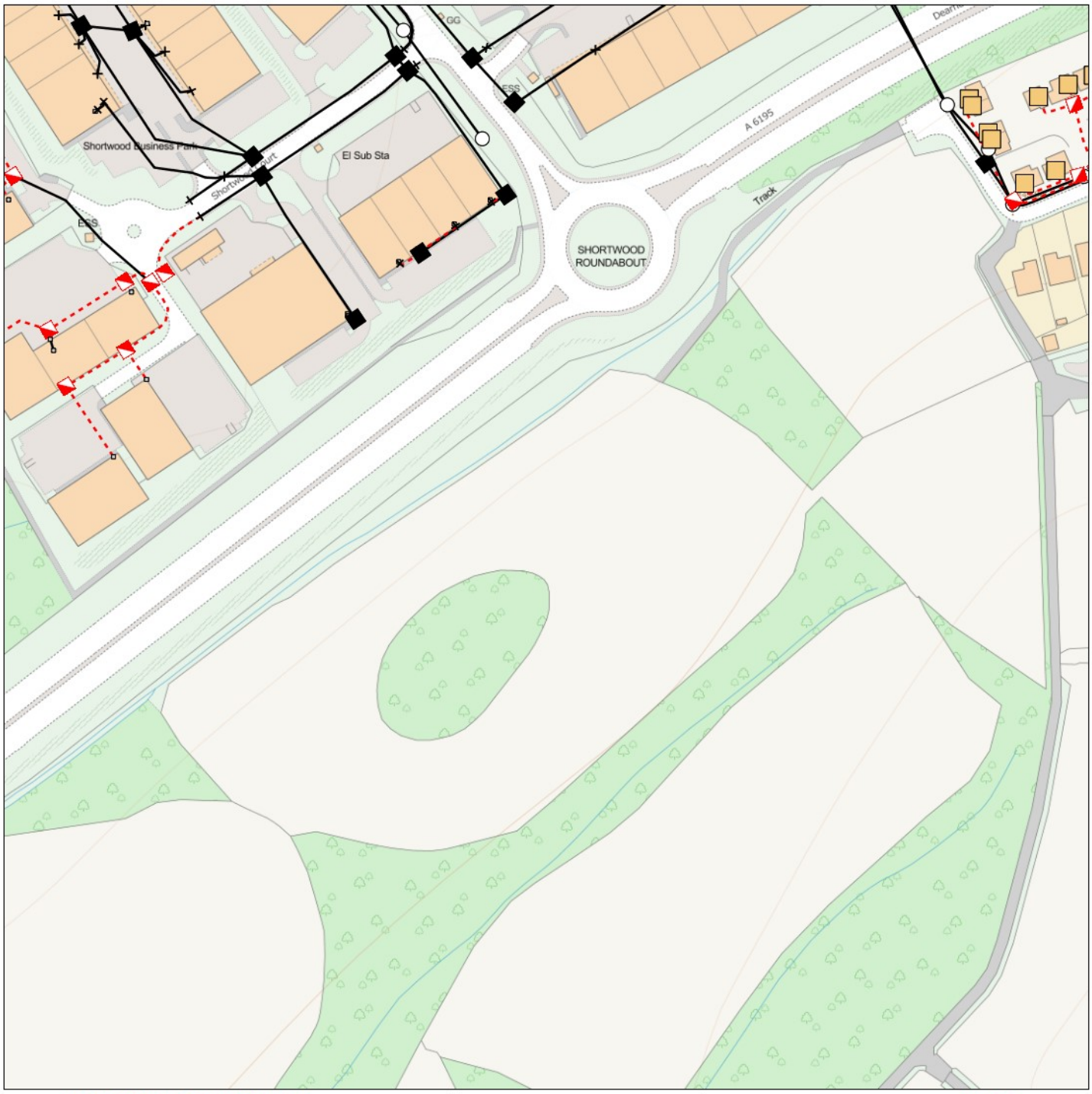
Other proposed plant is shown using dashed lines.
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	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : PNZ11256T
Map Reference : (centre) SE3560701032
Easting/Northing : (centre) 435607,401032
Issued : 08/10/2019 11:25:14

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Maps by email Plant Information Reply



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	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : CXR11253A
Map Reference : (centre) SE3584901222
Easting/Northing : (centre) 435849,401222
Issued : 08/10/2019 11:25:34

WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

openreach

CLICK BEFORE YOU DIG

FOR PROFESSIONAL FREE ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS INCLUDING LOCATE AND MARKING SERVICE

email cbyd@openreach.co.uk

ADVANCE NOTICE REQUIRED
(Office hours: Monday - Friday 08.00 to 17.00)
www.openreach.co.uk/cbyd

Accidents happen

If you do damage any Openreach equipment please let us know by calling 0800 023 2023 (opt 1 + opt 1) and we can get it fixed ASAP

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Controller of Her Majesty's Stationary Office
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KEY TO BT SYMBOLS

	Planned	Live
PCP		
Pole		
Box		
Manhole		
Cabinet		

Change Of State	+	Hatchings	
Split Coupling		Built	
Duct Tee		Planned	
Building		Inferred	
Kiosk	K	Duct	

Other proposed plant is shown using dashed lines.
BT Symbols not listed above may be disregarded.
Existing BT Plant may not be recorded.
Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.

	Pending Add	In Place	Pending Remove	Not In Use
Power Cable				
Power Duct				N/A

BT Ref : ITP11254R
Map Reference : (centre) SE3561901492
Easting/Northing : (centre) 435619,401492
Issued : 08/10/2019 11:25:55

WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk


Legend
CW / FW Cable
Fibrespan Cable
Rail Cable
S74 9LH
A6195
B6096
Shortwood Way
High Royd Ln
Upper Hoyland Rd
Hawshaw Bank
Hawshaw Ln
Dearne Valley Pkwy
Alverley Way
Rockingham Row
Osprey Ave
Herons Way
Wrens Way
Google Earth
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SPECIAL REQUIREMENTS IN RELATION TO CENTURYLINK PLANT

1. In this special requirement, the following terms shall have the meanings assigned to it:-

   a. "Company" means CenturyLink.

   b. "Company Representative" means the staff of CenturyLink or its Authorized Representatives and Agents.

   c. "Apparatus" means all surface or sub-surface equipment and plant including any associated cabling and/or ducting owned leased or rented by CenturyLink.

2. Before commencing any work or moving heavy plant or equipment over any portion of the site, the contractor shall confirm details of the Apparatus, owned, leased or rented by the Company, within the site with the Company Representative, who can be contacted at the following point: -

Instalcom Limited
Borehamwood Industrial Park
Rowley Lane
Borehamwood
Hertfordshire
WD6 5PZ
Tel: 0208 731 4600
Fax: 0208 731 4601
E-mail: plantenquiries@instalcom.co.uk

3. Where such details show that the works or the movement of plant or equipment may endanger the Apparatus of the Company the Contractor must give the Company Representative at least 7 days written notice of the date on which it is intended to commence such works of the movement of plant and equipment in order that the presence of any sub-surface apparatus can be indicated by markers to be supplied by the Company and placed by the Contractor under the supervision of a Company Representative. The Contractor shall ensure that all Company Apparatus, particularly surface running cabling is adequately protected from damage and such protective measures shall be approved by the Company Representative.

4. In the event of a Company marker being disturbed for any reason, it shall not be replaced other than in the exact position of its former depth unless the repositioning is carried out at the direction and under the supervision of a Company Representative.

5. The Contractor shall take particular care in relation to the protection of Company Apparatus, where such Apparatus includes the presence within the site of optical fibre cabling. The contractor should particularly note that the damage to such Apparatus is extremely disruptive to the Company network and costly to reinstate. The Contractor shall make every effort to avoid the disturbance of Company Apparatus more than is absolutely necessary for the completion of the works in accordance with the contract.

6. When excavating around, moving or backfilling around Company Apparatus, the Company Representative shall be given adequate notice, which shall not be less than 3 days, of the contractor's intentions in order that he may supervise the works. The Contractor should note that the normal depth of cover for Company Apparatus and ducts are as follows: -

   a. Carriageways 600mm
   b. Footways 350mm
   c. Verges 450mm

These minimum depths of cover should be maintained wherever possible.

Where the minimum depths of cover cannot be maintained, the Contractor shall carry out the instructions of the Company Representative for the protection of Company Apparatus.

Where cables are not in duct and the required depth of cover cannot be maintained, such cables as are affected shall be enclosed and protected in UPVC duct or equivalent materials as supplied by the Company and by the method directed by the Company Representative.

With regard to excavation in the vicinity of Company Apparatus the Contractor should have particular regard to the possibility of reduced cover and the encountering of such Company Apparatus at depths of cover less than that given at **a, b and c above**.

7. All excavation adjacent to Company Apparatus is to be carried out by hand until the exact extent and/or location of Company Apparatus is known. Mechanical borers and/or excavators shall not be used within 1.0m of Company Apparatus without the supervisory presence of a Company Representative, to prevent any movement of Company Apparatus during excavations, complete shuttering shall be used as directed by the Company Representative if:-

   a. Excavation is deeper than the depth of cover of adjacent Company Apparatus.

   b. Excavation is within 1.0m of Company Apparatus in stable ground.

   c. Excavation is within 5.0m of Company Apparatus in unstable ground.

   If for the completion of the works, the Contractor intends using any of the following: -

   a. Pile driving equipment within 10.0m of Company Apparatus.

   b. Explosives within 20.0m of Company Apparatus.

   c. Laser equipment within 10.0m of Company Apparatus.

   The Contractor shall advise the Company Representative, giving at least 7 working days written notice in order that any special protective measure for the Company Apparatus affected may be arranged.

8. All Company manhole, joint box and /or other access points and chambers within the site shall be kept clear and unobstructed. Access for vehicles, winches, cable drums and/or further equipment required by the Company for the maintenance of it's Apparatus, must be maintained at all reasonable times. The Contractor should particularly note that footway type jointing chambers are not specified for carriageway loadings and will need to be adequately protected and/or demolished and rebuilt under the supervision of a Company Representative where such chambers are likely to be placed at risk, either temporarily or permanently, from the movement of plant and/or equipment on the site.

9. The covers to Company chambers and/or Apparatus shall only be lifted by means of appropriate keys obtained from the Company Representative and under the direct supervision of the Company Representative. No employee of the Contractor or of any sub-contractor employed by the Contractor shall enter any chamber and/or Apparatus of the Company unless under the supervision of the Company Representative and in any case not before the mandatory gas check has been carried out in the presence of the Company Representative and such checks have shown it to be safe to enter the chamber and/or Apparatus of the Company.

   The Company Representatives shall be given reasonable access to all Company Apparatus and chambers when required.

10. In the event of any damage whatsoever to Company Apparatus, the Contractor shall immediately inform the Company Representative and report the occurrence immediately by contacting the Company as follows:-

Telephone:-

0208 731 4600
Mon-Fri Office Hours (Instalcom Head Office)

0845 330 8615
Out of Office Hours / Weekends

11. The above requirements do not relieve the Contractor of any of his obligations under the Contract.

The accuracy of information on the plans cannot be guaranteed and no liability can be accepted for errors or omissions.

Damage to Communications Plant is Expensive – Please Take Care.

YORKSHIRE WATER
PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the ***general*** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.

2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.

3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will ***generally*** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will ***generally*** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.

4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.

5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter *(see illustration below).* Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.

6. All excavation works near to YW apparatus should be by hand digging only.

7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.

8. Adequate support must be provided where any works pass under YW apparatus.

9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.

10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.

11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.

12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.

13. ***Under no circumstances*** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.

14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.

16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.

Registered Office, Yorkshire Water Services Limited.
Western House, Halifax Road, Bradford BD6 2SZ. Registered in England and Wales No. 2366682

SafeMove
A part of YorkshireWater

17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available* " should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.

18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011. Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

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20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trail holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0345 124 24 24.

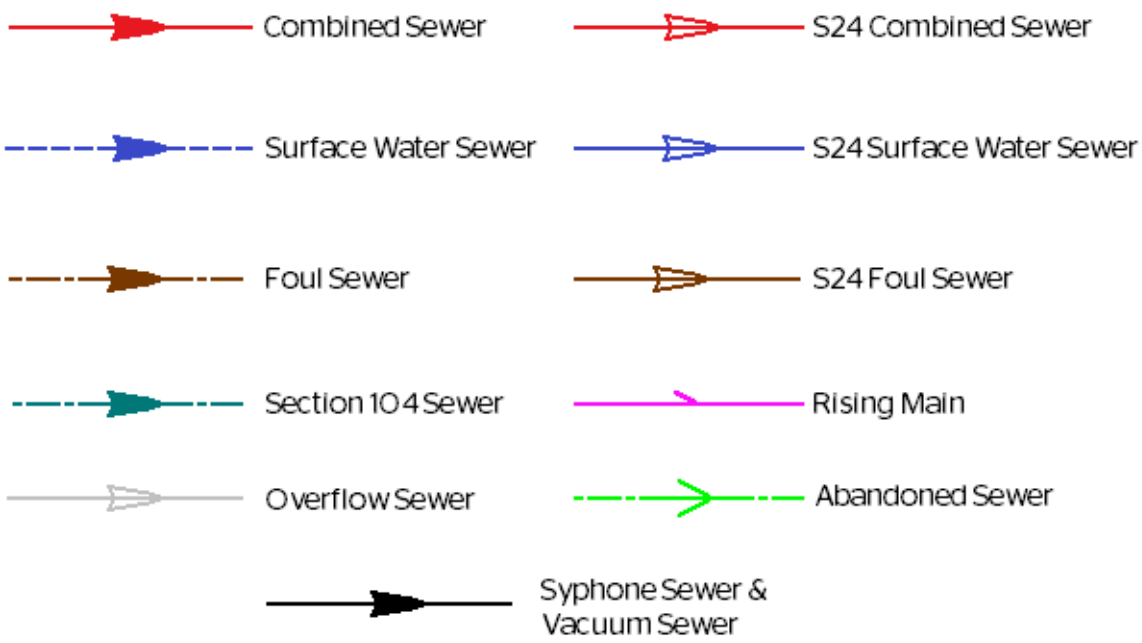
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SafeMove
A part of YorkshireWater

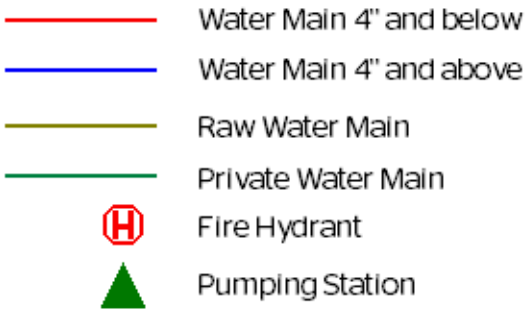
Property Identfier



Sewer Legend


Water Legend



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SafeMove
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435316 : 401098	Map Name : SE3400SW	Title	Partial Key	

YorkshireWater

Yorkshire Water,
PO Box 500,
Halifax Road,
Bradford BD6 2LZ
Contact Name :
S Edon
Contact Tel :

Notes


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Partial Key
Foul Sewer = F
Combined Sewer = C
Surface Water Sewer = SW
Trade Sewer = TD
Partially Separate = PS

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Req : 09/10/2019, 14:36:09
Date Gen : 09/10/2019, 14:37:16
Source : Sewer Network Enquiry

UPN: Undefined   Originator: S Edon, ,



435305 : 401084	Map Name : SE3400SW	Title	Partial Key
YorkshireWater	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : S Edon Contact Tel :	Notes (Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432	Water mains up to 4" in diameter Water mains over 4" in diameter Raw water mains Private water mains

The position and depths of apparatus shown on this plan are approximate only. The exact positions and depths should be obtained by excavation trial holes.

Scale :	1:2500		
Drg No :		Maris No :	
Date Req :	09/10/2019, 14:37:47	Date Gen :	09/10/2019, 14:38:25
Source :	Water Network Enquiry		

UPN: Undefined   Originator: S Edon, ,

APPENDIX E
TECHNICAL BACKGROUND

H1 Desk Study

Aquifer designation and Source protection zones

Principal aquifer: layers of rock or drift deposit that have high intergranular and/or fracture permeability (usually providing a high level of water storage). They may support water supply and/or river base flow on a strategic scale.

Secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

Secondary B aquifer: predominantly lower permeability layers that may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

Secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both a minor and non-aquifer in different locations owing to the variable characteristics.

Unproductive' strata: low permeability with negligible significance for water supply or river base flow.

The EA generally adopts a three-fold classification of source protection zones (SPZ) surround abstractions for public water supply. The Site is situated in an area defined as follows:

- Zone 1 or the 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- Zone 2 or the 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants
- Zone 3 or the 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Preliminary risk assessment methodology

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) contaminant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)
- medium: chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required
- high: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term
- moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term
- low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild
- very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

H2 Site Investigation Methodology

Ground gas monitoring

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

Low flow groundwater sampling

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology.

The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

H3 Site Investigation Methodology

Statistical assessment

Statistical analysis of the results has been conducted in accordance with *Guidance on Comparing Soil Contamination Data with a Critical Concentration* (CIEH and CL:AIRE, 2008) as detailed in Appendix D.

Statistical analysis is utilised to establish whether the land is suitable for the proposed use under the land use planning system by attempting to answer a key question. For a site being developed the key question is: '*can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk?*' More specifically, this is expressed as '*Is there sufficient evidence that the true mean concentration of the contaminant (μ) is less than the critical concentration (C_c)?*', where the critical concentration could be the GAC or a site-specific assessment criterion (SSAC). The true mean (μ) is unknown and therefore a conservative estimate, termed the upper confidence limit (UCL), of this value is derived from the data. The UCL is then compared against the GAC.

In statistical terms the question above is handled through the use of a formal hypothesis – the null hypothesis and the alternate hypothesis. The statistical tests are structured to show (with a defined level of confidence, in this case 95%) which of the two hypotheses is most likely to be true, by determining whether the null hypothesis can be rejected.

For consideration under the planning regime, the null (H_0) and alternative (H_1) hypotheses are presented below.

Null and alternative hypotheses

Hypothesis	Equation	Description
Null (H_0)	$\mu \geq C_c$	The true mean concentration is equal to, or greater than, the critical concentration
Alternative (H_1)	$\mu < C_c$	The true mean concentration is less than the critical concentration

Therefore, if the null hypothesis is accepted for a certain contaminant it can be concluded that its concentration is high relative to the critical concentration, which in the case of this assessment is taken to be the GAC/SSAC and as such the whole site may be classed as being contaminated by a particular substance.

In addition, the statistical guidance provides an outlier test (Grubbs' test) that has been used within this assessment for the identification of 'outliers' or 'hotspots'. The 'outlier' test is conducted before undertaking statistical analysis (and 'outliers' may be removed from the dataset) but **only** where the conceptual model supports this.

The statistical tests applied to the dataset are selected based on whether the data is normally or non-normally distributed. The distribution of the dataset has been assessed using the Shapiro-Wilks normality test. Where the dataset has been found to be normally distributed the one sample t-test is undertaken. Where data has been found to be non-normally distributed Chebyshev's theorem is utilised.

Reuse of suitable materials

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on-sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.

APPENDIX F
EXPLORATORY HOLE RECORDS

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH501**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **17.10.19**	**124.26**	**E:435312.7 N:401144.9**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.25	1	D				MADE GROUND: Grass over soft to firm sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of mixed lithologies. (MADE GROUND)	(1.20)	
0.50	2	B						
0.60	3	D						
0.90	4	D				. . . 0.80m, becoming firm and firm to stiff.	1.20	
1.20	5	D				MADE GROUND: Soft to firm dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone, burnt shale and coal fragments. (MADE GROUND)	(0.80)	
1.20-1.65	6	SPT(c)	N=12					
1.20	7	B					2.00	
2.00	8	D				MADE GROUND: Light grey gravelly mudstone BOULDER. (MADE GROUND)	(0.50)	
							2.50	
2.50-2.95	9	SPT	N=28			MADE GROUND: Dense grey red and black silty angular to subangular fine to coarse GRAVEL of mudstone, burnt shale, brick and coal fragments. (MADE GROUND)	(0.50)	
2.50	9	DSPT					3.00	
3.00	10	D					(1.00)	
3.50-3.95	11	SPT	N=21			MADE GROUND: Stiff to very stiff black slightly sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone. (MADE GROUND)		
3.50	11	DSPT						
3.50-3.95	12	B					4.00	
4.00	13	D				MADE GROUND: Soft to firm light grey silty CLAY with high cobble content of mudstone. (MADE GROUND)	(2.50)	
4.50-4.90	14	SPT	N=60*					
4.50	14	DSPT						
4.50-4.95	15	B						
6.00-6.45	16	SPT	N=10					
6.00	16	DSPT					6.50	
7.00	17	B				MADE GROUND: Very dense grey very clayey slightly sandy angular to subangular fine to coarse GRAVEL of siltstone with low cobble content. (MADE GROUND)		
7.50-7.85	18	SPT	N=61*				(2.50)	
7.50	18	DSPT						
8.50	19	B					9.00	

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/10/19		3.00	3.00		Dry
17/10/19		3.00	3.00		Dry
17/10/19		13.42	4.50		Dry

Chiselling / Slow Progress

From	To	Duration (hh:mm)
2.30	2.50	00:45
7.40	7.60	00:45
12.80	13.00	00:50

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 13.00m depth on completion. Response zone 9.00m to 13.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH501**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **17.10.19**	**124.26**	**E:435312.7 N:401144.9**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.41	20	SPT(c)	N=34			MADE GROUND: Firm grey sandy gravelly CLAY with moderate cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone with rare coal fragments. (MADE GROUND)	(1.50)	
9.00-9.45	21	B						
10.00	22	D					10.50	
10.50-10.95	23	UT	50 blows 100% recovery			MADE GROUND: Firm to stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone with rare coal fragments. (MADE GROUND)	(1.00)	
11.00	24	D					11.50	
11.50	25	B				MADE GROUND: Dense to very dense grey clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and siltstone with a moderate cobble content. (MADE GROUND)	(1.92)	
12.00-12.45	26	SPT(c)	N=41					
12.50	27	B						
13.00-13.42	28	SPT	N=56*				13.42	
13.00	28	DSPT				Cable percussion borehole terminated at 13.42m depth due to gas egress from borehole.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

4. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 3.00m depth on completion. Response zone 1.00m to 3.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH502**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **18.10.19**	**128.29**	**E:435393.5 N:401153.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Soft to firm light brown and greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of sandstone and mudstone. (MADE GROUND)	(0.60)	
0.40	2	B					0.60	
0.60	3	D				MADE GROUND: Soft dark greyish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, red shale and coal. (MADE GROUND)	(0.60)	
0.90	4	D					1.20	
1.20	5	D				MADE GROUND: Stiff dark blackish grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular fine to coarse of mudstone, coal and siltstone. Cobbles are of mudstone. (MADE GROUND)	(6.60)	
1.20-1.65	6	SPT(c)	N=12					
1.20-1.65	7	B						
2.00	8	D						
2.50-2.95	9	SPT(c)	N=13					
2.50-2.95	10	B						
3.00	11	D						
3.50-3.95	12	SPT(c)	N=17					
3.50	13	B						
4.00	14	D						
4.50-4.95	15	SPT	N=31					
4.50-4.95	15	DSPT						
4.50-4.95	16	B						
5.00	17	D						
5.50	18	B						
6.00	19	D						
6.00-6.45	20	SPT	N=20					
6.00-6.45	20	DSPT						
7.00	21	D						
7.50	22	B						
7.50-7.88	23	SPT(c)	N=64*			. . . at 7.50m depth very gravelly.	7.80	
8.00	24	D				MADE GROUND: Mudstone BOULDER recovered as coarse gravel. (MADE GROUND)	(0.65)	
8.00-8.41	25	SPT	N=58*				8.45	
8.00-8.41	25	DSPT				Borehole terminated at 8.45m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/10/19		8.45	1.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
8.41	8.45	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 8.00m depth on completion. Response zone 2.00m to 8.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**1** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				MADE GROUND: Grass over firm to stiff brown slightly sandy slightly gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mixed lithologies. (MADE GROUND)	(2.00)	
0.50-1.20	2	B						
1.20-1.65	3	SPT	N=17					
1.20-1.65	3	DSPT						
1.20-1.65	4	B					2.00	
2.00-2.45	5	SPT	N=23			MADE GROUND: Firm black and brown gravelly CLAY. Gravel is fine to coarse angular to subangular of mudstone and coal fragments. (MADE GROUND)		
2.00-2.45	5	DSPT						
2.00-2.45	6	B						
3.00-3.45	7	SPT	N=13				(2.80)	
3.00-3.45	7	DSPT						
3.00-3.45	8	B						
4.00-4.45	9	SPT	N=12					
4.00-4.45	10	B						
4.00-4.45	9	DSPT						
4.50	11	D					4.80	
5.00-5.41	12	SPT	N=51*			MADE GROUND: Light grey COBBLES AND BOULDERS of siltstone (recovered as a gravel). (MADE GROUND)		
5.00	12	DSPT						
5.00-5.45	13	B						
6.00-6.42	14	SPT(c)	N=55*					
6.00-6.45	15	B						
7.50-7.90	16	SPT(c)	N=53*				(5.20)	
7.50-7.95	17	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/10/19		5.00	3.00		Dry
17/10/19		5.00	3.00		Dry
17/10/19		13.95	3.00		Dry
18/10/19		13.95	3.00		Dry
18/10/19		19.00	3.00		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
4.50	5.00	01:00
5.00	6.00	01:00
11.50	12.00	01:00
18.70	19.00	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 19.00m depth on completion. Response zone 17.00m to 19.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**2** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.40	18	SPT(c)	N=55*			MADE GROUND: Light grey COBBLES AND BOULDERS of siltstone (recovered as a gravel). (MADE GROUND)		
9.00-9.45	19	B				*(stratum copied from 4.80m from previous sheet)*	10.00	
10.00	20	D				MADE GROUND: Stiff grey, black and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subangular of mudstone and coal fragments. (MADE GROUND)		
10.50-10.95	21	U	28 blows 60% recovery				(1.50)	
11.00	22	D					11.50	
11.60	23	D				MADE GROUND: Light grey BOULDER of siltstone (recovered as a gravel). (MADE GROUND)	(0.50)	
12.00-12.37	24	SPT(c)	N=57*				12.00	
12.00-12.45	25	B				MADE GROUND: Stiff grey, black and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subangular of mudstone and coal fragments. (MADE GROUND)		
13.50-13.95	26	SPT(c)	N=46					
13.50-13.95	27	B						
15.00-15.45	29	B					(6.70)	
16.50-16.90	30	SPT(c)	N=53*					
16.50-16.95	31	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**3** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.38 18.00-18.45	32 33	SPT(c) B	N=57*				18.70	
19.00-19.35	34	SPT(c)	N=59*			MADE GROUND: Light grey BOULDER of siltstone (recovered as a gravel). (MADE GROUND)	(0.65) 19.35	
						Borehole terminated at 19.35m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**15.10.19** End: **15.10.19**	**130.01**	**E:435448.1 N:401161.5**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.25	1	D				MADE GROUND: Soft to firm brown and dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and red shale. (MADE GROUND)	(1.20)	
0.50	2	B						
0.60	3	D						
0.90	4	D					1.20	
1.20-1.65	5	UT	50 blows 100% recovery			MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. (MADE GROUND)	1.65	
1.70	6	D						
1.80	7	B						
2.00	8	D				MADE GROUND: Blackish brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone. (MADE GROUND)	(1.35)	
2.50-2.95	9	SPT	N=13					
2.50-2.95	9	DSPT					3.00	
3.00	10	D				MADE GROUND: Firm dark grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone and coal. (MADE GROUND)	(1.50)	
3.50-3.95	11	SPT(c)	N=18					
3.50-3.95	12	B						
4.00	13	D					4.50	
4.50-4.95	14	SPT(c)	N=21			MADE GROUND: Firm dark grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone, coal and red shale. (MADE GROUND)	(4.50)	
4.50-4.95	15	B						
5.00	16	D						
6.00	17	D						
6.00-6.45	18	SPT(c)	N=16					
6.00-6.45	19	B						
7.00	20	D						
7.50-7.95	21	SPT(c)	N=13					
7.50-7.95	22	B						
8.00	23	B					9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
15/10/19		20.00	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Groundwater struck at 13.03m depth, rising to 12.90m depth after 20 minutes.
3. Borehole backfilled with bentonite up 8.00m depth and arisings to ground level.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**15.10.19** End: **15.10.19**	**130.01**	**E:435448.1 N:401161.5**	**2** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	24	D				MADE GROUND: Soft to firm dark brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone, sandstone and coal. (MADE GROUND)	(0.50)	
9.00-9.45	25	UT	30 blows 100% recovery				9.50	
9.50	26	D				MADE GROUND: Dark brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium of coal and mudstone. (MADE GROUND)		
10.00	27	D						
10.50-10.95	28	SPT	N=11				(2.50)	
10.50-10.95	28	DSPT						
11.00	29	D						
11.50	30	B					12.00	
12.00	31	D				MADE GROUND: Soft dark grey and black slightly sandy gravelly CLAY. Gravel is angular to subangular fine to medium of mudstone and coal with red shale. (MADE GROUND)		
12.00-12.45	32	SPT	N=12					
12.00-12.45	32	DSPT		1			(2.00)	
13.00	33	D						
13.50	34	B					14.00	
13.50-13.95	35	SPT	N=14			MADE GROUND: Black and brown sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse of sandstone, coal and mudstone. (MADE GROUND)		
13.50-13.95	35	DSPT						
14.00	36	D					(1.00)	
15.00	37	D					15.00	
15.00-15.45	38	SPT	N=32			MADE GROUND: Brown sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse of sandstone, coal and mudstone. (MADE GROUND)	(0.50)	
15.00-15.45	38	DSPT					15.50	
15.50	39	B				MADE GROUND: Dark blackish grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone and coal. (MADE GROUND)		
16.00	40	D						
16.50-16.95	41	SPT	N=25				(2.50)	
16.50-16.95	41	DSPT						
17.00	42	D						
17.50	43	D					18.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**15.10.19** End: **15.10.19**	**130.01**	**E:435448.1 N:401161.5**	**3** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00	44	D				MADE GROUND: Dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal and red shale. (MADE GROUND)	(1.50)	
18.00-18.45	45	SPT	N=20					
18.00-18.45	45	DSPT						
19.00	46	D					19.50	
19.50	47	B				MADE GROUND: Dark blackish brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone, coal and red shale. (MADE GROUND)	(0.50)	
19.50-19.95	48	UT	15 blows 75% recovery				20.00	
20.00	49	D				Cable percussion borehole terminated at 20.00m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.10.19** End: **23.10.19**	**128.96**	**E:435560.3 N:401248.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.50-1.00	1	B				MADE GROUND: Firm to stiff brown and beige very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies, including mudstone and sandstone. (MADE GROUND)	(1.00)	
							1.00	
1.20-1.60		$SPT_{(NR)}$	N=61*			MADE GROUND: Stiff grey sandy gravelly CLAY with low cobble content. (MADE GROUND)		
1.20-2.50	2	B						
2.50-2.93		SPT(c)	N=55*					
2.50-4.50	3	B				. . . 2.50m to 3.50m, mudstone boulder.		
3.50-3.90		SPT(c)	N=60*				(5.50)	
4.50-4.95	4	SPT	N=21					
4.50-4.50	4	DSPT						
4.50-5.00	5	B						
6.00-6.45	6	SPT	N=20					
6.00-6.45	6	DSPT						
6.00-6.45	7	B					6.50	
						MADE GROUND: Very stiff grey and beige slightly sandy gravelly CLAY with moderate cobble content. Sand is fine to carse. Gravel is subangular to angular fine to medium of mudstone, sandstone and rare coal fragments. (MADE GROUND)		
7.50-7.95	8	SPT	N=26				(2.50)	
7.50-7.95	8	DSPT						
7.50-7.95	9	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
22/10/19		18.50	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
2.50	3.50	01:00
18.00	18.10	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 18.41m depth on completion. Response zone 10.50m to 18.41m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.10.19** End: **23.10.19**	**128.96**	**E:435560.3 N:401248.4**	**2** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45 9.00-9.45 9.00-10.50	10 10 11	SPT DSPT B	N=25			MADE GROUND: Very stiff black and brown silty slightly gravelly CLAY. Gravel is subangular to angular fine to coarse of sandstone and mudstone with abundant coal fragments. (MADE GROUND)	9.00 (4.50) 13.50	
10.50-11.00	12	U	50 blows 75% recovery					
12.00-12.44 12.00-13.00	13 14	SPT(c) B	N=53*					
13.50-13.93 13.50-15.00	15 16	SPT(c) B	N=55*			MADE GROUND: Very dense grey slightly sandy slightly gravelly COBBLES of mudstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone. (MADE GROUND)	(2.50) 16.00	
15.00-15.45 15.00-15.45 15.00-16.50	17 17 18	SPT DSPT B	N=40					
16.50-16.95 16.50-16.95 16.50-18.00	19 19 20	SPT DSPT B	N=33			MADE GROUND: Very stiff black and grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone. (MADE GROUND)	(2.41)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.10.19** End: **23.10.19**	**128.96**	**E:435560.3 N:401248.4**	**3** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.41 18.00-18.41	21	SPT$_{(NR)}$ B	N=59*				18.41	
						Cable percussion borehole terminated at 18.5m depth due to SPT refusal and 1 hour chiselling for no progress.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**18.10.19** End: **21.10.19**	**131.86**	**E:435589.4 N:401200.8**	**1** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Soft light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of sandstone. (MADE GROUND)	(0.50)	
0.25	1	D					0.50	
0.50	2	B						
0.60	3	D					(0.70)	
						. . . at 0.50m low cobble content of subangular sandstone.		
0.90	4	D				MADE GROUND: Soft light greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of sandstone and mudstone. (MADE GROUND)	1.20	
1.20	5	D						
1.40-1.85	1.4	SPT(c)	N=33					
1.40	101	ES						
1.40-1.85	7	B						
						MADE GROUND: Soft brownish grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone, sandstone and siltstone. (MADE GROUND)		
2.00	8	D						
2.50-2.95	9a	B						
2.50-2.93	9	SPT(c)	N=55*				(3.30)	
						. . . from 2.50m to 2.95m medium cobble content of siltstone.		
3.00	10	D						
						. . . from 3.00m to 3.50m gravel of coal.		
3.50-3.88	11	SPT(c)	N=57*					
3.50-3.95	12	B						
						. . . from 3.50m to 3.95m low cobble content of siltstone.		
							4.50	
4.50-4.95	14	SPT	N=10			MADE GROUND: Soft to firm blackish brown and brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, siltstone, sandstone and coal. (MADE GROUND)		
4.50	14	DSPT						
5.00	13	D						
5.00	15	D						
5.50	16	B						
						. . . from 5.50m to 6.00m low cobble content of siltstone.		
6.00-6.45	17	UT	41 blows 100% recovery					
						. . . from 6.00m to 6.45m soft.		
6.50	18	D						
							(5.00)	
7.50	19	B						
7.50-7.95	20	SPT	N=11					
7.50	20	DSPT						
8.00	21	D						
						. . . from 8.00m to 9.50m grey with medium cobble content of siltstone and mudstone.		
8.50	22	B						
8.50	102	ES						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 19.91m depth on completion. Response zone 10.00m to 19.91m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**18.10.19** End: **21.10.19**	**131.86**	**E:435589.4 N:401200.8**	**2** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	23	UT	25 blows 100% recovery					
							9.50	
9.50	24	D				MADE GROUND: Soft to firm light grey and dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal. (MADE GROUND)		
10.00	25	B						
10.50-10.95	26	SPT	N=10					
10.50	26	DSPT						
11.00	27	D						
11.50	28	B						
						. . . from 11.50m to 16.50m gravel becomes sandstone and siltstone.		
12.00-12.45	29	UT						
12.50	30	D						
13.00	31	B					(7.50)	
						. . . from 13.00m to 14.00m low cobble content of sandstone.		
13.50-13.95	32	SPT	N=13					
13.50	32	DSPT						
14.00	33	D						
14.50	34	B						
15.00	35	B						
15.00-15.45	36	SPT	N=23					
15.00	36	DSPT						
16.50-16.95	37	SPT	N=32					
16.50	37	DSPT						
16.50	37	B					17.00	
17.00	38	D				MADE GROUND: Soft light brown and dark brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone and sandstone. (MADE GROUND)		
17.50	39	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	End: **21.10.19**	**131.86**	**E:435589.4 N:401200.8**	**3** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.43	40	SPT	N=40			MADE GROUND: Soft light brown and dark brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone and sandstone. (MADE GROUND)	(2.91)	
18.00	40	DSPT				*(stratum copied from 17.00m from previous sheet)*		
19.00	41	D						
19.50	42	B						
19.55-19.91	43	SPT	N=60*			. . . from 19.50m to 19.91m firm.	19.91	
19.55	43	DSPT				Cable percussion borehole terminated at 19.91m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**06.11.19** End: **06.11.19**	**141.25**	**E:435867.1 N:401246.8**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Grassy TOPSOIL.	0.20	
0.20	1	D				(MADE GROUND)		
0.50	2	B				MADE GROUND: Soft to firm dark mottled greyish orangish brown slightly sandy slightly gravelly CLAY with infrequent rootlets and a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, mudstone and coal. Cobbles are of sandstone.	(0.80)	
0.70	3	D				(MADE GROUND)	1.00	
1.00	4	B				MADE GROUND: Soft to stiff dark mottled greyish orangish brown slightly sandy slightly gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone, sandstone and coal. Cobbles are of sandstone.	1.40	
1.20	5	D				(MADE GROUND)		
1.40-1.85	6	UT	27 blows 100% recovery			MADE GROUND: Firm to stiff dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse of mudstone, coal and siltstone.		
1.90	7	D				(MADE GROUND)		
2.00	8	B						
2.50-2.95	9	SPT	N=11					
2.50-2.95	10	B						
2.50-2.95	9	DSPT						
3.00	11	D				. . . below 3.00m depth becoming soft to firm.		
3.50-3.95	12	SPT	N=7					
3.50-3.95	12	DSPT						
4.50-4.95	101	U	40% recovery				(6.49)	
5.00	15	D						
5.50	16	B						
6.00	17	D						
6.00-6.45	18	SPT	N=8					
6.00-6.45	18	DSPT						
7.00	19	D						
7.50-7.89	20	SPT	N=58*					
7.50-7.89	20	DSPT					7.89	
						Borehole terminated at 7.89m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
06/11/19		7.89	1.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
7.30	7.50	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 7.00m depth on completion. Response zone 5.00m to 7.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ABennett**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH509**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**07.11.19** End: **07.11.19**	**142.40**	**E:435907.7 N:401248.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	D				MADE GROUND: Soft to firm light brown and greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal. (MADE GROUND)		
0.50	2	B						
0.60	3	D						
0.90	4	B						
1.20	5	D						
1.40-1.85	6	SPT(c)	N=28					
1.40-1.85	7	B				. . . from 1.40m to 2.50m depth firm.		
2.00	8	D					(4.00)	
2.50-2.95	9	SPT(c)	N=11					
2.50-2.95	10	B						
3.00	11	D						
3.50-3.95	12	SPT	N=8					
3.50-3.95	12	DSPT						
3.50-3.95	13	B					4.00	
4.00	14	D				MADE GROUND: Soft dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal. (MADE GROUND)		
4.50-4.95	15	UT	10 blows 100% recovery					
5.00	16	D						
5.50	17	B					(3.00)	
6.00	18	D						
6.00-6.45	19	SPT	N=11					
6.00-6.45	19	DSPT						
6.00-6.45	20	B					7.00	
7.00	21	D				POSSIBLE MADE GROUND: Soft light grey very gravelly CLAY. Gravel is angular fine to coarse of mudstone. (POSSIBLE MADE GROUND)		
7.50-7.85	22	SPT(c)	N=60*				(0.95)	
							7.95	
						Borehole terminated at 7.95m depth on mudstone, suspected bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
07/11/19		7.95	1.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
7.00	7.20	00:30
7.20	7.50	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with bentonite from 7.95m to ground level on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**01.11.19**	**144.18**	**E:435860.6 N:401202.3**	**1** of **1**
	End: **01.11.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of sandstone of mudstone.		
0.50-1.00	2	B					(2.00)	
1.20-1.65	3	SPT	N=19					
1.20-1.65	3	DSPT						
1.20-1.65	4	B					2.00	
2.00-2.45	5	SPT	N=16			MADE GROUND: Stiff dark blackish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal.		
2.00-2.45	5	DSPT						
2.00-2.45	6	B						
3.00-3.45	7	SPT	N=12					
3.00-3.45	7	DSPT				. . . at 3.00m depth gravel of sandstone.		
3.00-3.45	8	B						
4.00-4.45	9	SPT	N=8					
4.00-4.45	10	B						
4.00-4.45	9	DSPT					(5.95)	
5.00-5.45	11	SPT	N=13					
5.00-5.45	11	DSPT				. . . at 5.00m depth gravel of red shale.		
5.00-5.45	12	B						
6.00-6.45	13	U	32 blows 30% recovery					
6.50	14	D						
7.50-7.95	15	SPT	N=44					
7.50-7.95	15	DSPT						
7.50-7.95	16	B					7.95	
						Borehole terminated at 7.95m depth. Suspected Pennine Middle Coal Measures Bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
2.50	2.80	01:00
7.60	7.80	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with bentonite from 7.95m to ground level.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH511**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**28.10.19** End: **28.10.19**	**148.14**	**E:435927.3 N:401193.8**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Soft to firm light grey and light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of siltstone. (MADE GROUND)	(1.20)	
0.50	2	B						
0.60	3	D						
0.90	4	D					1.20	
1.20	5	D				MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone. (MADE GROUND)		
1.40-1.85	6	SPT	N=13					
1.40	6	DSPT						
1.80	7	B						
2.00	8	D				. . . from 1.80m to 4.00m gravel of coal.		
2.50-2.95	9	SPT(c)	N=10				(2.80)	
2.50-2.95	10	B						
3.00	11	D						
3.50-3.95	12	SPT	N=12					
3.50	12	DSPT				. . . from 3.50m to 4.00m gravel of red shale.		
3.50-3.95	13	B					4.00	
4.00	14	D				MADE GROUND: Firm dark blackish grey and brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone, coal and siltstone. (MADE GROUND)		
4.50-4.95	15	UT	20 blows 100% recovery					
5.00	16	D						
5.50	17	B						
6.00	18	D						
6.00-6.45	19	SPT	N=6				(4.50)	
6.00	19	DSPT						
7.00	20	D				. . . from 7.00m to 8.50m cobbles of sandstone.		
7.50	21	B						
7.50-7.95	22	SPT	N=9					
7.50	22	DSPT						
8.00	23	D					8.50	
8.50	24	B				*Description on next sheet*		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
28/10/19	17:00	7.50	1.50	200	Dry
29/10/19	07:30	7.50	1.50	200	Dry
29/10/19	17:00	13.68	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
13.00	13.30	01:00
13.30	13.40	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Monitoring well installed with response zone from 7.40m to 13.40m

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH511**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**28.10.19** End: **28.10.19**	**148.14**	**E:435927.3 N:401193.8**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	25	UT	30 blows 100% recovery			MADE GROUND: Firm to stiff dark mottled greyish orangish brown slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to subangular fine to coarse of mudstone and coal. Cobbles are of mudstone. (MADE GROUND)		
9.50	26	D						
10.00	27	B				*(stratum copied from 8.50m from previous sheet)*	(3.00)	
10.50-10.95	28	SPT	N=14					
10.50	28	DSPT						
11.00	29	D						
							11.50	
11.50	30	B				MADE GROUND: Soft to firm dark grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to subangular fine to coarse of mudstone, coal, siltstone and sandstone. Cobbles are of mudstone and siltstone. (MADE GROUND)		
12.00-12.45	31	UT	33 blows 100% recovery				(1.70)	
12.50	32	D						
13.00	33	B					13.20	
13.30-13.68	34	SPT	N=57*			POSSIBLE MADE GROUND: Soft to firm dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of coal and mudstone. (POSSIBLE MADE GROUND)	13.68	
13.30	34	DSPT				Borehole terminated at 13.68m on suspected mudstone bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19** End: **30.10.19**	**148.76**	**E:435892.5 N:401167.3**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Soft to firm light brown and greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of sandstone and mudstone. (MADE GROUND)	(1.40)	
0.50	2	B						
0.60	3	D						
1.00	4	D						
							1.40	
1.40-1.85	5	SPT	N=41			MADE GROUND: Soft dark greyish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, red shale and coal. (MADE GROUND)	(5.05)	
1.40	5	DSPT						
1.45-1.85	6	B						
2.00	7	D						
2.50-2.95	8	SPT	N=8					
2.50	8	DSPT						
2.50-2.95	9	B						
3.00	10	D						
3.50-3.95	11	SPT	N=10					
3.50	11	DSPT						
3.50-3.95	12	B						
4.00	13	D				. . . from 4.00m to 6.45m firm with some gravel of sandstone.		
4.50-4.95	14	SPT(c)	N=13					
4.50-4.95	15	B						
5.00	16	D						
5.50	17	B						
6.00-6.45	18	UT	25 blows 100% recovery					
							6.45	
6.50	19	D				MADE GROUND: Stiff dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal and siltstone. (MADE GROUND)	(3.55)	
7.00	20	B						
7.50-7.95	21	SPT(c)	N=11					
7.50-7.95	22	B						
8.00	23	D				. . . from 8.00m to 8.50m soft.		
8.50	24	B				. . . from 8.50m to 10.00m firm dark greyish brown and light brown.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
30/10/19	17:00	10.93	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
10.80	11.00	01:30

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Borehole backfilled with bentonite from 11.00m to ground level.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19** End: **30.10.19**	**148.76**	**E:435892.5 N:401167.3**	**2** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	25	UT	15 blows 100% recovery			MADE GROUND: Stiff dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal and siltstone. (MADE GROUND)		
9.50	26	D				*(stratum copied from 6.45m from previous sheet)*	10.00	
10.00	27	B				. . . wood fragment with creosote odour encountered. MADE GROUND: Stiff dark blackish grey slightly sandy gravelly CLAY with a medium cobble content. Gravel is angular fine to coarse of mudstone. Cobble is of mudstone. (MADE GROUND)	(0.93)	
10.50	28	D						
10.50-10.93	29	SPT	N=54*					
10.50	29	DSPT					10.93	
						Cable percussion borehole terminated at 10.93m depth on possible mudstone bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**31.10.19** End: **01.11.19**	**146.36**	**E:435840.7 N:401161.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Grassy topsoil over soft dark greyish brown slightly sandy slightly gravelly slightly organic CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium of mixed lithologies including sandstone. (MADE GROUND)	0.30	
0.50	2	B				MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy gravelly CLAY with infrequent rootlets. Sand is fine to coarse. Gravel is fine to coarse of mixed lithologies including sandstone, coal and mudstone. (MADE GROUND)	(4.20)	
0.50-0.60	101	ES						
0.60	3	D						
0.90	4	B						
1.00	5	D						
1.40-1.85	6	SPT	N=24					
1.40-1.85	6	DSPT						
1.40-1.85	7	B						
2.00	8	D						
2.50-2.93	9	SPT(c)	N=54*					
2.50-2.95	10	B						
3.00	11	D						
3.50-3.84	12	SPT(c)	N=61*					
3.50-3.95	13	B						
4.00	14	D					4.50	
4.50-4.95	15	SPT	N=29			MADE GROUND: Firm dark grey slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone and siltstone. Boulder of mudstone recovered as slightly sandy gravelly clay. (MADE GROUND)	(0.92)	
4.50-4.95	15	DSPT						
5.00	16	D					5.42	
5.00-5.42	17	SPT(c)	N=56*					
						Borehole terminated at 5.42m depth on boulder of mudstone.		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
31/10/19		2.25	1.50		Dry
01/11/19		2.25	1.50		Dry
01/11/19		5.42	4.00		Dry

Chiselling / Slow Progress

From	To	Duration (hh:mm)
2.10	2.20	00:30
2.20	2.30	01:00
4.30	4.50	01:00
4.50	5.00	02:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ABennett**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**07.11.19** End: **08.11.19**	**147.50**	**E:435826.1 N:401128.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	D				MADE GROUND: Grass over firm brown slightly sandy clayey TOPSOIL. Sand is fine to coarse. (MADE GROUND)	0.30	
0.50	2	B						
0.70	3	D				MADE GROUND: Firm oragnish brown to brown and black slightly gravelly sandy CLAY. Gravel is subangular to subrounded of red brick, mudstone, sandstone and some coal. Sand is fine to coarse. (FILL) (MADE GROUND)	(1.40)	
0.90	4	B						
1.20	5	D						
1.40-1.85	6	UT	25 blows 75% recovery				1.70	
1.90	7	D				MADE GROUND: Stiff black, shiny black and grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mudstone, sandstone and coal. (FILL) (MADE GROUND)		
2.00	8	B						
2.50-2.95	9	SPT(c)	N=20					
2.50-2.95	10	B						
3.00	11	D						
3.50-3.95	12	UT	25 blows 100% recovery					
4.00	13	D					(5.40)	
4.50-4.95	14	SPT	N=14					
4.50-4.95	14	DSPT						
4.50-4.95	15	B						
5.00	16	D				. . . at 5.00m depth sandstone cobble 0.15m.		
6.00	17	D						
6.00-6.45	18	UT	21 blows 100% recovery					
6.50	19	D						
7.00	20	B					7.10	
7.50-7.61	21	SPT	N=333*			Extremely weak light grey weathered MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.60)	
7.50-7.65	21	DSPT					7.70	
						Borehole terminated at 7.70m depth following SPT refusal at 7.65m and 1 hour of chisseling to 7.70m.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
08/10/19		7.95	1.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
7.50	7.70	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Hole drilled in 250mm casing.
4. Chisseling from 7.50m to 7.70m depth for 1 hour.
5. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**GGoldthorpe**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**01.11.19** End: **04.11.19**	**144.19**	**E:435773.3 N:401137.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Grass over firm brown slightly sandy CLAY. Sand is fine to coarse. (MADE GROUND)	0.25	
0.50	2	B						
0.70	3	D				MADE GROUND: Firm to stiff light brown and light grey slightly sandy slightly gravelly CLAY. Sand is fine to course, gravel is subangular fine to coarse of mudstone, sandstone and siltstone. (MADE GROUND)	(1.15)	
0.90	4	B						
1.20	5	D					1.40	
1.40-1.74	6	SPT(c)	N=59*			Extremely weak brownish grey weathered SILTSTONE recovered as an angular to subangular gravel. (PENNINE MIDDLE COAL MEASURES FORMATION)		
1.40-1.85	7	B						
2.00	8	D					(2.29)	
2.50-2.89	9	SPT	N=55*					
2.50-2.95	10	B						
3.00	11	D						
3.30-3.69	12	SPT(c)	N=55*				3.69	
						Borehole terminated at 3.69m depth due to the presence of bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
04/11/19	17:00	3.69	1.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
1.50	1.70	00:30
3.00	3.30	01:15

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Borehole backfilled with bentonite from 3.69m to ground level.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ACox**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.11.19** End: **04.11.19**	**140.71**	**E:435775.2 N:401196.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				MADE GROUND: Stiff light greyish brown and light grey slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of mudstone, sandstone and siltstone. (MADE GROUND)	(2.00)	
0.50-1.20	2	B						
1.20-1.65	3	SPT	N=13			. . . from 1.20m to 1.65m dark brown with gravel of red shale.		
1.20-1.65	3	DSPT						
1.20-1.65	4	B					2.00	
2.00-2.44	5	SPT	N=53*			Weak brownish grey weathered SILTSTONE recovered as an angular to subangular gravel. (PENNINE MIDDLE COAL MEASURES FORMATION)	2.45	
2.00-2.44	5	DSPT				Cable percussion borehole terminated at 2.45m depth on bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
04/11/19	17:00	2.50	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
2.00	2.50	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 2.45m depth on completion. Response zone 2.00m to 2.45m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.11.19** End: **06.11.19**	**140.89**	**E:435726.5 N:401154.7**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Firm light brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, siltstone and mudstone. (MADE GROUND)	(1.20)	
0.50	2	B						
0.50	101	ES						
0.70	3	D						
1.00	4	B					1.20	
1.20	5	D				. . . from 1.00m to 1.20m soft.		
1.40-1.83	6	SPT(c)	N=55*			MADE GROUND: Firm to stiff dark brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and siltstone. (MADE GROUND)	(1.75)	
1.40-1.85	7	B						
2.00	8	D						
2.50-2.87	9	SPT	N=64*					
2.50-2.95	9	DSPT						
2.50-2.95	9	B					2.95	
3.00	10	D				MUDSTONE recovered as gravel. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.16)	
3.00	11	B						
3.50-3.87	11	SPT(c)	N=61*					
3.70-4.11	12	SPT(c)	N=55*					
							4.11	
						Cable percussion borehole terminated at 4.11m depth on pennine middle coal measures bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
05/11/19	17:00	3.50	1.50	200	Dry
06/11/19	07:30	3.50	1.50	200	Dry
06/11/19	17:00	3.70	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
3.60	3.70	00:30

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH519**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19** End: **05.11.19**	**143.01**	**E:435720.1 N:401113.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Soft brown and light brown slightly sandy gravelly CLAY. Gravel is fine to coarse of sandstone and mudstone. (MADE GROUND)	(0.50)	
							0.50	
0.50	2	B				MADE GROUND: Soft light brown and dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, mudstone and coal. (MADE GROUND)		
0.70	3	D						
1.20	4	D					(1.50)	
1.40-1.85	5	SPT(c)	N=16					
1.40-1.85	6	B				. . . from 1.90m to 2.00m light greyish brown and blackish grey.		
							2.00	
2.00	7	D				MADE GROUND: Soft brownish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, siltstone, sandstone and coal. (MADE GROUND)		
2.50-2.95	8	UT	10 blows 75% recovery					
3.00	9	D				. . . from 2.00m to 3.00m blackish grey.		
3.50	10	D						
3.50-3.95	11	SPT	N=13					
3.50-3.95	11	DSPT						
3.50-3.95	12	B						
4.00	13	D					(4.40)	
4.50-4.95	14	SPT	N=10					
4.50-4.95	14	DSPT				. . . from 4.50m to 6.40m gravel of coal.		
5.00	15	D						
5.50	16	B						
6.00	17	D						
6.00-6.10	18	UT	100 blows 0% recovery					
							6.40	
6.00-6.10	19	B				Weak brownish grey SILTSTONE recovered as a gravel.		
6.40-6.73	20	SPT	N=62*					
6.40-6.85	20	DSPT					6.85	
						Cable percussion borehole terminated at 6.85m depth on probable pennine middle coal measures bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
04/11/19	17:00	3.00	1.50	200	Dry
05/11/19	07:30	3.00	1.50	200	Dry
05/11/19	17:00	6.85	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
6.20	6.40	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 6.00m depth on completion. Response zone 1.00m to 6.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**18.11.19** End: **19.11.19**	**144.99**	**E:435706.7 N:401064.6**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	D				MADE GROUND: Soft light greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of mudstone and siltstone. (MADE GROUND)		
0.70	2	B				. . . from 0.00m to 0.30m very soft and brown.		
1.00	3	D					(2.50)	
1.40-1.85	4	SPT	N=7			. . . from 1.40m to 2.50m stiff and brown.		
1.40-1.85	4	DSPT						
1.40-1.85	5	B						
2.00	6	D						
							2.50	
2.50-2.95	7	SPT	N=6			MADE GROUND: Soft dark greyish brown and blackish brown slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular fine to coarse of mudstone, siltstone and sandstone. Cobbles are angular of mudstone. (MADE GROUND)		
2.50-2.95	7	DSPT						
2.50-2.95	8	B						
3.00	9	D						
3.50-3.89	10	SPT(c)	N=64*				(2.50)	
3.50-3.95	11	B						
4.00	12	D						
							5.00	
4.50-4.95	13	SPT(c)	N=30			MADE GROUND: Stiff friable grey and light brownish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone and siltstone. (MADE GROUND)		
4.50-4.95	14	B						
5.00	15	D						
6.00-6.45	16	SPT(c)	N=25					
6.00-6.45	17	B						
							(4.00)	
7.00	18	D						
7.50-7.95	19	SPT(c)	N=39					
8.00	20	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
18/11/19		9.41	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
8.60	8.90	01:00
8.90	9.00	00:30

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 8.00m depth on completion. Response zone 3.00m to 8.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**18.11.19** End: **19.11.19**	**144.99**	**E:435706.7 N:401064.6**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00 9.00-9.41	21 22	D SPT(c)	N=59*			MADE GROUND: Weathered mudstone recovered as GRAVEL. Possibly a large boulder of reworked bedrock.	9.00	
						Cable percussion borehole terminated at 9.41m depth on suspected large boulder.	9.41	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH521**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**14.11.19** End: **15.11.19**	**141.77**	**E:435681.8 N:401099.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Grass over very soft light brown slightly sandy slightly gravelly clay. (MADE GROUND)	0.20	
0.50	2	B						
0.70	3	D				MADE GROUND: Firm light brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone and siltstone. (MADE GROUND)	(1.20)	
1.00	4	B						
1.00	101	ES					1.40	
1.20	5	D						
1.40-1.85	6	SPT	N=8			MADE GROUND: Soft blackish grey and dark brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal and red shale. (MADE GROUND)		
1.40-1.85	6	DSPT						
1.40-1.85	7	B						
2.00	8	D					(2.10)	
2.50-2.95	9	SPT	N=10					
2.50-2.95	10	B				. . . from 2.50m to 2.95m light greyish brown.		
2.50-2.95	9	DSPT						
3.00	11	D					3.50	
3.50-3.93	12	SPT(c)	N=55*			MADE GROUND: Soft blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone. (MADE GROUND)		
3.50-3.95	13	B						
4.00	14	D						
4.50-4.95	16	B					(2.50)	
5.00	17	D						
							6.00	
6.00	18	D				POSSIBLE MADE GROUND: Mudstone recovered as grey gravelly CLAY. Possibly a large boulder of reworked bedrock. (MADE GROUND)		
6.00-6.43	19	SPT(c)	N=55*				6.43	
						Cable percussion borehole terminated at 6.43m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
14/11/19	17:00	3.95	1.50	200	Dry
15/11/19	07:30	3.95	1.50	200	Dry
15/11/19	17:00	6.43	-	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
4.20	4.50	01:00
5.30	5.70	01:00
5.70	6.00	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 6.00m depth on completion. Response zone 3.00m to 6.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH522**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.11.19** End: **07.11.19**	**142.53**	**E:435644.6 N:401044.9**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of siltstone, mudstone and sandstone. (MADE GROUND)	(1.20)	
0.50-1.20	2	B					1.20	
1.20-1.65	3	SPT	N=10			MADE GROUND: Firm greyish brown and light brown slightly sandy gravelly CLAY with a low cobble content. Gravel is subangular fine to coarse of sandstone and mudstone. Cobbles are of sandstone. (MADE GROUND)	(1.80)	
1.20-1.85	3	DSPT						
1.20-1.65	4	B						
2.00-2.45	5	SPT	N=25			. . . from 2.00m to 3.00m becoming stiff and dark grey.	3.00	
2.00-2.45	5	DSPT						
2.00-2.45	6	B						
3.00-3.45	7	SPT	N=28			MADE GROUND: Stiff dark grey slightly sandy gravelly CLAY with a high cobble content. Gravel is angular fine to coarse of sandstone, mudstone and coal. Cobbles are of sandstone. (MADE GROUND)	(1.00)	
3.00-3.45	7	DSPT					4.00	
3.00-3.45	8	B						
4.00-4.45	9	SPT	N=29			MADE GROUND: Soft to firm light greyish brown and dark grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular fine to coarse of sandstone, mudstone and coal. Cobbles are of sandstone. (MADE GROUND)	(5.00)	
4.00-4.45	10	B						
4.00-4.45	9	DSPT						
5.00-5.45	11	SPT	N=29					
5.00-5.45	11	DSPT						
5.00-5.45	12	B						
6.00-6.45	13	SPT	N=28					
6.00-6.45	13	DSPT						
6.00-6.45	14	B						
7.50-7.95	15	SPT	N=40				9.00	
7.50-7.95	15	DSPT						
7.50-7.95	16	B						

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
05/11/19	17:00	4.45	1.50		Dry
06/11/19	07:30	4.45	1.50		Dry
06/11/19	17:00	12.62	-		Dry

Chiselling / Slow Progress

From	To	Duration (hh:mm)
6.50	6.90	01:00
9.00	9.30	01:00
12.00	12.50	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 11.00m depth on completion. Response zone 6.00m to 11.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH522**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.11.19** End: **07.11.19**	**142.53**	**E:435644.6 N:401044.9**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	17	SPT	N=37			MADE GROUND: Soft to firm light grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular fine to coarse of mudstone, sandstone and siltstone. Cobbles are of mudstone and siltstone. (MADE GROUND)		
9.00-9.95	17	DSPT						
9.00-9.45	18	B						
10.50-10.95	19	SPT	N=51*					
10.50-10.95	19	DSPT						
10.50-10.95	20	B					(3.92)	
12.00-12.45	21	SPT	N=51*					
12.00-12.45	21	DSPT						
12.00-12.45	22	B						
12.50-12.92	23	SPT	N=53*					
12.50	23	DSPT					12.92	
						Cable percussion borehole terminated at 12.92m depth on mudstone - probably a large boulder.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH523**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.11.19** End: **13.11.19**	**142.08**	**E:435609.9 N:401022.1**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Soft light brown and greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and sandstone. (MADE GROUND)	(1.80)	
0.50	2	B						
0.60	3	D						
0.80	4	B						
1.20	5	D						
1.40-1.85	6	SPT	N=11					
1.40-1.85	6	DSPT						
1.40-1.85	7	B					1.80	
2.00	8	D				MADE GROUND: Firm dark brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal. (MADE GROUND)		
2.50-2.95	9	SPT	N=12					
2.50-2.95	10	B						
2.50-2.95	9	DSPT						
3.00	11	D					(3.20)	
3.50-3.95	12	SPT	N=13					
3.50-3.95	12	DSPT						
3.50-3.95	13	B						
4.00	14	D						
4.50-4.95	15	SPT(c)	N=16					
4.50-4.95	16	B					5.00	
5.00	17	D				MADE GROUND: Firm to stiff dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coare of mudstone, sandsotne, red shale and coal. (MADE GROUND)		
6.00-6.45	18	UT	20 blows 100% recovery					
6.50	19	D						
6.50-6.95	20	SPT	N=20					
6.50-6.95	20	DSPT						
6.50-6.95	21	B						
7.00	22	D					(6.00)	
8.00	23	D						
8.00-8.45	24	SPT	N=10					
8.00-8.45	24	DSPT						
8.00-8.45	25	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
12/11/19	17:00	11.60	1.50	200	Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
11.30	11.40	00:45

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 11.50m depth on completion. Response zone 3.00m to 11.50m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH523**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.11.19** End: **13.11.19**	**142.08**	**E:435609.9 N:401022.1**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	26	D				MADE GROUND: Firm to stiff dark blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coare of mudstone, sandsotne, red shale and coal. (MADE GROUND)		
9.50-9.88	27	SPT(c)	N=34					
9.50-9.95	28	B				*(stratum copied from 5.00m from previous sheet)*		
10.50	29	D					11.00	
11.00-11.39	30	SPT(c)	N=62*			MADE GROUND: Soft light grey gravelly CLAY. Gravel is angular of mudstone. (MADE GROUND)	11.30	
11.00-11.45	31	B					(0.60)	
11.50-11.90	32	SPT(c)	N=55*			MADE GROUND: Mudstone BOULDER. (MADE GROUND)	11.90	
11.50	32	D				Borehole terminated at 11.90m depth due to refusal on boulder.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH524**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**13.11.19** End: **15.11.19**	**142.17**	**E:435516.2 N:400951.0**	**1** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone. (MADE GROUND)	(0.70)	
0.50	2	B					0.70	
0.70	3	D				MADE GROUND: Firm dark grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of siltstone. (MADE GROUND)	1.00	
1.00	4	B					1.20	
1.20	5	D					1.40	
1.40-1.85	6	SPT	N=5			MADE GROUND: Stiff dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, siltstone and coal. (MADE GROUND)	(0.60)	
1.40-1.85	6	DSPT					2.00	
1.40-1.85	7	B						
2.00	8	D				MADE GROUND: Firm grey and light brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium of mudstone and siltstone. (MADE GROUND)	(1.00)	
2.50-2.95	9	SPT	N=9				3.00	
2.50-2.95	10	B						
2.50-2.95	9	DSPT						
3.00	11	D				MADE GROUND: Soft dark brown and light brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal and red shale. (MADE GROUND)	(1.50)	
3.50-3.95	12	SPT	N=7					
3.50-3.95	12	DSPT						
3.50-3.95	13	B				MADE GROUND: Firm dark blackish grey slightly sandy gravelly CLAY. Gravel is of mudstone and coal. (MADE GROUND)		
4.00	14	D					4.50	
4.50-4.95	15	SPT	N=11			MADE GROUND: Stiff brownish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of red shale, mudstone and siltstone. (MADE GROUND)	(0.50)	
4.50-4.95	15	DSPT					5.00	
4.50-4.95	16	B						
5.00	17	D				MADE GROUND: Stiff dark greyish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, siltstone, coal and red shale. (MADE GROUND)	(0.50)	
5.50	18	B					5.50	
							(0.50)	
							6.00	
6.00-	19	SPT				MADE GROUND: Soft blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to medium of mudstone. (MADE GROUND)		
6.00-6.45	19	DSPT						
						MADE GROUND: Very weak dark grey slightly sandy gravelly CLAY. Gravel is fine to coarse of mudstone. (MADE GROUND)		
7.00	20	D						
7.50-7.95	21	SPT(c)	N=26			MADE GROUND: Mudstone COBBLES AND BOULDERS recovered as a coarse gravel. (MADE GROUND)		
7.50-7.95	22	B						
8.00	23	D					(4.50)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
13/11/19	17:00	10.10	1.50		Dry
14/11/19	07:30	10.10	1.50		Dry
14/11/19	17:00	19.96	-		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
10.00	10.10	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 20.00m depth on completion. Response zone 14.00m to 20.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH524**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**13.11.19** End: **15.11.19**	**142.17**	**E:435516.2 N:400951.0**	**2** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	24	D				MADE GROUND: Mudstone COBBLES AND BOULDERS recovered as a coarse gravel. (MADE GROUND)		
9.00-	25	SPT						
9.00-9.45	25	DSPT						
9.00-9.45	26	B						
						(stratum copied from 6.00m from previous sheet)		
10.10	27	D					10.50	
10.50-10.95	28	SPT(c)	N=16			MADE GROUND: Stiff grey and brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular of sandstone, mudstone and coal fragments. (MADE GROUND)		
10.50-10.95	29	B						
11.00	30	D						
12.00	31	D						
12.00-12.45	32	SPT	N=15					
12.00-12.45	32	DSPT						
12.00-12.45	33	B					(4.00)	
13.00	34	D						
						. . . from 13.00m moderate cobble content.		
13.50-13.95	35	SPT	N=18					
13.50-13.95	35	DSPT						
13.50-13.95	36	B						
14.00	37	D					14.50	
15.00	38	D				MADE GROUND: Soft grey sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and coal fragments. (MADE GROUND)		
15.00-15.45	39	SPT	N=29					
15.00-15.45	39	DSPT						
15.00-15.45	40	B						
16.00	41	D						
16.50-16.95	42	SPT	N=40					
16.50-16.95	42	DSPT						
16.50-16.95	43	B						
17.00	44	D					(5.46)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH524**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**13.11.19** End: **15.11.19**	**142.17**	**E:435516.2 N:400951.0**	**3** of **3**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
18.00	45	D				MADE GROUND: Soft grey sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and coal fragments. (MADE GROUND)		
18.00-18.45	46	SPT	N=45					
18.00-18.45	46	DSPT						
18.00-18.45	47	B						
						(stratum copied from 14.50m from previous sheet)		
19.00	48	D						
19.55-19.96	49	SPT	N=58*					
19.55-19.96	49	DSPT					19.96	
						Cable percussion borehole terminated at 19.96m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**WHopkins**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH525

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	18.11.19 End: 19.11.19	145.88	E:435605.2 N:400948.3	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone (TOPSOIL). (MADE GROUND)	0.40	
0.50	1	B					(1.30)	
						MADE GROUND: Soft to firm dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)	1.70	
1.50-1.95	2	SPT	N=13					
1.70	2	B						
						MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(1.30)	
2.50-2.95	4	SPT(c)	N=18				3.00	
3.00	3	B				MADE GROUND: Very soft to soft light brown sandy gravelly CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly sandstone with mudstone. (MADE GROUND)	(1.00)	
3.50-3.65	6	SPT(c)	N=150*				4.00	
4.00	4	B				MADE GROUND: Very soft to soft dark greyish brown slightly sandy gravelly CLAY with a medium cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
4.00-4.45	8	SPT	N=27					
5.50-5.95	9	SPT(c)	N=38				(3.50)	
6.50-6.95	10	SPT(c)	N=43				7.50	
						Borehole terminated at 7.50m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2500	PB Drilling	ACox	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH526**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**144.08**	**E:435492.3 N:400879.2**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone (TOPSOIL). (MADE GROUND)	0.40	
1.20-1.65	1	SPT	N=8			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(2.16)	
2.00-2.45	2	SPT	N=10				2.56	
3.00-3.45	3	SPT	N=15			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and siltstone. (MADE GROUND)	(2.44)	
4.00-4.45	4	SPT	N=13				5.00	
5.00-5.45	5	SPT	N=15			MADE GROUND: Firm light mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of mixed lithologies including sandstone and mudstone. (MADE GROUND)	(5.00)	
6.00-6.45	6	SPT	N=11					
7.00-7.45	7	SPT	N=10					
8.00-8.45	8	SPT	N=13					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
06/02/20		0.00	-		-
06/02/20		16.00	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH526**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**144.08**	**E:435492.3 N:400879.2**	**2** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	9	SPT	N=15			MADE GROUND: Firm light mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of mixed lithologies including sandstone and mudstone. (MADE GROUND)	10.00	
10.00-10.45	10	SPT	N=13			*(stratum copied from 5.00m from previous sheet)*		
10.00-11.00	11	B				MADE GROUND: Firm to stiff light grey slightly sandy gravelly CLAY with a medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone. (MADE GROUND)	(1.50)	
11.00-11.45	12	SPT	N=21				11.50	
12.00-12.45	13	SPT	N=19			MADE GROUND: Firm to stiff light grey slightly sandy gravelly CLAY with a low to medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(4.60)	
13.00-13.45	14	SPT	N=17					
14.00-14.45	15	SPT	N=16					
15.00-15.45	16	SPT	N=25					
16.00-16.10	17	SPT	NP				16.10	
						SPT refusal at 16.10m bgl. Possible mudstone boulder. Borehole terminated at 16.10m bgl due to buried obstructions.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH527**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**06.02.20** End: **07.02.20**	**148.68**	**E:435590.1 N:400840.8**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone (TOPSOIL). (MADE GROUND)	(0.50) 0.50	
1.00-2.00	1	B				MADE GROUND: Firm to stiff light mottled greyish brown slightly gravelly sandy CLAY with a low cobble content of sandstone. Sand is fine to medium. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND)	(1.50)	
1.50-1.95	2	SPT	N=8				2.00	
2.00-3.00	3	B				MADE GROUND: Firm dark mottled brownish grey slightly sandy gravelly CLAY with a low to medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including predominantly mudstone with sandstone and coal. (MADE GROUND)		
2.50-2.95	4	SPT	N=7				(2.00)	
3.50-3.95	5	SPT	N=13				4.00	
4.50-4.95	6	SPT	N=15			MADE GROUND: Firm to stiff light mottled greyish brown slightly sandy gravelly CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including predominantly sandstone with mudstone. (MADE GROUND)	(1.80)	
5.50-5.95	7	SPT	N=8				5.80	
6.50-6.95	8	SPT	N=11			MADE GROUND: Firm to stiff light grey slightly sandy gravelly CLAY with a low to medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mudstone. (MADE GROUND)		
7.50-7.95	9	SPT	N=15				(3.70)	
8.50-8.95	10	SPT	N=25					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
06/02/20		0.00	-		-
06/02/20		20.00	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH527

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	06.02.20 End: 07.02.20	148.68	E:435590.1 N:400840.8	2 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
							9.50	
9.50-9.95 9.50-10.50	11 12	SPT B	N=12			MADE GROUND: Stiff light grey slightly sandy gravelly CLAY with a medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone. (MADE GROUND)		
10.50-10.95	13	SPT	N=14					
11.50-11.95	14	SPT	N=25			. . . moderate cobble content noted from 11.50m to 13.50m depth.		
12.50-12.95	15	SPT	N=15					
13.50-13.95	16	SPT	N=20					
14.50-14.95	17	SPT	N=9				(10.50)	
15.50-15.95	18	SPT	N=11					
16.50-16.95	19	SPT	N=14					
17.50-17.95	20	SPT	N=17					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2000	PB Drilling	ABennett	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH527**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**06.02.20** End: **07.02.20**	**148.68**	**E:435590.1 N:400840.8**	**3** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.50-18.95	21	SPT	N=17			MADE GROUND: Stiff light grey slightly sandy gravelly CLAY with a medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone. (MADE GROUND)		
19.50-19.95	22	SPT	N=15			*(stratum copied from 9.50m from previous sheet)*	20.00	
						Borehole terminated at 20.00m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 12:13 | EOR1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH528**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20** End: **04.02.20**	**149.00**	**E:435683.9 N:400773.1**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone. (MADE GROUND)	0.45	
0.50-1.50	1	B				MADE GROUND: Firm light mottled greyish brown slightly sandy slightly gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)	(3.55)	
1.50-1.95	2	SPT	N=10					
2.50-2.95	3	SPT	N=9					
3.50-3.95	4	SPT	N=12				4.00	
4.50-4.95	5	SPT	N=7			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND)	(2.00)	
5.50-5.95	6	SPT	N=6				6.00	
6.50-6.95	7	SPT	N=10			MADE GROUND: Stiff light mottled orangish greyish brown slightly gravelly sandy CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone and coal. (MADE GROUND)	(2.00)	
7.50-7.95	8	SPT	N=12				8.00	
						Description on next sheet		
8.50-8.95	9	SPT	N=13					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
04/02/20		0.00	-		-
04/02/20		10.50	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
10.50	10.50	00:30

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH528**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20**	**149.00**	**E:435683.9 N:400773.1**	**2** of **2**
	End: **04.02.20**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.50-9.95 9.50-10.50	10 11	SPT B	N=15			MADE GROUND: Firm to stiff light mottled orangish greyish brown slightly gravelly sandy CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND) *(stratum copied from 8.00m from previous sheet)*	(2.59)	
10.50-10.55 10.55-10.59	12 13	SPT SPT	N=300* N=375*			. . . SPT refusal at approximately 10.5m bgl. Possible sandstone boulder. Borehole terminated at 10.59m depth due to buried obstructions.	10.59	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH529**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **11.02.20**	**150.60**	**E:435686.8 N:400909.3**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone (TOPSOIL). (MADE GROUND)	0.40 (0.80) 1.20	
0.50-1.20	1	B						
1.20-1.65	2	SPT	N=9			MADE GROUND: Soft to firm dark mottled light and dark brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone and mudstone. (MADE GROUND)	1.65 (1.35) 3.00	
1.20-1.65	3	B						
2.00-2.45	4	SPT	N=22					
3.00-3.45	5	SPT	N=19			MADE GROUND: Very soft to soft dark grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(5.00) 8.00	
4.00-4.45	6	SPT	N=18			MADE GROUND: Soft to firm dark grey slightly sandy gravelly CLAY with a low to medium cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone with sandstone. (MADE GROUND) . . . Becoming soft to firm at approximately 3.0m bgl with predominantly mudstone and coal noted.		
5.00-5.45	7	SPT	N=14					
6.00-6.45	8	SPT	N=15					
7.00-7.45	9	SPT	N=21					
8.00-8.45	10	SPT	N=43			MADE GROUND: Soft to firm dark grey slightly sandy gravelly CLAY with a medium to high cobble and boulder content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse. (MADE GROUND) *Description on next sheet*	(1.00) 9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH529

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	10.02.20 End: 11.02.20	150.60	E:435686.8 N:400909.3	2 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	11	SPT	N=19			. . . Boulder obstruction noted at approximately 8.50m bgl.		
10.00-10.45	12	SPT	N=15			MADE GROUND: Soft to firm dark grey slightly sandy gravelly CLAY with a low to medium cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
11.00-11.45	13	SPT	N=13					
12.00-12.45	14	SPT	N=28				(6.00)	
13.00-13.45	15	SPT	N=32			. . . Increasingly frequent sandstone cobbles noted from approximately 12.0m bgl.		
14.00-14.45	16	SPT	N=35					
15.00-15.45	17	SPT	N=34				15.00	
16.00-16.45	18	SPT	N=36			MADE GROUND: Soft to stiff dark grey slightly sandy gravelly CLAY with a medium cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
17.00-17.45	19	SPT	N=36			. . . Clay becoming stiffer from approximately 15.0m bgl.	(4.50)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2000	PB Drilling	ABennett	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH529**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **11.02.20**	**150.60**	**E:435686.8 N:400909.3**	**3** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.45	20	SPT	N=39			MADE GROUND: Soft to stiff dark grey slightly sandy gravelly CLAY with a medium cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
19.00-19.45	21	SPT	N=40			. . . Clay becoming stiffer from approximately 15.0m bgl.*(stratum* copied from 15.00m from previous sheet)	19.50	
20.00-20.45	22	SPT	N=48			MADE GROUND: Stiff dark grey slightly sandy gravelly CLAY with a medium to high cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone. (MADE GROUND)	(0.95)	
						Borehole terminated at 20.45m depth.	20.45	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH531

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	29.01.20 End: 31.01.20	149.91	E:435714.1 N:400975.2	1 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.40	
						MADE GROUND: Soft to firm dark mottled light and dark brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies. (MADE GROUND)	(1.00) 1.40	
1.40	1	B						
1.50-1.95	2	SPT(c)	N=24					
						MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)	(2.10) 3.50	
2.50-2.95	3	SPT(c)	N=11					
3.50-3.95	4	SPT(c)	N=10			MADE GROUND: Firm to stiff dark mottled brownish grey slightly sandy gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)		
3.50	5	B						
4.50-4.95	6	SPT(c)	N=15				(3.50)	
5.50-5.95	7	SPT(c)	N=31					
6.50-6.89	8	SPT(c)	N=64*				7.00	
7.00	9	B				MADE GROUND: Firm to stiff dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including predominantly mudstone with coal. (MADE GROUND)		
7.50-7.95	10	SPT(c)	N=31					
8.50-8.95	11	SPT(c)	N=34					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2500	PB Drilling	ABennett	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH531**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **31.01.20**	**149.91**	**E:435714.1 N:400975.2**	**2** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.50-9.95	12	SPT(c)	N=31			MADE GROUND: Firm to stiff dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including predominantly mudstone with coal. (MADE GROUND) *(stratum copied from 7.00m from previous sheet)*	(7.00)	
10.50-10.95	13	SPT(c)	N=25					
11.50-11.95	14	SPT(c)	N=26					
12.50-12.95	15	SPT(c)	N=24					
13.50-13.95	16	SPT(c)	N=24				14.00	
14.00	17	B				MADE GROUND: Firm to stiff dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND) . . . SPT refusal at approximately 14.5m bgl. Possible cobble or boulder obstruction.	(5.00)	
14.50-14.82	18	SPT(c)	N=88*					
15.50-15.95	19	SPT(c)	N=31					
16.50-16.95	20	SPT(c)	N=27					
17.50-17.95	21	SPT(c)	N=26					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2500**	**PB Drilling**	**ABennett**	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH531

Contract Ref:	Start: 29.01.20 End: 31.01.20	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		149.91	E:435714.1 N:400975.2	3 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.50-18.95	23	SPT(c)	N=27			MADE GROUND: Firm to stiff dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)		
19.00	22	B					19.00	
						(stratum copied from 14.00m from previous sheet)		
19.50-19.95	24	SPT(c)	N=39			MADE GROUND: Stiff dark mottled brownish grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(1.45)	
							20.45	
						Borehole terminated at 20.45m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2500	PB Drilling	ABennett	A.C

AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH532**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **28.01.20**	**154.44**	**E:435789.0 N:400921.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10-0.30	1	B				MADE GROUND: Very soft to soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.35	
0.40-1.10	2	B				MADE GROUND: Soft to firm dark mottled brown and light brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(1.65)	
1.20-1.65	3	SPT	N=8				2.00	
2.00-2.45	4	SPT	N=9			MADE GROUND: Light brown slightly clayey gravelly fine to coarse SAND with pockets of soft clay and low cobble content of sandstone. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, coal and sandstone. (MADE GROUND)		
3.00-3.45	5	SPT	N=6			. . . Becoming increasingly sandy from approximately 2.0m bgl.	(3.00)	
4.00-4.41	6	SPT	N=28			. . . Predominantly sandstone arisings noted from approximately 4.0m to 5.0m Possible boulder.	5.00	
5.00-5.45	7	SPT	N=6			MADE GROUND: Soft to firm light mottled greyish brown and dark brown slightly sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)	(0.90)	
5.00-5.90	8	B					5.90	
6.00-6.45	9	SPT	N=13			MADE GROUND: Firm to stiff dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(1.10)	
6.00-7.00	11	B					7.00	
7.00-7.45	10	SPT	N=14			MADE GROUND: Soft to stiff dark brownish grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)	(1.50)	
7.00-8.00	12	B					8.50	
8.00-8.45	13	SPT	N=10			*Description on next sheet*		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
27/01/20		0.00	-		-
27/01/20		10.45	-		-
28/01/20		10.45	-		-
28/01/20		20.45	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation
2. On Completion, borehole backfilled with arisings

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2500**	**PB Drilling**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH532**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **28.01.20**	**154.44**	**E:435789.0 N:400921.1**	**2** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	14	SPT	N=32			MADE GROUND: Stiff dark mottled greyish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(1.70)	
10.00-10.45	15	SPT	N=8			*(stratum copied from 8.50m from previous sheet)*	10.20	
11.00-11.45	16	SPT	N=13			MADE GROUND: Soft dark mottled greyish brown slightly sandy slightly gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(2.80)	
12.00-12.45	17	SPT	N=9				13.00	
13.00-13.45	18	SPT	N=12			MADE GROUND: Soft to stiff light brownish grey slightly gravelly sandy CLAY with a low cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including coal, mudstone and sandstone. (MADE GROUND)	(7.45)	
14.00-14.45	19	SPT	N=7					
15.00-15.45	20	SPT	N=28					
16.00-16.45	21	SPT	N=26					
17.00-17.45	22	SPT	N=36					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2500**	**PB Drilling**	**ABennett**	A.C

AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH532

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	27.01.20	154.44	E:435789.0 N:400921.1	3 of 3
	End: 28.01.20			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.45	23	SPT	N=35			MADE GROUND: Soft to stiff light brownish grey slightly gravelly sandy CLAY with a low cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including coal, mudstone and sandstone. (MADE GROUND)		
19.00-19.45	24	SPT	N=16			*(stratum copied from 13.00m from previous sheet)*		
20.00-20.45	25	SPT	N=17				20.45	
						Borehole terminated at 20.45m.		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2500	PB Drilling	ABennett	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH533

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	27.01.20 End: 28.01.20	155.32	E:435824.1 N:400826.1	1 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10-1.20	1	B				MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.30	
1.20-1.65	2	SPT	N=12			MADE GROUND: Soft to firm dark mottled greyish brown and light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(1.70)	
2.00-2.45	2	B				MADE GROUND: Very soft to soft light greyish brown slightly gravelly sandy CLAY with a low cobble and boulder content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	2.00	
2.00-2.45	3A	B						
2.00-2.13	3	SPT	N= > 50					
3.00-3.15	4	SPT	N= > 50			. . . Clay becoming increasingly sandy from approximately 2.0m bgl.		
4.00-4.15	5	SPT	N= > 50			. . . Predominantly sandstone arisings noted from approximately 4.0m to 6.0m bgl, then frequently interspersed in clay hereafter. Possible boulders.	(4.50)	
4.60	6A	D						
5.00-5.14	6	SPT	N= > 50					
6.00-6.16	7	SPT	N= > 50				6.50	
6.50-7.00	7A	B				MADE GROUND: Light greyish brown slightly sandy clayey angular to sub angular fine to coarse GRAVEL with a low cobble content of sandstone. Sand is fine to coarse. Gravel is of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
7.00-7.23	8	SPT	N= > 50					
7.50-8.00	8A	B					(2.50)	
8.00-8.11	9	SPT	N= > 50				9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
27/01/20		0.00	-		-
27/01/20		9.45	-		-
28/01/20		9.45	-		-
28/01/20		20.45	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation
2. On Completion, borehole backfilled with arisings

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2000	David Seddon	ABennett	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH533

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	27.01.20 End: 28.01.20	155.32	E:435824.1 N:400826.1	2 of 3

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	10	SPT	N=15			MADE GROUND: Stiff light mottled greyish brown slightly gravelly sandy CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND)		
10.00-10.45	11	SPT	N=43				(2.50)	
11.00-11.45	12	SPT	N=17				11.50	
11.50-12.00	13A	B				MADE GROUND: Stiff to very stiff dark brownish grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)		
12.00-12.45	13	SPT	N=19				(2.50)	
13.00-13.45	14	SPT	N=20				14.00	
14.00-14.45	15	SPT	N=26			MADE GROUND: Soft to stiff dark brown slightly sandy slightly gravelly CLAY with medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
15.00-15.45	16	SPT	N=20					
16.00-16.45	17	SPT	N=45				(5.50)	
17.00-17.45	18	SPT	N=48					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	Dando 2000	David Seddon	ABennett	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH533**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **28.01.20**	**155.32**	**E:435824.1 N:400826.1**	**3** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.45	19	SPT	N=35			MADE GROUND: Soft to stiff dark brown slightly sandy slightly gravelly CLAY with medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)		
19.00-	20	SPT				*(stratum copied from 14.00m from previous sheet)* . . . Predominantly sandstone arisings noted from approximately 19.0m to 19.5m. Possible boulder.	19.50	
20.00-20.45	21	SPT	N=27			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with a low cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(0.95) 20.45	
						Borehole terminated following final SPT test to 20.45m.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**David Seddon**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH534**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **29.01.20**	**153.21**	**E:435795.0 N:400997.7**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30-1.20	1	B				MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.30	
1.20-1.65	3	SPT	N=10			MADE GROUND: Soft to firm dark mottled dark brown and light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone. (MADE GROUND)	(2.20)	
2.00-2.45	2	B						
2.00-2.45	4	SPT	N=11				2.50	
3.00-3.45	5	SPT	N=19			MADE GROUND: Soft to firm dark brownish grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)	(1.00)	
4.00-4.45	6	SPT	N=11			MADE GROUND: Soft dark grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and coal. (MADE GROUND)	3.50	
5.00-5.45	7	SPT	N=12				(4.50)	
6.00-6.45	8	SPT	N=8					
7.00-7.45	9	SPT	N=12					
8.00-8.04	10	SPT	NP	≈			8.00	
						Very weak to weak light grey weathered MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	8.04	
						Borehole terminated at 8.04m bgl due to SPT refusal on mudstone bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
28/01/20		0.00	-		-
28/01/20		3.45	-		-
29/01/20		3.45	-		-
29/01/20		8.04	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position ccanned with a CAT and Genny prior to excavation
2. Water Seepage at 8.0m depth
3. Quick drilling through soft clay from 3.5m to 8.0m bgl.
4. On completion, borehole backfilled with arisings

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**David Seddon**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH535**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **29.01.20**	**156.69**	**E:435902.1 N:401050.2**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.30	
1.20-1.65	1	SPT	N=8			MADE GROUND: Soft dark mottled brown and light brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)	(1.70)	
2.00-2.45	2	SPT	N=15				2.00	
2.50-3.00	2A	B				MADE GROUND: Soft to firm dark brown slightly sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)		
3.00-3.45	3	SPT	N=17			. . . Slow drilling at 2.5m bgl, predominantly mudstone and siltstone arisings. Possible boulders.		
4.00-4.45	4	SPT	N=21				(4.50)	
4.60	6A	D						
5.00-5.45	5	SPT	N=21					
6.00-6.45	6	SPT	N=20					
6.50	7A	B					6.50	
6.50	2	B				MADE GROUND: Stiff dark mottled brownish grey slightly sandy slightly gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and siltstone. (MADE GROUND)		
7.00-7.07	7	SPT	N=125					
7.50	8A	B				. . . Suspected sandstone boulder at approximately 7.00m bgl.		
							(5.00)	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
29/01/20		0.00	-		-
29/01/20		7.00	7.00		

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation
2. On completion, borehole backfilled with arisings

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**David Seddon**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH535**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20**	**156.69**	**E:435902.1 N:401050.2**	**2** of **2**
	End: **29.01.20**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Stiff dark mottled brownish grey slightly sandy slightly gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and siltstone. (MADE GROUND) *(stratum copied from 6.50m from previous sheet)*	11.50	
11.50	13A	B				Borehole terminated at 11.50m due to buried obstructions. Borehole moved to BH535A.		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**David Seddon**	**ABennett**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH535A**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **04.02.20**	**156.00**	**E:435902.0 N:401050.0**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.25	
1.20-1.65	1	SPT	N=8			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. (MADE GROUND)	(1.55)	
							1.80	
2.00-2.45	1	B				MADE GROUND: Firm to stiff dark mottled brownish grey slightly sandy slightly gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, sandstone, coal and red shale. (MADE GROUND)		
2.00-2.45	2	SPT	N=10					
2.50-3.00	2A	B					(2.20)	
3.00-3.45	4	SPT	N=13					
							4.00	
4.00-4.45	2	B				MADE GROUND: Stiff dark mottled reddish brown slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, sandstone, red shale and coal. (MADE GROUND)		
4.00-4.45	5	SPT	N=24					
5.00-5.45	7	SPT	N=21			. . . larger proportion of red shale fragments noted in borehole from approximately 4.00m to 6.00m bgl.	(1.90)	
							5.90	
6.00-6.18	8	SPT	N=500*			MADE GROUND: Firm to stiff light mottled orangish greyish brown slightly sandy gravelly CLAY with a medium cobble content of sandstone and mudstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)		
7.00-7.45	9	SPT	N=23			. . . slow drilling from approximately 6.00m bgl. Possible sandstone cobbles and boulders.	(4.10)	
8.00-8.45	10	SPT	N=19					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
03/02/20		14.50	-		-
03/02/20		14.70	-		-
04/02/20		14.70	-		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 14.70m depth on completion. Response zone 4.70m to 14.70m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH535A**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **04.02.20**	**156.00**	**E:435902.0 N:401050.0**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	11	SPT	N=17					
10.00-10.45	12	SPT	N=20			MADE GROUND: Stiff light mottled orangish greyish brown slightly sandy slightly gravelly CLAY with a low to medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including primarily sandstone with infrequent mudstone and coal fragments. (MADE GROUND)	10.00	
11.00-11.45	13	SPT	N=27					
12.00-12.45	14	SPT	N=20				(5.00)	
13.00-13.45	15	SPT	N=27			. . . becoming stiff to very stiff from approximately 13.00m bgl with large sandstone cobbles noted in arisings.		
14.00-14.45	16	SPT	N=31					
							15.00	
						. . . refusal at approximately 15.00m depth. Borehole terminated at 15.00m depth, possible pennine middle coal measures bedrock.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ABennett**	A.C

AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH536**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **29.01.20**	**161.00**	**E:436039.0 N:401116.0**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20-1.10	1	B				MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse. (MADE GROUND)	0.20 (1.30)	
1.20-1.65	2	SPT	N=8			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy gravelly CLAY with occassional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	1.50	
2.00-2.45	3	SPT	N=4			MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy slightly gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)	(3.00)	
3.00-3.45	4	SPT	N=14					
4.00-4.45	5	SPT	N=24				4.50	
5.00-5.45	6	SPT	N=30			MADE GROUND: Soft to firm dark grey slightly sandy gravelly CLAY with a low cobble content of sandstone and brick. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone, coal and red shale. (MADE GROUND)	(1.50)	
5.00-6.00	7	B					6.00	
6.00-6.41	8	SPT	N=27			MADE GROUND: Soft to firm slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including primarily mudstone with infrequent red shale fragments (MADE GROUND)	(1.00)	
6.00-7.00	9	B					7.00	
7.00-7.45	10	SPT	N=29			MADE GROUND: Very soft to soft dark mottled brownish, reddish grey slightly sandy gravelly CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone, coal and red shale. (MADE GROUND)	(2.00)	
7.50-8.30	11	B						
8.00-8.45	12	SPT	N=14			. . . Predominantly sandstone arisings noted in borehole from approximately 7.5m bgl.	9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
29/01/20		0.00	-		-
29/01/20		4.45	4.20		-

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation
2. Water seepage at 3.0m depth
3. On completion, borehole backfilled with bentonite pellets

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2500**	**PB Drilling**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH536**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **29.01.20**	**161.00**	**E:436039.0 N:401116.0**	**2** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.45	13	SPT	N=13			MADE GROUND: Light brown slightly clayey sandy angular to sub angular fine to coarse GRAVEL with a medium to high cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including primarily sandstone. (MADE GROUND)	(6.45)	
10.00-10.45	14	SPT	N=15					
11.00-11.45	15	SPT	N=26					
12.00-12.45	16	SPT	N=51*					
13.00-13.45	17	SPT	N=30					
14.00-14.45	18	SPT	N=22					
15.00-15.45	19	SPT	N=28				15.45	
						Borehole terminated at 15.45m following final SPT test.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2500**	**PB Drilling**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH537**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20**	**---**	**---**	**1** of **2**
	End: **10.02.20**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.40	
0.50	1	B				MADE GROUND: Firm to stiff dark brownish grey slightly sandy gravelly CLAY with a low cobble content of siltstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, siltstone and coal. (MADE GROUND)	(1.60)	
							2.00	
2.00	2	B				MADE GROUND: Firm dark mottled orangeish greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(2.00)	
							4.00	
4.00	3	B				MADE GROUND: Firm dark mottled orangeish greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, red shale and coal. (MADE GROUND)	(1.00)	
							5.00	
5.00	4	B				MADE GROUND: Soft to firm dark greyish brown slightly sandy gravelly CLAY with a medium to high cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone with siltstone. (MADE GROUND)	(3.00)	
							8.00	
8.00	5	B				*Description on next sheet*		
8.50-8.95	12	SPT(c)	N=33					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH537**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20**	**---**	**---**	**2** of **2**
	End: **10.02.20**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.50-9.95	13	SPT(c)	N=20			MADE GROUND: Stiff dark mottled brownish grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and siltstone. (MADE GROUND) *(stratum copied from 8.00m from previous sheet)* . . . Stiffening slightly from approximately 9.0m bgl.	(3.00)	
10.50-10.69	14	SPT(c)	N= >50				11.00	
11.00	6	B				MADE GROUND: Firm to stiff light mottled orangeish greyish brown sandy gravelly CLAY with a medium to high cobble and boulder content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(0.60)	
11.00	15	B					11.60	
11.50-11.60	16	SPT(c)	N= >50			Borehole terminated at 11.5m bgl due to SPT refusal on suspected sandstone boulder.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ABennett**	A.C

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH530**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**29.01.20** End: **31.01.20**	**156.00**	**E:435822.0 N:400920.0**	**1** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
0.10-0.30	1	B									MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.35	
0.40-1.10	2	B											
1.20-1.65	3	SPT	N=11								MADE GROUND: Soft to firm dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	(2.65)	
2.00-2.06	4	SPT	N=55									3.00	
3.00-3.45	5	SPT	N=21								MADE GROUND: Very soft to soft light mottled greyish brown slightly sandy gravelly CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND)	(2.00)	
3.70-4.45	6	B											
4.00-4.45	7	SPT	N=14									5.00	
5.00-5.45	8	SPT	N=15								MADE GROUND: Firm to stiff dark mottled brownish grey slightly sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone, mudstone and coal. (MADE GROUND)	(1.00)	
5.00-6.00	9	B										6.00	
6.00-6.45	10	SPT	N=6								MADE GROUND: Very soft to soft dark mottled greyish brown slightly sandy gravelly CLAY with a medium cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including sandstone and coal. (MADE GROUND)	(1.00)	
6.00-7.00	12	B										7.00	
7.00-7.45	11	SPT	N=10										
7.00-8.00	14	B											
8.00-8.45	13	SPT	N=23								*Description on next sheet*	(3.00)	

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
28/01/20		0.00	None	N/R	-
28/01/20		6.00	6.00	N/R	-
29/01/20		6.00	6.00	N/R	-
29/01/20		11.00	11.00	N/R	-
29/01/20	08:00	11.00	11.00	N/R	-
29/01/20	17:00	12.50	11.00	N/R	-
31/01/20	08:00	12.50	11.00	N/R	-
31/01/20	17:00	14.00	11.00	N/R	-

Chiselling / Slow Progress

From	To	Duration (hh:mm)

General Remarks

1. Position scanned with a CAT and Jenny prior to excavation
2. Slow drilling from 10.0m, penetrated to 11.0m bgl. Switched to rotary coring after completion of SPT test from 11.0-11.13m.
3. On completion, borehole backfilled with bentonite pellets

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-5**	**PB Drilling + Central Alliance**	**ABennett + SHunt**	AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	Harworth Estates	BH530

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	29.01.20 End: 31.01.20	156.00	E:435822.0 N:400920.0	2 of 2

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00-9.45	15	SPT	N=22								MADE GROUND: Soft to firm dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of sandstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and sandstone. (MADE GROUND)	10.00	
10.00-10.45 10.00-11.00	16 18	SPT B	N=42								*(stratum copied from 7.00m from* previous sheet)	(1.00) 11.00	
11.00-12.50 11.00-11.13	17	SPT	N=125	87	43	0	NI	100% return Air+Mist (Grey)			POSSIBLE MADE GROUND: Stiff light grey slightly sandy gravelly CLAY with a low cobble content of mudstone. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including primarily mudstone. (POSSIBLE MADE GROUND)	(1.50) 12.50	
12.50-14.00 12.50-12.70	19	C		93	80	38	90 200	100% return Air+Mist (Grey)			Weak dark grey thinly laminated MUDSTONE. Fracture set 1: planar smooth clay smeared. Fracture set 2: 70-75° planar smooth. . . . from 11.00m to 11.50m depth area of mostly non-intact possibly drilling induced recovered as angular to subangular fine to coarse GRAVEL of mudstone. Borehole extended to 14.00m depth by rotary coring to confirm suspected bedrock.	(1.50) 14.00	
											Weak occasionally medium strong brown fine SANDSTONE. Fractures are 0-5° undulating rough and 75-90° undulating rough. . . . from 12.65m to 12.80m depth shelly band. Rotary borehole terminated at 14.00m depth.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: 1:50

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	Dando 2500 + Massenza M-I-5	PB Drilling + Central Alliance	ABennett + SHunt	AC

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH518**

Contract Ref:	Start: **18.11.19** End: **19.11.19**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**144.27**	**E:435758.4 N:401121.8**	**1** of **2**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air (Brown)			MADE GROUND: Grassy vegetation on to very soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse. (MADE GROUND)	0.30	
								MADE GROUND: Soft light mottled greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone and siltstone. (MADE GROUND)	(2.00)	
									2.30	
					100% return Air (Brown)			Light brown MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(8.20)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Scanned CAT + Genny prior to drilling
2. No water strikes encountered
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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RAW FIELD DATA

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH518**

Contract Ref:	Start: **18.11.19** End: **19.11.19**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**144.27**	**E:435758.4 N:401121.8**	**2** of **2**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
					100% return Air (Brown)			Light brown MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 2.30m from previous sheet)*	10.50	
								Borehole terminated at 10.50m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH501**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.11.19** End: **22.11.19**	**141.06**	**E:435718.0 N:401146.4**	**1** of **2**

Mechanical Log						Samples & Testing					Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	
0.10-0.20					100% return Air (Brown)	1	ES	1xT+1xJ+1xV			MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse. (MADE GROUND)	(1.00) 1.00
											MADE GROUND: Soft dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including predominantly mudstone and coal fragments with sandstone. (MADE GROUND)	(1.50) 2.50
2.50-3.80 2.70-3.80	52	19			100% return Air (Grey)	2	C				MADE GROUND: Brown grey extremely weak MUDSTONE with brow fine grained sandstone recovered as clayey sandy angular to subangular fine to coarse GRAVEL of sandstone and mudstone with coal and brick. Sand is fine to coarse. (MADE GROUND)	(0.60) 3.10
											Extremely weak grey laminated MUDSTONE recovered as slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone with evidence of redrilling. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.85) 3.95
3.80-5.30 3.80-5.30	100	8	7	NI 260 720	100% return Air (Grey)	3	C				. . . from 3.10m to 3.15m brown sandy marine band.	(1.55)
											Very weak locally extremely weak fine grained silty SANDSTONE with orange discolouration and occasional siltstone laminations. Fractures are 0-5° clay smeared planar smooth along bedding. Set 2 are 85-90° rough undulating. (PENNINE MIDDLE COAL MEASURES FORMATION)	5.50 5.65
5.30-6.80 5.30-6.80	107	79	33	360 720 NI	100% return Air (Grey)	4	C				Area of SANDSTONE interbedded with grey siltstone and brown sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.15) 6.80
6.80-8.30 6.80-8.30	100	86	48	NI 40 110		5	C				Very weak brown grey SANDSTONE with orange staining on possible sedimentary slumping features. Fractures are 0-5° undulating smooth.	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. At 2.50m switch from open hole to coring.
4. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**DHodder**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH501**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.11.19** End: **22.11.19**	**141.06**	**E:435718.0 N:401146.4**	**2** of **2**

Mechanical Log						Samples & Testing						
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
	100	86	48	NI 40 110	100% return Air (Grey)						(PENNINE MIDDLE COAL MEASURES FORMATION)	(1.50)	
											. . . from 6.85m to 6.90m brown band possible ironstone. Fractures are 0-5° planar smooth locally clay smeared along bedding. Weak locally very weak brownish grey laminated SILTSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 6.80m from* previous sheet)	8.30	
											Borehole terminated at 8.30m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**DHodder**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH502**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.11.19** End: **22.11.19**	**141.50**	**E:435699.0 N:401127.0**	**1** of **1**

Mechanical Log						Samples & Testing					Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	
0.50-0.70					100% return Air (Grey)	1	ES	1xT+1xJ+1xV			MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	0.40 (0.70) 1.10
											MADE GROUND: Very soft dark mottled brown and light brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.40)
											MADE GROUND: Dark grey slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of predominantly mudstone fragments. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	3.50
											MADE GROUND: Light grey mudstone GRAVEL. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(5.20)
											Borehole terminated at 8.70m depth.	8.70

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Borehole backfilled with bentonite from 8.70m to ground level.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Comacchio GEO 250**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**25.11.19** End: **28.11.19**	**144.70**	**E:435635.0 N:401000.0**	**1** of **5**

Mechanical Log						Samples & Testing					Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill & Instrumentation	Water			
0.70-0.90					50% return Air (Brown)	1	ES	1xT+1xJ+1xV			MADE GROUND: Very soft dark brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub rounded of mixed lithologies including mudstone (TOPSOIL). (MADE GROUND)	0.40 (1.10) 1.50	
											. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Very soft to soft dark and light brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse of mixed lithologies including mudstone and siltstone. (MADE GROUND)	(2.50) 4.00	
											. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Light brown slightly sandy clayey angular to sub rounded fine to coarse GRAVEL of predominantly sandstone lithology. Sand is fine to coarse. (MADE GROUND)		
											. . . descriptions from rotary open hole drilling are based on limited sample return. . . . from 3.00m to 17.00m very few cutting return, loss of flush. MADE GROUND: Very soft to soft dark and light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of mixed lithologies including mudstone, siltstone, sandstone and coal. (MADE GROUND)	(13.50)	
											. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Possible water strike at 54m depth.
3. Borehole backfilled with bentonite from 63m to 54m.
4. Monitoring well installed from 54m, 40m slotted, 14m plain.

All dimensions in metres | Scale: **1:80**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**25.11.19** End: **28.11.19**	**144.70**	**E:435635.0 N:401000.0**	**2** of **5**

Mechanical Log					Samples & Testing						
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Material Graphic Legend
					50% return Air (Brown)						MADE GROUND: Very soft to soft dark and light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of mixed lithologies including mudstone, siltstone, sandstone and coal. (MADE GROUND) *(stratum copied from 4.00m from* previous sheet)		
												17.50	
					100% return Air (Grey)						MADE GROUND: Dark and light grey slightly sandy slighty clayey angular to rounded fine to coarse GRAVEL of mudstone and coal. Sand is fine to coarse. (MADE GROUND) . . . from 17.50m return of flush and cuttings after casing off to 15m. . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:80**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH503**

Contract Ref:	Start: **25.11.19** End: **28.11.19**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
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Mechanical Log						Samples & Testing					Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill & Instrumentation	Water			
					100% return Air (Grey)						MADE GROUND: Dark and light grey slightly sandy slighty clayey angular to rounded fine to coarse GRAVEL of mudstone and coal. Sand is fine to coarse. (MADE GROUND) . . . from 17.50m return of flush and cuttings after casing off to 15m.*(stratum* copied from 17.50m from previous sheet)	(36.50)	
					100% return Air (Grey)						. . . at 40.00m all flush lost.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:80**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH503**

Contract Ref:	Start: **25.11.19** End: **28.11.19**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**144.70**	**E:435635.0 N:401000.0**	**4** of **5**

Mechanical Log					Samples & Testing						
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Material Graphic Legend
					100% return Air (Grey)						MADE GROUND: Dark and light grey slightly sandy slighty clayey angular to rounded fine to coarse GRAVEL of mudstone and coal. Sand is fine to coarse. (MADE GROUND) . . . from 17.50m return of flush and cuttings after casing off to 15m.*(stratum* copied from 17.50m from previous sheet)		
					100% return Air (Grey)						Increased strength and return of coarser, rounded MUDSTONE gravel. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . at 54.00m groundwater possibly encountered, indicated by a greater return of water flush than noted previously. . . . descriptions from rotary open hole drilling are based on limited sample return.	54.00	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:80**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**25.11.19** End: **28.11.19**	**144.70**	**E:435635.0 N:401000.0**	**5** of **5**

Mechanical Log					Samples & Testing							
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Material Graphic Legend
					100% return Air (Grey)						Increased strength and return of coarser, rounded MUDSTONE gravel. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . at 54.00m groundwater possibly encountered, indicated by a greater return of water flush than noted previously.*(stratum copied from 54.00m* from previous sheet)	(9.00)	
											Borehole terminated at 63.00m depth.	63.00	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:80**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH504**

Contract Ref:	Start: **04.02.20** End: **04.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**142.47**	**E:435860.9 N:401222.0**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Material Graphic Legend
					100% return Air+Mis			MADE GROUND: Soft brown silty CLAY. (MADE GROUND)	(1.50) 1.50	
					100% return Air+Mis			MADE GROUND: Grey gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.30) 4.80	
					100% return Air+Mist			MADE GROUND: Grey mudstone BOULDER. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	5.10	
					100% return Air+Mis			Weathered grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
04/02/20	07:30	0.00	None	N/R	-
04/02/20	17:00	41.50	10.50	N/R	-

General Remarks

1. Scanned with CAT + Genny prior to drilling.
2. Groundwater seepage at 25.10m depth.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 40.00m depth on completion. Response zone 20.00m to 40.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20** End: **04.02.20**	**142.47**	**E:435860.9 N:401222.0**	**2** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air+Mis			Weathered grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 5.10m from previous sheet)*	(8.10)	
					100% return Air+Mis			Brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	13.20 (3.30)	
					100% return Air+Mis			Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	16.50	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20** End: **04.02.20**	**142.47**	**E:435860.9 N:401222.0**	**3** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
					100% return Air+Mist			Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 16.50m from previous sheet)*	(7.70) 24.20	
					100% return Air+Mist			COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	24.40	
					100% return Air+Mist			Grey MUDSTONE and occasional brown sandstone bands. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20** End: **04.02.20**	**142.47**	**E:435860.9 N:401222.0**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
					100% return Air+Mist			Grey MUDSTONE and occasional brown sandstone bands. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 24.40m from previous sheet)*	(17.10)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**04.02.20** End: **04.02.20**	**142.47**	**E:435860.9 N:401222.0**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
					100% return Air+Mist			Grey MUDSTONE and occasional brown sandstone bands. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 24.40m from previous sheet)*	41.50	
								Rotary borehole terminated at 41.50m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**141.73**	**E:435835.2 N:401221.2**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Grass over soft dark brown slightly sandy slightly gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	0.20	
					100% return Air (Brown)			MADE GROUND: Brown and grey gravelly CLAY. Gravel is subangular of mudstone and coal fragments. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(4.70)	
5.00-6.50	100				100% return Air (Grey)			SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	4.90	
6.50-8.00	100				100% return Air (Grey)					
8.00-9.50	100				100% return Air (Grey)					

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
11/02/20	07:00	0.00	None	N/R	-
11/02/20	18:30	40.00	None	N/R	35.10

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. Possible water strike recorded at 35.10m.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**141.73**	**E:435835.2 N:401221.2**	**2** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
	100				100% return Air (Grey)			SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 4.90m from previous sheet)*	(16.70)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**141.73**	**E:435835.2 N:401221.2**	**3** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 4.90m from previous sheet)*	21.60	
					100% return Air (Grey)			COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	21.80	
								SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.30) 24.10	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(0.90) 25.00	
								SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**141.73**	**E:435835.2 N:401221.2**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air (Grey)		1.1	SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 25.00m from previous sheet)*	(15.00)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**141.73**	**E:435835.2 N:401221.2**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air (Grey)			SANDSTONE interbedded with mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 25.00m from previous sheet)*	40.00	
								Borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **10.02.20**	**141.85**	**E:435751.6 N:401159.4**	**1** of **5**

Depth	Mechanical Log TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air (Brown)			MADE GROUND: Grass over soft dark brown gravelly CLAY. (MADE GROUND)	0.20	
								MADE GROUND: Brown and grey very gravelly CLAY. Gravel is of mudstone. (MADE GROUND)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(2.80)	
									3.00	
3.00-4.50	93	87	22	20 70 160	100% return Air (Grey)			Moderately weak to medium strong light grey stained orangish brown fine SANDSTONE with extremely closely spaced convoluted thin laminations of dark grey mudstone. Discontinuities: 0-10° very closely to closely spaced planar undulating rough and locally stained dark brown. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.67)	
									3.67	
								. . . from 3.10m to 3.45m depth 2 fractures 70-80° undulating rough and stained black.	(0.73)	
									4.40	
4.50-6.00	50	4	0	NI NI 20	100% return Air (Grey)			Moderately weak grey locally stained orangish brown MUDSTONE. Discontinuities: 0-20° very closely to closely spaced planar stepped and smooth with localised penetrative orange brown staining (<5mm). (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.60)	
								. . . from 4.20m depth extremely closely spaced thin laminations of light grey sandstone.		
								Very weak to weak grey MUDSTONE. Recovered as non-intact core (angular medium to coarse gravel sized shell fragments). (PENNINE MIDDLE COAL MEASURES FORMATION)	6.00	
6.00-7.50	99	54	9	NI 20 60	100% return Air (Grey)			. . . from 4.50m to 5.25m depth AZCL.	(0.90)	
								. . . from 5.45m to 5.30m depth very thin extremely weak lamination of dark grey to black carbonaceous mudstone.	6.90	
7.50-9.00	93	87	87	30 100 660	100% return Air (Grey)			. . . from 5.75m to 5.85m depth extremely weak and recovered as gravelly clay.		
								Extremely weak to very weak grey MUDSTONE. Discontinuities: 0-10° extremely closely to very closely spaced planar stepped smooth and locally clay smeared. Recovered as partially non-intact core. (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.10)	
								. . . from 6.40m to 6.48m depth recovered as non-intact core (angular fine to medium gravel sized fragments).	9.00	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**PRowlay**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **10.02.20**	**141.85**	**E:435751.6 N:401159.4**	**2** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air (Grey)			. . . from 6.70m depth heavily stained orangish brown and recovered as non-intact core (angular fine to medium gravel sized fragments). . . . from 6.75m depth with two very thin laminations of dark brown ironstone. Moderately weak to medium strong light greyish brown fine grained SANDSTONE with localised very thin laminations of dark grey mudstone. Discontinuities: 0-10° closely to medium spaced locally widely spaced planar smooth and clean. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . from 6.90m to 7.20m depth very weak heavily stained brown and recovered predominantly as non-intact core. . . . from 7.20m to 7.45m depth fracture 80-90° undulating rough stained dark brown. . . . from 8.50m to 9.00m depth with tightly folded bedding. MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(7.50) 16.50	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return. *Description on next sheet* . . . descriptions from rotary open hole drilling are based on limited sample return.	16.70	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**PRowlay**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **10.02.20**	**141.85**	**E:435751.6 N:401159.4**	**3** of **5**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
								MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 16.70m from previous sheet)*	(3.60) 20.30	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(0.80) 21.10	
					100% return Air (Grey)			MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(9.20)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**PRowlay**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **10.02.20**	**141.85**	**E:435751.6 N:401159.4**	**4** of **5**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
								MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 21.10m from previous sheet)*	30.30	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	30.60	
					100% return Air (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(9.40)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**PRowlay**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **10.02.20**	**141.85**	**E:435751.6 N:401159.4**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air (Grey)			MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 30.60m from previous sheet)*	40.00	
								Borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**PRowlay**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **03.02.20**	**145.60**	**E:435848.0 N:401178.0**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air+Mis (Brown)			MADE GROUND: Very soft to soft light brown CLAY. (MADE GROUND)	(0.80) 0.80	
					100% return Air+Mis (Brown grey)			MADE GROUND: Light brown and grey very gravelly CLAY. Gravel is subangular of mudstone. (MADE GROUND)	(2.30) 3.10	
					100% return Air+Mis (Grey)			Weathered grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(4.40) 7.50	
					100% return Air+Mist			Brown MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return. *Description on next sheet* . . . descriptions from rotary open hole drilling are based on limited sample return.	7.90	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
03/02/20	08:00	0.00	None	N/R	-
03/02/20	17:00	40.00	None	N/R	-

General Remarks

1. Scanned with CAT and Genny prior to drilling
2. No water strikes recorded
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **03.02.20**	**145.60**	**E:435848.0 N:401178.0**	**2** of **5**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 7.90m from previous sheet)*	(16.60)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **03.02.20**	**145.60**	**E:435848.0 N:401178.0**	**3** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 7.90m from previous sheet)*		
									24.50	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	24.70	
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.30)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **03.02.20**	**145.60**	**E:435848.0 N:401178.0**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 24.70m from previous sheet)*	28.00	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.80)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	28.80	
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(11.20)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **03.02.20**	**145.60**	**E:435848.0 N:401178.0**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								Grey MUDSTONE and small bands of brown mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 28.80m from previous sheet)*	40.00	
								Rotary borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **13.02.20**	**143.12**	**E:435890.0 N:401229.0**	**1** of **5**

Mechanical Log					Samples & Testing						
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
											MADE GROUND: Grass over soft dark brown slightly sandy slightly gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	0.20	
											MADE GROUND: Brown and grey gravelly CLAY. Gravel is subangular of mudstone and coal fragments. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.80) 3.00	
3.00-4.50	100				100% return Air+Mist (Brown)						MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		
4.50-6.00	67												
6.00-7.50	100											(6.50)	
7.50-9.00	100												

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
10/02/20	07:00	0.00	None	N/R	-
10/02/20	17:00	20.00	None	N/R	-
13/02/20	06:30	20.00	None	N/R	-
13/02/20	17:30	40.00	None	N/R	-

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt + WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH508**

Contract Ref:	Start: **10.02.20** End: **13.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**143.12**	**E:435890.0 N:401229.0**	**2** of **5**

Mechanical Log						Samples & Testing					Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	
												9.50
9.50-11.00	100	67	38	NI 95 320	100% return Air+Mist (Grey)						Very weak to weak dark grey thinly laminated SILTSTONE. Fractures are subhorizontal close to medium spaced planar and smooth to rough. Joints are subhorizontal to vertical medium to widely spaced planar and smooth with dark reddish brown fill. (PENNINE MIDDLE COAL MEASURES FORMATION)	(3.00)
11.00-12.50 11.25-11.50	100	91	66		100% return Air+Mist (Grey)	1	C				. . . from 9.74m to 9.90m non-intact recovered as fine to coarse gravel of siltstone. . . . from 9.74m to 10.10m depth dark reddish brown weathering in joints. . . . from 11.50m to 12.08m depth interbedded dark grey mudstone and siltstone.	12.50
					100% return Air+Mist (Grey)						MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt + WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **13.02.20**	**143.12**	**E:435890.0 N:401229.0**	**3** of **5**

Mechanical Log						Samples & Testing					Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water			
					100% return Air+Mist (Grey)						MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 12.50m from* previous sheet)	(15.60)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt + WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
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Mechanical Log					Samples & Testing							
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
											MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
											(stratum copied from 12.50m from previous sheet)	28.10	
											COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.70)	
												28.80	
											. . . descriptions from rotary open hole drilling are based on limited sample return.		
					100% return Air+Mist (Grey)						MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
											. . . descriptions from rotary open hole drilling are based on limited sample return.	(11.20)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt + WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.02.20** End: **13.02.20**	**143.12**	**E:435890.0 N:401229.0**	**5** of **5**

Mechanical Log						Samples & Testing						
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air+Mist (Grey)						MUDSTONE interbedded with SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 28.80m from* previous sheet)	40.00	
											Borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt + WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH509**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.11.19** End: **22.11.20**	**142.33**	**E:435680.2 N:401072.0**	**1** of **4**

Mechanical Log						Samples & Testing							
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					70% return Air (Grey)						MADE GROUND: Grassy vegetation on to very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse. (MADE GROUND)	0.30	
											. . . descriptions from rotary open hole drilling are based on limited sample return.	(1.50)	
											MADE GROUND: Very soft light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse of mixed lithologies including mudstone. (MADE GROUND)	1.80	
											. . . descriptions from rotary open hole drilling are based on limited sample return.		
											MADE GROUND: Light brown very clayey GRAVEL of mudstone and sandstone with low cobble and boulder content. (MADE GROUND)		
											. . . descriptions from rotary open hole drilling are based on limited sample return.		
											. . . from 4.00m to 7.00m lack of returns.	(5.20)	
												7.00	
											Description on next sheet		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**IHayes**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH509**

Contract Ref:	Start: **22.11.19** End: **22.11.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
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Mechanical Log						Samples & Testing					Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water			
					70% return Air (Grey)						MADE GROUND: Light grey and brown gravelly CLAY with moderate boulder content of mudstone. (MADE GROUND) *(stratum copied from 7.00m from* previous sheet) . . . descriptions from rotary open hole drilling are based on limited sample return.	(4.50) 11.50	
					50% return Air (Grey)						MADE GROUND: Brown gravelly CLAY. Gravel is siltstone, mudstone and coal fragments. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(5.50)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH509**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**22.11.19** End: **22.11.20**	**142.33**	**E:435680.2 N:401072.0**	**3** of **4**

Mechanical Log						Samples & Testing							
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					50% return Air (Grey)						MADE GROUND: Brown gravelly CLAY. Gravel is siltstone, mudstone and coal fragments. (MADE GROUND) *(stratum copied from 11.50m from* previous sheet)	17.00	
17.00-18.00 17.00-18.00	34	0	0	NI NI NI	0% return Air (Grey)	1	C				MADE GROUND: Poor recovery. (MADE GROUND) . . . from 17.00m little recovery from first core run. Only small sample of competent mudstone core retrieved.	(0.80) 17.80	
											MADE GROUND Weak to medium strong thinly laminated dark grey mudstone GRAVEL. (MADE GROUND)	18.00	
					100% return Air (Grey)						MADE GROUND: Gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(7.00)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**IHayes**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH509**

Contract Ref:	Start: **22.11.19** End: **22.11.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**142.33**	**E:435680.2 N:401072.0**	**4** of **4**

Mechanical Log						Samples & Testing					Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	No	Type	Results	Backfill	Water	Description of Strata	
					100% return Air (Grey)						MADE GROUND: Gravelly CLAY. (MADE GROUND) *(stratum copied from 18.00m from previous sheet)* . . . at 24.50m noted an approximate 20cm drop in the drill rig, indicative of soft material or voided ground.	25.00
25.00-26.00 25.00-26.00	58	11	11	NI NI NI	100% return Air (Grey)	2	C				MADE GROUND: Poor recovery. (MADE GROUND) . . . at 25.00m approximate 0.5m recovery from second core run. Weathered mudstone and siltstone with coal. MADE GROUND: Sandstone BOULDER. (MADE GROUND) Borehole terminated at 26.00m depth.	(0.45) 25.45 (0.55) 26.00

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:40**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole + Rotary Cored	**Fraste**	**Central Alliance**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**31.01.20** End: **31.01.20**	**144.39**	**E:435735.1 N:401101.0**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Dark brown gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.20) 1.20	
					90% return Air+Mis (Grey)			MADE GROUND: Grey very clayey GRAVEL. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.10) 2.30	
					90% return Air+Mis (Light grey)			Brownish grey weathered MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.05) 3.35	
					90% return Air+Mis (Brown grey)			Light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.75) 6.10	
					90% return Air+Mis (Light grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
31/01/20	10:15	1.20	None	N/R	-
31/01/20	16:30	40.00	None	N/R	-

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH510**

Contract Ref:	Start: **31.01.20** End: **31.01.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**144.39**	**E:435735.1 N:401101.0**	**2** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					90% return Air+Mis (Light grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 6.10m from previous sheet)*	(9.30) 15.40	
					90% return Air+Mis (Dark grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.20) 16.60	
					90% return Air+Mist (Dark grey)			Dark grey MUDSTONE with traces of coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.50) 17.10	
					90% return Air+Mis (Dark grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. *Description on next sheet* . . . descriptions from rotary open hole drilling are based on limited		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
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Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					90% return Air+Mis (Dark grey)			sample return. Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 17.10m from previous sheet)*	(4.30) 21.40	
					90% return Air+Mis (Dark grey)			Dark grey MUDSTONE with traces of coal. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.20) 22.60	
					70% return Air+Mis (Black)			COAL. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(0.65) 23.25	
					50% return Air+Mis (Grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**31.01.20** End: **31.01.20**	**144.39**	**E:435735.1 N:401101.0**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					50% return Air+Mis (Grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 23.25m from previous sheet)*	(16.75)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**31.01.20** End: **31.01.20**	**144.39**	**E:435735.1 N:401101.0**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					50% return Air+Mis (Grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 23.25m from previous sheet)*	40.00	
								Borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH511**

Contract Ref:	Start: **05.02.20** End: **07.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**142.00**	**E:435690.0 N:401110.0**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Grass over soft sandy CLAY. (MADE GROUND)	0.30	
								MADE GROUND: Soft to firm orangish brown slightly gravelly sandy CLAY. Gravel is angular to rounded fine to coarse of sandstone. Sand is fine to coarse. (MADE GROUND)	(1.00) 1.30	
	Window run 113mm dia (100% rec)							MADE GROUND: Firm to stiff sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of coal and mudstone. (MADE GROUND)	(2.20) 3.50	
	Window run 113mm dia (75% rec)									
3.50-5.00	87			NI NI 200				MADE GROUND: Extremely weak light grey mudstone LARGE BOULDER.. Dinstinctly weathered in places to clay. (MADE GROUND)	(1.50) 5.00	
								. . . from 4.70m to 5.00m depth clay.		
5.00-6.50	13				0% return Air+Mis			MADE GROUND: Firm sandy gravelly CLAY with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of coal and mudstone. (MADE GROUND)		
6.50-8.00	33									
8.00-9.50	67								(6.10)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
05/02/20	08:00	0.00	None	N/R	-
05/02/20	17:00	12.50	6.50	N/R	11.20
06/02/20	08:00	12.50	6.50	N/R	-
06/02/20	17:00	30.00	21.70	N/R	-
07/02/20	08:00	30.00	21.70	N/R	-
07/02/20	16:30	37.00	21.70	N/R	-

General Remarks

1. Scanned with CAT + Genny prior to drilling
2. Possible water seepage at 11.20m
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH511**

Contract Ref:	Start: **05.02.20** End: **07.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**142.00**	**E:435690.0 N:401110.0**	**2** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
9.50-11.00	67 7							MADE GROUND: Firm sandy gravelly CLAY with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of coal and mudstone. (MADE GROUND) *(stratum copied from 5.00m from previous sheet)*	11.10	
11.00-12.50	73	67	67					MADE GROUND: Weak light grey mudstone LARGE BOULDER. (MADE GROUND)	(1.40) 12.50	
					100% return Air+Mis (Grey)			MADE GROUND: Firm sandy gravelly CLAY with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of coal and mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH511**

Contract Ref:	Start: **05.02.20** End: **07.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**142.00**	**E:435690.0 N:401110.0**	**3** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air+Mist (Grey)			MADE GROUND: Firm sandy gravelly CLAY with frequent cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to medium of coal and mudstone. (MADE GROUND)	(11.50)	
								(stratum copied from 12.50m from previous sheet)		
22.50-24.00	33				100% return Air+Mist (Grey)			. . . cored from 22.50m to 30.00m depth.		
								. . . from 22.70m to 22.75m depth coal gravel.	24.00	
24.00-25.50	67	40	33		100% return Air+Mist (Grey)			Weak grey thinly laminated fractured MUDSTONE. Fractures are subhorizontal planar smooth with orange iron staining. (PENNINE MIDDLE COAL MEASURES FORMATION)		
25.50-27.00	67	40	27		100% return Air+Mist (Grey)				(3.20)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH511**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **07.02.20**	**142.00**	**E:435690.0 N:401110.0**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
27.00-28.50	80	67	40		100% return Air+Mis (Grey)				27.20	
								Weak orangish brown SANDSTONE. Fracture set 1: subhorizontal smooth planar with orange staining. Fracture set 2: subvertical rough undulating with iron staining. (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.60)	
28.50-30.00	87	60	47		100% return Air+Mis (Grey)				29.80	
								Weak light MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(5.70)	
					100% return Air+Mis (Grey)				35.50	
35.50-37.00	90	90	71	30 120 320	0% return Air+Mis			*Description on next sheet*		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH511**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **07.02.20**	**142.00**	**E:435690.0 N:401110.0**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
	90	90	71	30 120 320	0% return Air+Mis			Medium strong grey SILTSTONE. Fracture 1: 0-5° closely to medium spaced planar rough and open. Fracture 2: 85-90° closely spaced undulating rough closed to open.	(1.50)	
								. . . from 35.50m to 36.00m depth band of shells.*(stratum copied* from 35.50m from previous sheet)	37.00	
								. . . from 36.55m to 36.65m depth peat with organic matter.		
								. . . from 36.70m to 36.75m depth closely spaced parallel bedding.		
								Rotary borehole terminated at 37.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**1** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Soft brown gravelly CLAY. Gravel is subangular of mudstone. (MADE GROUND)	(1.20) 1.20	
					90% return Air+Mis (Brown)			MADE GROUND: Soft brown CLAY. (MADE GROUND)	(0.80) 2.00	
					90% return Air+Mis (Brown)			MADE GROUND: Very gravelly CLAY with moderate boulder content of mudstone. (MADE GROUND)	(1.50) 3.50	
					90% return Air+Mis (Grey)			MADE GROUND: Dark greyish black very gravelly CLAY with moderate boulder content of mudstone. Gravel of coal fragments and mudstone. (MADE GROUND)	(3.50) 7.00	
					90% return Air+Mis (Dark grey)			MADE GROUND: Light grey very gravelly CLAY with high boulder content of mudstone. (MADE GROUND)	(3.10)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
30/01/20	08:00	1.20	None	N/R	-
30/01/20	17:00	50.60	16.80	N/R	Dry

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**2** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					0% return Air+Mis			MADE GROUND: Light grey very gravelly CLAY with high boulder content of mudstone. (MADE GROUND) *(stratum copied from 7.00m from previous sheet)*	10.10	
					80% return Air+Mis (Light grey)			MADE GROUND: Light grey gravelly CLAY with moderate boulder content of mudstone. (MADE GROUND)	(0.95) 11.05	
					80% return Air+Mis (Grey black)			MADE GROUND: Very gravelly CLAY. Gravel is subangular of coal fragments and mudstone. (MADE GROUND)	(1.35) 12.40	
					80% return Air+Mis (Grey)			MADE GROUND: Light grey gravelly CLAY with moderate boulder content of mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(4.40) 16.80	
					70% return Air+Mis (Grey)			MADE GROUND: Grey gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**3** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					70% return Air+Mis (Grey)			MADE GROUND: Grey gravelly CLAY. (MADE GROUND) *(stratum copied from 16.80m from previous sheet)*	(2.60) 19.40	
					70% return Air+Mis (Brown)			Brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(0.85) 20.25	
					70% return Air+Mis (Dark grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**4** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					70% return Air+Mis (Dark grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 20.25m from previous sheet)*	(20.35)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**5** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					70% return Air+Mis (Dark grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 20.25m from previous sheet)*	40.60	
					70% return Air+Mis (Grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.75) 43.35	
					70% return Air+Mist (Dark grey)			Dark grey MUDSTONE with traces of coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.50) 43.85	
					70% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *Description on next sheet*		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**143.48**	**E:435697.6 N:401078.4**	**6** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					70% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 43.85m from previous sheet)*	(3.65) 47.50	
					70% return Air+Mis (Dark grey)			Dark grey MUDSTONE with traces of coal. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.60) 49.10	
					70% return Air+Mis (Grey brown)			Grey MUDSTONE and brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.50) 50.60	
								Borehole terminated at 50.60m depth.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**148.50**	**E:435833.0 N:401110.0**	**1** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								MADE GROUND: Grass over soft dark brown slightly sandy slightly gravelly CLAY. (MADE GROUND)	0.20	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								MADE GROUND: Brown and grey gravelly CLAY. Gravel is subangular of mudstone. (MADE GROUND)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(8.30)	
					100% return Air+Mis (Brown)					
8.50-10.00	97	73	51	NI 130 360				*Description on next sheet*	8.50	
								. . . descriptions from rotary open hole drilling are based on limited		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
12/02/20	06:30	0.00	None	N/R	Dry
12/02/20	18:00	30.00	None	N/R	Dry

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**148.50**	**E:435833.0 N:401110.0**	**2** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
10.00-11.50	97 94	73 94	51 34	NI 130 360	100% return Air+Mis (Grey) 100% return Air+Mis (Grey) 100% return Air+Mis (Grey)			sample return. Very weak to weak dark orangish grey fine to medium grained thinly laminated SANDSTONE with occasional laminations of siltstone and mudstone. Fractures are subhorizontal very close to medium spaced planar and smooth. Joints are subvertical undulating rough to smooth. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . from 8.50m to 8.75m depth dark orangish brown staining.*(stratum copied from 8.50m from previous sheet)* . . . from 9.20m to 9.34m depth extremely weak laminated siltstone. . . . from 9.34m to 9.60m depth non-intact recovered as coarse gravel of sandstone and siltstone. . . . from 10.00m to 10.05m depth non-intact recovered as medium to coarse gravel of siltstone. . . . from 10.25m to 10.40m depth dark grey siltstone. . . . from 10.60m to 10.65m depth non-intact coarse gravel of interbedded sandstone and siltstone. MADE GROUND: Brown and grey gravelly CLAY. Gravel is subangular of mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(3.00) 11.50	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**148.50**	**E:435833.0 N:401110.0**	**3** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air+Mis (Grey)			MADE GROUND: Brown and grey gravelly CLAY. Gravel is subangular of mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 11.50m from previous sheet)*	(14.50)	
									26.00	
								COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	26.30	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**148.50**	**E:435833.0 N:401110.0**	**4** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 26.30m from previous sheet)*	(4.00) 30.30	
								MUDSTONE interbedded with sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.20) 32.50	
								Borehole terminated at 32.50m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**148.49**	**E:435918.8 N:401185.2**	**1** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air			MADE GROUND: Grass over soft to very soft brown slightly gravelly CLAY. Gravel is sub-angular of mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.70) 2.70	
					100% return Air			MADE GROUND: Brown and grey very gravelly CLAY with a low cobble and boulder content. Gravel is subandgular to sub rounded of mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(8.90)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
05/02/20	08:00	0.00	None	N/R	-
05/02/20	17:00	24.00	13.00	N/R	-
06/02/20	08:00	24.00	13.00	N/R	-
06/02/20	18:00	41.00	13.00	N/R	-

General Remarks

1. Scanned with CAT and Genny prior to drilling
2. Groundwater seepage at 27.50m depth.
3. Backfilled with bentonite on completion

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**148.49**	**E:435918.8 N:401185.2**	**2** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air			MADE GROUND: Brown and grey very gravelly CLAY with a low cobble and boulder content. Gravel is subandgular to sub rounded of mudstone. (MADE GROUND) *(stratum copied from 2.70m from previous sheet)*	11.60	
					100% return Air			MUDSTONE and occasional bands of SANDSTONE 100mm to 200mm. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(12.40)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**148.49**	**E:435918.8 N:401185.2**	**3** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air			MUDSTONE and occasional bands of SANDSTONE 100mm to 200mm. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 11.60m from previous sheet)*	24.00	
					100% return Air (Grey)			Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.50)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**148.49**	**E:435918.8 N:401185.2**	**4** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
									27.50	
					100% return Air (Black)			Band of COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	27.70	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
					0% return Air (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return.	(3.10)	
									30.80	
					100% return Air (Black)			Band of COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.70)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	31.50	
								Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
					100% return Air (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**05.02.20** End: **06.02.20**	**148.49**	**E:435918.8 N:401185.2**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air (Grey)			Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 31.50m from previous sheet)*	(9.50)	
								Rotary borehole terminated at 41.00m depth.	41.00	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**WHopkins**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**152.46**	**E:435842.0 N:401061.2**	**1** of **4**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Dark brown slightly silty sandy CLAY with occasional rootlets. Sand is fine to coarse. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	0.30	
					100% return Air+Mis (Brown)			MADE GROUND: Light yellow brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to angular sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.40)	
								3.70		
								MADE GROUND: Dark grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to angular fine to coarse mudstone and sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.80)	
								5.50		
					100% return Air+Mis (Grey)			Light yellowish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to angular sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(5.30)	
					100% return Air+Mis (Grey)					
					100% return Air+Mis					

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
30/01/20	07:00	0.00	None	N/R	Dry
30/01/20	17:30	25.00	9.00	N/R	17.00
31/01/20	07:00	25.00	9.00	N/R	23.00
31/01/20	17:30	32.50	None	N/R	Dry

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**152.46**	**E:435842.0 N:401061.2**	**2** of **4**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
					(Brown) 100% return Air+Mis (Brown)			Light yellowish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to angular sandstone. (MADE GROUND) *(stratum copied from 5.50m from previous sheet)* . . . at 9.80m depth hard to drill. . . . descriptions from rotary open hole drilling are based on limited sample return.	10.80	
					100% return Air+Mis (Brown)			Light yellowish brown SANDSTONE with laminations (grey and red). (PENNINE MIDDLE COAL MEASURES FORMATION)	(4.00) 14.80	
								Dark grey SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.20) 16.00	
								Dark grey SILTSTONE (hard to drill). (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(0.50) 16.50	
								Light yellowish brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**152.46**	**E:435842.0 N:401061.2**	**3** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air+Mis (Brown)			Light yellowish brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 16.50m from previous sheet)*	(8.10) 24.60	
								Light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	25.00	
25.00-26.50	97	68	11	NI 10 140	100% return Air+Mis (Grey)			Weak grey thinly laminated MUDSTONE with rare medium ironstone nodules. Fracture set 1: 0-5° undulating smooth clay smeared orientated along bedding. Fracture set 2: 70-80° planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.50) 25.50	
								Light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.00) 26.50	
26.50-28.00	69	30	0					Weak to extremely weak dark grey to black MUDSTONE with black specks. Fractures are along bedding 5-10° non-intact recovered as subangular fine to coarse gravel.	26.70 (0.60)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.01.20** End: **31.01.20**	**152.46**	**E:435842.0 N:401061.2**	**4** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
	69	30	0	NI 10 140	100% return Air+Mis (Grey)			(PENNINE MIDDLE COAL MEASURES FORMATION)	27.30	
								. . . from 26.85m to 27.00m dark grey peat with plant matter. Weak grey MUDSTONE with occasional to rare iron nodules. Fracture set 1: 5-10° planar smooth clay smeared. Fracture set 2: 65-75° planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION)	27.50	
28.00-29.50	95	93	39		100% return Air+Mis (Grey)			. . . from 26.70m to 26.85m black extremely weak coal layer.*(stratum copied from 26.70m from previous sheet)* Black COAL (friable fine to coarse with mica fragments). (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.60)	
								Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
29.50-31.00	100	91	38	NI 120 200	100% return Air+Mis (Grey)			. . . from 28.00m to 29.50m depth more compact.	30.10	
								Black COAL with mica. (PENNINE MIDDLE COAL MEASURES FORMATION)	30.15	
								Weak black thinly laminated COAL. Fracture set 1: 5° planar smooth undulating. Fracture set 2: 80-90° planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.85) 31.00	
31.00-32.50	107	86	41		100% return Air+Mis (Grey)			. . . from 30.60m to 30.70m depth weak thinly laminated mudstone band.	31.20	
								. . . from 30.90m to 31.00m depth pyrite along vertical fracture. Weak to extremely weak dark grey MUDSTONE thinly laminated with rare iron nodules. Fracture are 0-5° planar smooth clay smeared and 75-90° planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.30) 32.50	
								. . . from 31.00m to 32.00m depth weak black peat with plant matter. Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
								. . . from 32.10m to 32.15m depth dark grey to black thin coal laminations. Borehole terminated at 32.50m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**154.12**	**E:435803.9 N:400975.2**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Grass onto dark brown slightly silty sandy CLAY with occasional gravel and rootlets. Sand is fine to coarse. Gravel is fine to medium subangular to angular sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	0.20	
								MADE GROUND: Light yellowish brown slightly silty slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse subangular to angular sandstone and mudstone. Coming up as brown flush with sandstone and mudstone fragments and boulders of sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.60)	
					100% return Water (Grey)				3.80	
								MADE GROUND: Dark blackish grey gravelly CLAY with gravel of fine subangular to angular coal. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(5.90)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
27/01/20	06:15	0.00	None	N/R	Dry
27/01/20	17:30	15.80	9.00	N/R	14.50
28/01/20	07:00	15.80	9.00	N/R	10.10
28/01/20	17:30	30.50	20.00	N/R	24.30
29/01/20	07:00	30.50	20.00	N/R	28.00
29/01/20	17:30	40.00	None	N/R	Dry

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**154.12**	**E:435803.9 N:400975.2**	**2** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Water (Grey)			MADE GROUND: Dark blackish grey gravelly CLAY with gravel of fine subangular to angular coal. (MADE GROUND)		
								(stratum copied from 3.80m from previous sheet)	9.70	
								MADE GROUND: Light grey gravelly CLAY with occasional fragments of coal. Harder to drill through. (MADE GROUND)	10.00	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
					90% return Water (Grey)			MADE GROUND: Dark clayey fine subangular to angular GRAVEL of mudstone and red sandstone fragments (burnt shale). (MADE GROUND)		
								. . . at 10.00m depth loss of water flush.		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(9.70)	
								. . . at 14.80m depth loss of flush.		
					90% return Air+Mis (Grey)					

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**154.12**	**E:435803.9 N:400975.2**	**3** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					90% return Air+Mis (Grey)			MADE GROUND: Dark clayey fine subangular to angular GRAVEL of mudstone and red sandstone fragments (burnt shale). (MADE GROUND) . . . at 10.00m depth loss of water flush.*(stratum copied from* 10.00m from previous sheet)	19.70	
								Light brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	20.00	
20.00-21.50	93	77	38		100% return Air+Mis (Grey)			Weak to medium strong brown reddish in places fine SANDSTONE. Fractures are 0-5° undulating rough along bedding and 70-85° planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . from 20.00m to 20.30m depth area of non-intact drilling induced recovered as angular to subangular fine to coarse GRAVEL of sandstone and clay.		
21.50-23.00	96	96	13	NI 130 290	100% return Air+Mis (Grey)			. . . from 20.80m to 21.00m depth cross bedding.	(3.80)	
23.00-24.50	93	73	34		100% return Air+Mis (Grey)			. . . from 23.00m to 23.20m depth silty sand.	23.80	
								Weak to extremely weak grey thinly laminated MUDSTONE. Fractures are 0-10° undulating rough clay smeared and 90° planar smooth clay smeared. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.50) 24.30	
24.50-26.00	67	8	0	NI NI 120	100% return Air+Mis (Grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . from 24.50m to 24.70m depth zone of non-intact recovered as angular to subangular gravel of mudstone and clay.	(3.20)	
26.00-27.50	66	5	0		100% return Air+Mis (Grey)			. . . from 25.80m to 25.95m depth zone of non-intact recovered as angular to subangualr fine to coarse gravel of mudstone and clay with evidence of redrilling. . . . from 26.00m to 27.50m depth fine to coarse gravel of mudstone.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**154.12**	**E:435803.9 N:400975.2**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
	66	5	0						27.50	
27.50-29.00	53	35	22	NI 70 280	100% return Air+Mis (Grey)			Weak to extremely weak grey thinly laminated SILTSTONE. Fractures are 0-5° planar undulating and 75-90° undulating planar smooth. (PENNINE MIDDLE COAL MEASURES FORMATION)		
29.00-30.50	96	72	1		100% return Air+Mis (Grey)			. . . from 29.00m to 29.25m depth area of non-intact recovered as subangular to subrounded fine to medium gravel and clay.	(3.80)	
					100% return Air+Mis (Grey)				31.30	
								Dark blackish grey COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	31.60	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.20)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	33.80	
					100% return Air+Mis (Grey)			Light grey SILTSTONE.	(0.50)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	34.30	
								Dark grey MUDSTONE.		
								. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH516**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**154.12**	**E:435803.9 N:400975.2**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					100% return Air+Mis (Grey)			Dark grey MUDSTONE. *(stratum copied from 34.30m from previous sheet)*	(5.70) 40.00	
								Borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**SHunt**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **04.02.20**	**148.00**	**E:435743.0 N:401051.0**	**1** of **5**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Grass over soft brown CLAY. (MADE GROUND)	0.20	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(1.50)	
								MADE GROUND: Brown gravelly CLAY. (MADE GROUND)	1.70	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								MADE GROUND: Grey gravelly CLAY. Gravel is of mudstone, coal fragments, sandstone and burnt shale. (MADE GROUND)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(5.40)	
					100% return Air+Mis (Grey)				7.10	
								MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(2.70)	

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
03/02/20	07:00	0.00	None	N/R	Dry
03/02/20	17:30	17.50	8.50	N/R	13.00
04/02/20	07:00	17.50	8.50	N/R	15.00
04/02/20	17:30	40.00	None	N/R	Dry

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **04.02.20**	**148.00**	**E:435743.0 N:401051.0**	**2** of **5**

Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					100% return Air+Mis (Grey)			MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 7.10m from previous sheet)*	9.80	
10.00-11.50	91	71	48	NI 120 400	100% return Air+Mis (Brown)			SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) Moderately weak to medium strong CLAY and thickly laminated yellowish and greyish brown stained orangish brown fine gravelly SANDSTONE with localised thin laminations of dark grey mudstone. Discontinuities: 0-10° closely to medium spaced planar rough and locally stained dark orangish brown. (PENNINE MIDDLE COAL MEASURES FORMATION)	10.00 (1.90)	
11.50-13.00	100	58	27	NI 70 120	100% return Air+Mis (Brown)			. . . from 10.45m to 11.00m depth thickly interbedded with weak brownish grey mudstone. Recovered partially as non-intact core.	11.90	
								. . . from 10.75m to 10.90m depth AZCL.	(0.70)	
								. . . from 11.05m to 11.20m depth 80° fracture undulating rough slightly penetrative with dark brown and orange staining.	12.60	
13.00-14.50	97	69	48	NI 110 380	100% return Air+Mis			Weak yellowish brown stained orangish brown sandy SILTSTONE with localised very thin beds of fine gravel sandstone. Discontinuities: 0-10° very closely to closely spaced planar undulating smooth clean and locally stained orangish brown. Moderately to medium strong. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.50)	
								. . . from 12.30m to 12.65m depth 90° fracture undulating rough stained grey.	14.10	
14.50-16.00	97	81	27	NI 70 90 NI 70 120	60% return Air+Mis			Dark greenish and brownish grey fine gravel SANDSTONE with localised thick laminations of siltstone. Discontinuities: 0-20° very closely to medium spaced planar and undulating rough clean and locally stained orangish brown. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.50)	
								. . . from 12.65m to 13.30m depth 80-90° fracture undulating rough stained orangish brown and grey.	15.60	
								. . . from 12.85m to 13.20m depth recovered as non-intact core (angular medium to coarse gravel sized fragments).	(1.00)	
								. . . from 13.20m to 13.50m depth subvertical laminations (60-70°) of dark grey staining.	16.60	
16.00-17.50	97	67	25		0% return Air+Mis			Very weak to weak dark greyish brown thin and thickly laminated sandy SILTSTONE. Discontinuities are very close to medium spaced horizontal to subvertical 0-90° planar smooth with dark brown staining.		
								. . . from 14.10m to 14.23m depth 45° fracture undulating smooth stained grey.		
17.50-19.00	57	16	0		0% return Air+Mis			. . . from 14.68 to 14.77m depth 50° fracture planar smooth stained grey.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **04.02.20**	**148.00**	**E:435743.0 N:401051.0**	**3** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
	57	16	0		0% return Air+Mis			. . . from 15.40m to 15.50m non-intact recovered as medium to coarse gravel of siltstone.	(3.10)	
19.00-20.50	100	0	0	NI NI NI	0% return Air+Mis			Weak to medium strong light yellowish grey brown thinly laminated silty SANDSTONE. Discontinuities are horizontal 0-10° close to medium spaced planar smooth to rough with occasional dark orange staining. Laminations are closely spaced of dark grey mudstone.		
								. . . from 16.20m to 16.50m depth distinct undulating cross laminations.	19.70	
								. . . from 16.50m to 16.55m depth non-intact recovered as fine to coarse gravel of sandstone.	19.82	
								. . . from 16.55m to 17.45m depth orange staining throughout fractures, possible weathering.		
								. . . from 16.85m to 17.00m depth 80-90° vertical undulating rough fracture with orange staining.		
								. . . from 17.45m to 17.50m depth no recovery of potential non-intact material.		
								. . . from 17.50m to 18.10m depth no recovery due to liner failure. Very weak to weak dark greyish brown black thinly laminated MUDSTONE. Discontinuities are horizontal to subhorizontal 0-20° very close to medium spaced planar smooth to rough with dark orange and grey staining.		
								(stratum copied from 16.60m from previous sheet)		
								. . . from 18.10m to 18.30m depth non-intact recovered as light greyish black subangular fine to coarse gravel of mudstone fragments.		
								. . . from 18.40m to 18.50m depth non-intact recovered as dark black clayey subangular fine to coarse gravel of mudstone.		
								. . . from 18.66m to 18.73m depth non-intact recovered as subangular fine to coarse gravel of mudstone with clay matrix.		
								. . . from 18.80m to 18.90m depth non-intact recovered as subangular fine to medium gravel of clayey mudstone.		
								. . . from 19.00m to 19.24m depth non-intact recovered as subangular fine to coarse gravel of mudstone fragments.		
								. . . from 19.24m to 19.45m depth very weak dark greyish black mudstone with undulating 0-50° rough fractures with a clayey infill. Very easily fractured.		
								. . . from 19.45m to 19.70m depth mudstone becomes dark black with dark orangish brown staining within fractures.		
								Extremely weak to very weak very thinly laminated dark shiny black COAL. Discontinuities are subvertical 80-90° undulating rough with a slightly orange staining.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **04.02.20**	**148.00**	**E:435743.0 N:401051.0**	**4** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								. . . from 19.77m to 19.82m depth becomes less shiny with clay like texture. . . . from 19.88m to 19.93m depth soft to firm dark grey very clayey mudstone band. . . . at 20.20m depth subvertical 40° undulating rough fracture with dark grey staining. . . . descriptions from rotary open hole drilling are based on limited sample return. Very weak structureless light greyish black MUDSTONE. Discontinuities are 0-60° undulating rough with a dark grey staining. Frequent fractures throughout giving a non-intact structure. *(stratum copied from 19.82m from previous sheet)*	(20.18)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.02.20** End: **04.02.20**	**148.00**	**E:435743.0 N:401051.0**	**5** of **5**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								Very weak structureless light greyish black MUDSTONE. Discontinuities are 0-60° undulating rough with a dark grey staining. Frequent fractures throughout giving a non-intact structure. *(stratum copied from 19.82m from previous sheet)*	40.00	
								Rotary borehole terminated at 40.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Fraste**	**Central Alliance**	**ABennett**	AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log ROTARY COMPOSITE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**1** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
								MADE GROUND: Grass onto dark slightly silty sandy CLAY with occasional gravel and rootlets. Sand is fine to coarse. Gravel is fine to medium sandstone. (MADE GROUND)	0.30	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(1.30)	
					70% return Air+Mist (Brown)			MADE GROUND: Dark yellowish brown gravelly CLAY with sandstone and mudstone. Gravel is subangular to angular fine to coarse. (MADE GROUND)	1.60	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(1.70)	
					70% return Air+Mis (Grey)			MADE GROUND: Light greyish brown gravelly CLAY subangular to angular mudstone and sandstone and occasional sandstone boulders. (MADE GROUND)	3.30	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								MADE GROUND: Light grey gravelly CLAY. Gravel is subangular to angular fine to medium of mudstone. (MADE GROUND)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(3.50)	
					70% return Air+Mis (Grey)				6.80	
					70% return Air+Mis (Brown)			MADE GROUND: Light brown SANDSTONE (possible boulder). (MADE GROUND)	(0.90)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	7.70	
					70% return Air+Mist (Brown)			MADE GROUND: Dark brown SANDSTONE with traces of coal fragments. (MADE GROUND)	8.10	
					70% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
27/01/20	08:00	0.00	None	N/R	Dry
27/01/20	17:00	22.00	15.00	N/R	19.80
28/01/20	08:00	22.00	15.00	N/R	Dry
28/01/20	17:00	40.00	31.30	N/R	Dry
29/01/20	08:00	40.00	31.30	N/R	Dry
29/01/20	17:00	50.00	None	N/R	Dry

General Remarks

1. Scanned with CAT and Genny prior to drilling
2. At 22.60 depth loss of flush.
3. Cased to 31.30m.
4. Backfilled with bentonite.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**2** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					70% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Soft dark grey gravelly CLAY with traces of coal as fine to medium subangular to angular gravel. (MADE GROUND) *(stratum copied from 8.10m from previous sheet)*	(2.20) 10.30	
					70% return Air+Mis (Grey)			MADE GROUND: Light greyish brown gravelly CLAY. Gravel is fine to medium subangular to angular sandstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(3.40) 13.70	
					70% return Air+Mis (Grey)			Light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(6.30)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**3** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					70% return Air+Mis (Grey)			Light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 13.70m from previous sheet)*	20.00	
								Light yellowish brown SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.60) 22.60	
					70% return Air+Mis (Grey) 0% return Air+Mis			No returns - possibly grey interbedded mudstone and sandstone band or fault. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.		AZCL

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**4** of **6**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					0% return Air+Mist			No returns - possibly grey interbedded mudstone and sandstone band or fault. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 22.60m from previous sheet)*	(11.80)	AZCL
					90% return Air+Mist (Dark grey) 90% return Air+Mis (Grey)			Dark grey MUDSTONE (interbedded mudstone and sandstone). (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	34.40	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**5** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					90% return Air+Mis (Grey)			Dark grey MUDSTONE (interbedded mudstone and sandstone). (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 34.40m from previous sheet)*	(5.60) 40.00	
					90% return Air+Mis (Grey)			Light grey SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	(2.80) 42.80	
					90% return Air+Mist (Dark grey) 90% return Air+Mis (Dark grey/ black)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return.	43.10 (0.70) 43.80	
					90% return Air+Mis (Dark grey) 90%			Dark grey MUDSTONE with coal traces. (PENNINE MIDDLE COAL MEASURES FORMATION) . . . descriptions from rotary open hole drilling are based on limited sample return. *Description on next sheet*	(0.80) 44.60 (0.80)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**27.01.20** End: **29.01.20**	**155.50**	**E:435801.0 N:400409.0**	**6** of **6**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
					return Air+Mis (Light grey)			Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	45.40	
					90% return Air+Mis (Dark grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. Light grey SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION) *(stratum copied from 44.60m from previous sheet)*	(1.50)	
								Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	46.90	
					90% return Air+Mis (Light grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. Light grey SANDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.20)	
									48.10	
					90% return Air+Mis (Dark grey)			. . . descriptions from rotary open hole drilling are based on limited sample return. Dark grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.90)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.	50.00	
								Borehole terminated at 50.00m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary Cored + Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ABennett**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**130.28**	**E:435298.0 N:401021.0**	**1** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								MADE GROUND: Grass over soft dark brown slightly sandy slightly gravelly CLAY. (MADE GROUND)	0.40	
								. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Brown and grey very gravelly CLAY. Gravel is subangular of mudstone. (MADE GROUND)		
					100% return Air+Mis (Black)			. . . descriptions from rotary open hole drilling are based on limited sample return.	(3.90)	
									4.30	
								MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND)		
					100% return Air+Mis (Grey)			. . . descriptions from rotary open hole drilling are based on limited sample return.	(5.40)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

1. Scanned with CAT and Genny prior to drilling
2. No water strikes recorded.
3. Backfilled with bentonite on completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**130.28**	**E:435298.0 N:401021.0**	**2** of **4**

Mechanical Log: Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
					↓			MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND) *(stratum copied from 4.30m from previous sheet)*	9.70	
								MADE GROUND: Grey gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(7.60)	
								MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND) *Description on next sheet*	17.30 17.50	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**130.28**	**E:435298.0 N:401021.0**	**3** of **4**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill	Water			
								. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Grey gravelly CLAY. (MADE GROUND) *(stratum copied from 17.50m from previous sheet)*	(2.30) 19.80	
								MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND)	(0.50) 20.30	
								. . . descriptions from rotary open hole drilling are based on limited sample return. MADE GROUND: Grey gravelly CLAY. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(1.40) 21.70	
								MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND) . . . descriptions from rotary open hole drilling are based on limited sample return.	(6.50)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.02.20** End: **12.02.20**	**130.28**	**E:435298.0 N:401021.0**	**4** of **4**

Mechanical Log					Flush Returns & Details	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)						
								MADE GROUND: Grey very clayey GRAVEL of mudstone. (MADE GROUND) *(stratum copied from 21.70m from previous sheet)*	28.20	
								Grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(3.20)	
								Borehole terminated at 31.40m depth.	31.40	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH521**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**129.78**	**E:435277.0 N:401004.0**	**1** of **3**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
					100% return Air+Mis (Black)			MADE GROUND: Grass over brown gravelly CLAY (MADE GROUND)	(0.80)	
								0.80		
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								MADE GROUND: Brown and grey gravelly CLAY with a low boulder content of sandstone. (MADE GROUND)	(2.00)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								2.80		
					100% return Air+Mis (Grey)			MADE GROUND: Grey gravelly CLAY with low boulder content. (MADE GROUND)	(4.40)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								7.20		
					100% return Air+Mis (Grey)			MADE GROUND: gravelly CLAY. (MADE GROUND)	(2.20)	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
11/02/20	08:00	0.00	None	N/R	-
11/02/20	17:00	23.90	16.50	N/R	-

General Remarks

1. Scanned with CAT and Genny prior to drilling.
2. No water strikes recorded.
3. Borehole terminated on obstruction at 23.80m - thought to be a mineshaft cap.
4. Despite terminating on a refusal at 23.80m borehole dipped to >48m deep on completion (the limit of the tape). This is suggestive of a void beneath the shaft cap.
5. 50mm HDPE pipe installed to 23,80m to allow dipping of the shaft with longer

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log ROTARY COMPOSITE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 31/03/20 - 11:53 | AW1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH521**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.02.20** End: **11.02.20**	**129.78**	**E:435277.0 N:401004.0**	**2** of **3**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
									9.40	
								MADE GROUND: Very gravelly CLAY with low boulder content. (MADE GROUND)	9.80	
								. . . descriptions from rotary open hole drilling are based on limited sample return.		
								MADE GROUND: gravelly CLAY with low to moderate boulder content. (MADE GROUND)		
								. . . descriptions from rotary open hole drilling are based on limited sample return.	(14.00)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

tape.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log ROTARY COMPOSITE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 31/03/20 - 11:53 | AW1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**RBH521**

Contract Ref:	Start: **11.02.20** End: **11.02.20**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638		**129.78**	**E:435277.0 N:401004.0**	**3** of **3**

Mechanical Log								Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water			
								MADE GROUND: gravelly CLAY with low to moderate boulder content. (MADE GROUND) *(stratum copied from 9.80m from previous sheet)*	23.80	
								Borehole terminated at 23.80m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Rotary open hole	**Massenza M-I-5**	**Central Alliance**	**ACox**	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log ROTARY COMPOSITE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 31/03/20 - 11:53 | AW1 |

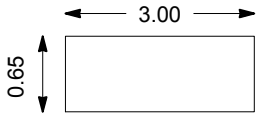
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP501**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
0.50-0.60	1	ES				MADE GROUND: Soft to firm light mottled greyish brown sandy gravelly CLAY with rootlets. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone, brick fragments and coal. (MADE GROUND)	(0.70)	
0.60-0.90	2	LB					0.80	
1.50-1.75	3	B				MADE GROUND: Stiff dark mottled whitish brownish grey slightly sandy slightly gravelly CLAY with a medium cobble and boulder content of mudstone and siltstone. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of predominantly mudstone with coal fragments and siltstone.	(1.00)	
							1.80	
						Trial pit terminated at 1.80m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. No groundwater entry.
4. Difficult excavation due to cobble and boulder content.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:01 | EOR1 |

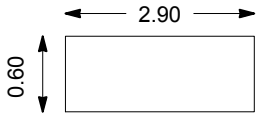
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP502**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
0.40-0.50	1	ES				MADE GROUND: Soft to firm light greyish brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, weathered sandstone, coal fragments and siltstone. With a low cobble content of sandstone. (MADE GROUND)	(0.90)	
0.50-0.70	2	LB					1.00	
1.00-1.10	3	ES				MADE GROUND: Stiff to very stiff dark greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone and siltstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, siltstone and coal fragments. (MADE GROUND)	(0.60)	
1.30-1.60	4	LB					1.60	
						Trial pit terminated at 1.60m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. Groundwater seepage encountered at 0.95m depth.
4. Moderate excavation difficulty.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP503**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
0.50-0.60	1	ES				MADE GROUND: Soft to firm light brown slightly sandy gravelly CLAY with frequent rootlets. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, mudstone, coal and brick. With a medium cobble content including sandstone and brick. (MADE GROUND)	(0.90)	
0.50-0.60	2	LB					1.00	
1.50-1.70	3	LB				MADE GROUND: Firm to stiff dark greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	(0.80)	
						. . . from 1.50m becoming very stiff.		
1.70		V	c_u =>130/>130/>130				1.80	
						Trial pit terminated at 1.80m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. Groundwater seepage encountered at 1.00m depth.
4. Excavation becoming more difficult with depth with very slow progress beneath 1.50m.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:01 | EOR1 |

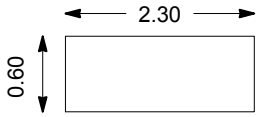
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP504**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
0.20-0.50	2	LB						
0.30-0.40	1	ES				MADE GROUND: Firm to stiff light mottled greyish brown slightly sandy gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone, weathered sandstone, coal and red shale. With a low cobble content. (MADE GROUND)	(1.20)	
0.50		V	c_u=84/110/>130					
						. . . becoming increasingly sandy and gravelly with depth.	1.30	
1.30-1.60	3	B				MADE GROUND: Stiff dark greyish brown slightly sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, coal and sandstone. (MADE GROUND)	(1.30)	
1.40		V	c_u=86/100/109					
						Trial pit terminated at 2.60m depth.	2.60	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. No groundwater entry.
4. Moderate ease of excavation.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:01 | EOR1 |

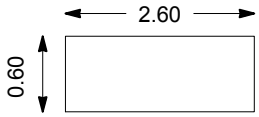
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP505**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10-0.20	1	ES				MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
						MADE GROUND: Soft light brown sandy gravelly CLAY with a medium cobble content including sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone and coal. (MADE GROUND)	(0.95)	
							1.05	
1.10-1.20	2	ES				MADE GROUND: Firm to stiff dark greyish brown slightly sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone and coal fragments. (MADE GROUND)	(1.30)	
1.10-1.30	3	LB					2.35	
						Trial pit terminated at 2.35m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. Groundwater seepage encountered at 1.05m depth.
4. Moderate ease of excavation.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:01 | EOR1 |

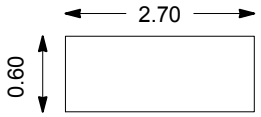
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP506**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30-0.40 0.30-0.60	1 2	ES LB		≈		MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
						MADE GROUND: Soft to firm light greyish brown gravelly sandy CLAY with a low cobble content of sandstone and frequent rootlets. Gravel is angular to subrounded of mixed lithologies including sandstone and coal. (MADE GROUND)	(1.00)	
1.10-1.30 1.20	3	LB V	c_u=78/78/>130	≈		MADE GROUND: Firm to stiff dark mottled greyish brown slightly sandy gravelly CLAY with a low cobble content of mudstone and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone, sandstone and coal. (MADE GROUND)	1.10 (1.90)	
2.40-2.60	4	B					3.00	
						Trial pit terminated at 3.00m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. Groundwater seepages encountered at 0.50m and 1.10m depth.
4. Moderate ease of excavation.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:01 | EOR1 |

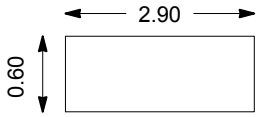
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP507**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**30.10.19**	**---**	**---**	**1** of **1**
	End: **30.10.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20-0.30 0.30	1	ES V	c_u=72/98/98			MADE GROUND: Vegetation over soft greyish brown slightly sandy CLAY. (MADE GROUND)	0.10	
						MADE GROUND: Soft to firm light mottled greyish brown slightly sandy gravelly CLAY with a low cobble content including sandstone and rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, siltstone, coal and mudstone. (MADE GROUND)	(1.00) 1.10	
1.20-1.50	2	LB				MADE GROUND: Stiff dark grey slightly sandy slightly gravelly CLAY with a low cobble content including mudstone and sandstone. Gravel is angular to subrounded fine to coarse including mudstone, sandstone and coal. (MADE GROUND)	(0.70) 1.80	
1.40-1.50	3	ES				Trial pit terminated at 1.80m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit excavation stable.
3. No groundwater entry.
4. Difficult excavation due to cobble and boulder content.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**8 Ton Tracked Excavator**	**ABennett**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

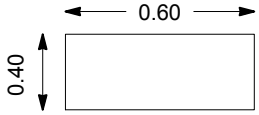
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP508**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**161.14**	**E:436037.8 N:401120.3**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft slightly sandy CLAY with rootlets. (MADE GROUND)	0.25	
						MADE GROUND: Firm to stiff greyish brown slightly sandy slightly gravelly CLAY with loc cobble content. Gravel is angular fine to coarse of mudtsone, sandston and red shale. (MADE GROUND)	(0.95)	
1.00-1.20	1	B					1.20	
						MADE GROUND: Firm blackish and brownish grey slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, red shale, sandstone and coal. Cobbles are of mudstone. (MADE GROUND)		
2.00	2	ES		≈				
						. . . Light greyish brown pockets.		
						. . . 2 boulders of mudstone	(4.30)	
						. . . Abundant red shale		
							5.50	
						Trial pit terminated at 5.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. Water seepage at 3.00m.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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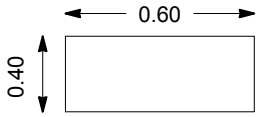
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP509**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**153.82**	**E:435950.7 N:401156.2**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
						MADE GROUND: Firm to stiff greyish brown slightly sandy slightly gravelly CLAY with loc cobble content. Gravel is angular fine to coarse of mudtsone, sandston and red shale. (MADE GROUND)	0.50	
						MADE GROUND: Stiff blackish and brownish grey slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, red shale, sandstone and coal. Cobbles are of mudstone. (MADE GROUND)	(3.00)	
2.00	1	ES						
							3.50	
						MADE GROUND: Cobbly BOULDERS of sandstone. (MADE GROUND)	3.70	
						Trial pit terminated at 3.70m depth, unable to progress beyond boulder.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate becoming difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

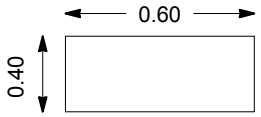
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP510**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**161.08**	**E:435935.9 N:401012.1**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.15	
						MADE GROUND: Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, coal and red shale. (MADE GROUND)	(0.75)	
							0.90	
						MADE GROUND: Stiff dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, red shale and coal. (MADE GROUND)		
1.50	1	B					(2.60)	
							3.50	
						. . . Sandstone boulder at 3.45m depth.		
						Trial pit terminated at 3.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

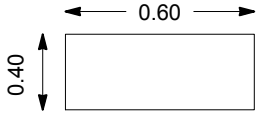
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP511**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**152.60**	**E:435829.3 N:401045.8**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.50	1	ES				MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.10	
						MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudtsone, sandstone, red shale and coal. (MADE GROUND)	(0.70)	
						MADE GROUND: Stiff dark grey slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, sandstone, red shale and coal. Cobbles are of angular mudstone. (MADE GROUND)	0.80	
							(3.00)	
						. . . Mudstone boulders in base of excavation.	3.80	
						Trial pit terminated at 3.80m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

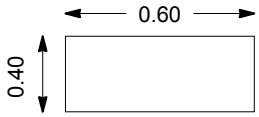
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP512**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**152.84**	**E:435768.9 N:400941.0**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
						MADE GROUND: Soft light greyish brown slightly slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, red shale and coal. (MADE GROUND)	(0.50) 0.70	
1.00	1	ES				MADE GROUND: Firm black slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, sandstone and coal. Cobbles are angular of mudstone. (MADE GROUND)	(0.50) 1.20	
						. . . Plastic water pipe 30mm diameter running between troughs.		
						MADE GROUND: Firm black slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, sandstone and coal. Cobbles are angular of mudstone. (MADE GROUND)	(2.80)	
						Trial pit terminated at 4.00m depth.	4.00	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

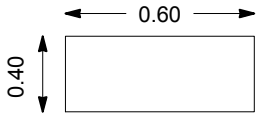
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP513**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**156.75**	**E:435825.8 N:400910.3**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft slightly sandy CLAY with rootlets. (MADE GROUND)	0.15	
0.70	1	B				MADE GROUND: Soft light greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone and coal. (MADE GROUND)	(1.65)	
1.00	2	ES					1.80	
						MADE GROUND: Firm light greyish brown slightly sandy gravelly CLAY with high cobble content. Gravel is angular fine to coarse of sandstone. Cobbles are angular of sandstone. (MADE GROUND)	(0.70)	
						. . . Several boulders of sandstone.	2.50	
						Trial pit terminated at 2.50m depth, unable to progress through boulders of sandstone.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. Water seepage at 3.00m.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

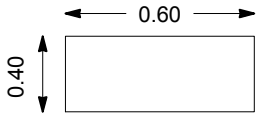
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP514**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**155.81**	**E:435840.5 N:400826.8**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft light brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
0.60 0.60	1 2	B ES				MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone and red shale. (MADE GROUND) . . . Becoming dark blackish brown.	(1.40) 1.60	
						MADE GROUND: Light brown clayey gravelly boulders of sandstone and siltstone. Gravel is angular fine to coarse of sandstone and siltstone. (MADE GROUND)	(0.90) 2.50	
						Trial pit terminated at 2.50m depth, unable to progress beyond boulders.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate becoming difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

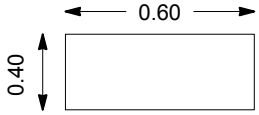
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP515**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**10.12.19**	**150.26**	**E:435748.7 N:400769.2**	**1** of **1**
	End: **10.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.50	1	ES				MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.10	
						MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone and red shale. (MADE GROUND)	(1.10)	
							1.20	
						MADE GROUND: Firm dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone. (MADE GROUND)	(2.60)	
						. . . Becoming cobbly. Cobbles are of sandstone and mudstone.		
							3.80	
						MADE GROUND: Light brown clayey gravelly boulders of sandstone and siltstone. Gravel is angular fine to coarse of sandstone and siltstone. (MADE GROUND)	4.00	
						Trial pit terminated at 4.00m depth, unable to progress beyond boulders.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate becoming difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

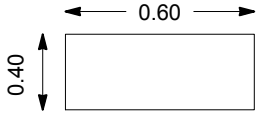
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP517**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.12.19**	**150.45**	**E:435659.5 N:400820.0**	**1** of **1**
	End: **12.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
1.00-1.20	1	B				MADE GROUND: Light greyish brown slightly sandy gravelly CLAY with moderate cobble content and low boulder content. Gravel is angular fine to coarse of mudstone and sandstone. Cobbles and boulders are angular of sandstone. (MADE GROUND)	(1.30)	
1.50	2	ES					1.50	
						MADE GROUND: Brown and grey subangular BOULDERS of sandstone. (MADE GROUND)	(0.50)	
							2.00	
						Trial pit terminated at 2.00m depth, unable to progress through sandstone boulders.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate becoming difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

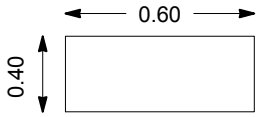
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP518**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.12.19** End: **12.12.19**	**148.37**	**E:435596.5 N:400798.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
						MADE GROUND: Light greyish brown slightly sandy gravelly CLAY with moderate cobble content and low boulder content. Gravel is angular fine to coarse of mudstone and sandstone. Cobbles and boulders are angular of sandstone. (MADE GROUND)	(1.50)	
1.00	1	ES		≈			1.70	
						MADE GROUND: Stiff dark grey slightly sandy gravelly CLAY with high cobble content. Gravel is angular fine to coarse of mudstone. Cobbles are angular of mudstone. (MADE GROUND)	(1.30)	
						. . . Several mudstone boulders.	3.00	
						Trial pit terminated at 3.00m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit unstable.
3. Water seepage at 1.70m.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

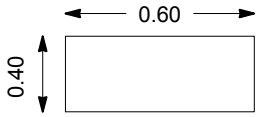
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP519**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.12.19**	**141.17**	**E:435491.5 N:400748.9**	**1** of **1**
	End: **12.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.10	
0.50	1	ES				MADE GROUND: Firm light greyish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone and sandstone. Cobbles are angular of mudstone. (MADE GROUND)	(1.10)	
							1.20	
						MADE GROUND: Firm black slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and occasional red shale and coal. (MADE GROUND)	(3.00)	
							4.20	
						Trial pit terminated at 4.20m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

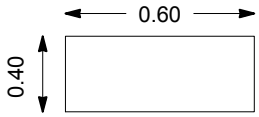
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP520**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.12.19**	**149.73**	**E:435634.4 N:400865.6**	**1** of **1**
	End: **12.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.15	
0.50-0.70	1	B				MADE GROUND: Soft light browish grey slightly sandy gravelly friable CLAY. Gravel is angular fine to coarse of sandstone and mudstone. (MADE GROUND)	(1.45)	
0.80	2	ES				. . . Land drain	1.60	
						MADE GROUND: Stiff dark blackish grey slightly sandy gravelly friable CLAY with low cobble content. Gravel is angular fine to coarse of mudstone and occasional coal. Cobble are angular of mudstone. (MADE GROUND)	(1.90)	
						. . . Pit collapse at 1.70m	3.50	
						Trial pit terminated at 3.50m depth due to several collapses.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit unstable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

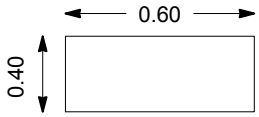
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP521**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**12.12.19**	**143.33**	**E:435473.5 N:400860.8**	**1** of **1**
	End: **12.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.15	
0.70	1	ES				MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY with high cobble content. Gravel is angular fine to coarse of mudstone. Cobbles are angular of mudstone. (MADE GROUND) . . . at 0.70m depth and drain; hole extended to avoid damage. . . . Several boulders of mudstone.	(3.85)	
						Trial pit terminated at 4.00m depth.	4.00	

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

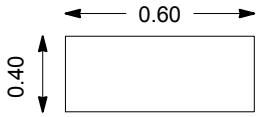
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP522**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.12.19**	**147.37**	**E:435646.9 N:400954.0**	**1** of **1**
	End: **11.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY. (MADE GROUND)	0.20	
0.70	1	ES				MADE GROUND: Soft light brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of sandstone. (MADE GROUND)	(1.20)	
							1.40	
2.00-2.20	2	B				MADE GROUND: Stiff dark blackish grey slightly sandy gravelly CLAY with low cobble content. Gravel is subangular fine to coarse of mudstone, sandstone, coal and occasional wood. Cobbles are angular of mudstone. (MADE GROUND) . . . Pit stability poor- collapse at 1.5m. . . . High cobble content of mudstone.	(3.10)	
							4.50	
						Trial pit terminated at 4.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit unstable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

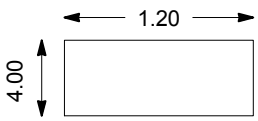
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP523**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.12.19**	**148.44**	**E:435698.9 N:400980.4**	**1** of **1**
	End: **11.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
						MADE GROUND: Soft light brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of sandstone. (MADE GROUND)	(1.00)	
0.80-1.00	1	B					1.20	
						MADE GROUND: Stiff dark blackish grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular fine to coarse of mudstone, sandstone and coal. Cobbles are angular of mudstone and occasionally brick. (MADE GROUND)	(2.80)	
3.50	2	ES					4.00	
						Trial pit terminated at 4.00m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate becoming difficult.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

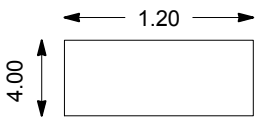
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP524**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.12.19**	**148.67**	**E:435735.9 N:401024.5**	**1** of **1**
	End: **11.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	(0.50) 0.50	
0.60-0.90	1	B				MADE GROUND: Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudtsone and sandstone. (MADE GROUND) . . . Becoming greyish brown.	(3.30) 3.80	
4.00	2	ES				MADE GROUND: Soft brownish grey slightly sandy gravelly CLAY with moderate cobble content. Gravel is angular fine to coarse of mudstone. Cobbles are angular of sandstone. (MADE GROUND)	(0.70) 4.50	
						Trial pit terminated at 4.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit unstable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP525**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.12.19**	**138.82**	**E:435631.8 N:401089.9**	**1** of **1**
	End: **11.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.20	
						MADE GROUND: Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudtsone and sandstone. (MADE GROUND)	(0.70)	
							0.90	
						. . . Land drain.		
						MADE GROUND: Firm dark brownish grey slightly sandy slightly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone and sandstone. Cobbles are angular of mudstone and sandstone. (MADE GROUND)	(1.50)	
							2.40	
2.50	1	ES				MADE GROUND: Firm greyish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone and sandstone. Cobbles are angular of sandstone. (MADE GROUND)	(1.30)	
							3.70	
						MADE GROUND: Stiff black slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, coal and red shale. Cobbles are angular of mudstone. (MADE GROUND)	(0.50)	
							4.20	
						. . . Wood fragment with creosote odour at 4.10m.		
						Trial pit terminated at 4.20m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

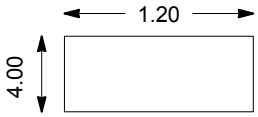
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Rockingham	**Harworth Estates**	**TP526**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**11.12.19**	**140.79**	**E:435689.7 N:401125.7**	**1** of **1**
	End: **11.12.19**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				MADE GROUND: Very soft slightly sandy CLAY with rootlets. (MADE GROUND)	0.15	
						MADE GROUND: Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone and sandstone. (MADE GROUND)	(0.95)	
							1.10	
						. . . Land drain at 1.00m		
						MADE GROUND: Stiff black slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular fine to coarse of mudstone, coal and red shale. Cobbles are angular of mudstone. (MADE GROUND)	(3.40)	
						. . . Abundant cobbles		
							4.50	
						Trial pit terminated at 4.50m depth.		

Plan (Not to Scale)



General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. Trial pit stable.
3. No water strikes.
4. Ease of excavation moderate.
5. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:35**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**13 Ton Tracked Excavator**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:02 | EOR1 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS101**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.12.19** End: **03.12.19**	**139.48**	**E:435908.9 N:401312.8**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec	0.40	1	ES				POSSIBLE MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (POSSIBLE MADE GROUND)	0.10	
							POSSIBLE MADE GROUND: Stiff grey and light brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse mudstone, coal and siltstone. (POSSIBLE MADE GROUND)	(1.30)	
1.00 - 1.43 (86mm dia) 45% rec	1.00-1.43	1	SPT	104 blows for 278mm				1.40	
							POSSIBLE MADE GROUND: Mudstone recovered as coarse angular gravel. (POSSIBLE MADE GROUND)	1.43	
							Borehole terminated at 1.43m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:09 | EOR1 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS102**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**02.12.19** End: **02.12.19**	**143.18**	**E:435943.7 N:401271.8**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec	0.20	1	ES				MADE GROUND: Very soft browm slightly sandy CLAY with rootlets. (MADE GROUND)	0.10	
							MADE GROUND: Stiff light greyish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, red shale, mudstone and coal. (MADE GROUND)	(0.90)	
								1.00	
1.00 - 2.00 (76mm dia) 100% rec	1.00-1.45	1	SPT	N=29			MADE GROUND: Stiff dark blackish grey and light brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, mudstone and coal. (MADE GROUND)		
	1.20	2	ES						
2.00 - 3.00 (76mm dia) 100% rec	2.00-2.45	2	SPT	N=25				(3.00)	
	2.60-3.05	3	SPT	N=26					
3.00 - 4.00 (76mm dia) 100% rec								4.00	
							Borehole terminated at 4.00m depth.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:09 | EOR1 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS103**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**02.12.19** End: **02.12.19**	**147.62**	**E:435965.1 N:401230.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec							MADE GROUND: Soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	0.10	
							MADE GROUND: Stiff light greyish brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, coal and mudstone. (MADE GROUND)	(1.10)	
1.00 - 1.40 (76mm dia) 40% rec	1.00-1.35	1	SPT	61 blows for 195mm				1.20	
							MADE GROUND: Stiff friable black slightly sandy gravelly CLAY. Gravel is fine to coarse of mudstone and coal. (MADE GROUND)	1.40	
							MADE GROUND: Mudstone BOULDER recovered as sandy angular gravel. (MADE GROUND)	1.45	
							Borehole terminated at 1.45m depth refusal on a suspected boulder within the made ground.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:09 | EOR1 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS104**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**02.12.19** End: **02.12.19**	**156.38**	**E:436012.0 N:401180.9**	**1** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec	0.20	1	ES				MADE GROUND: Soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	(0.30) 0.30	
							MADE GROUND: Firm light brown and dark browm slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone and red shale. (MADE GROUND)	(0.60) 0.90	
	1.00-1.45	1	SPT	N=13			MADE GROUND: Stiff black slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, coal and red shale. (MADE GROUND)		
1.00 - 2.00 (86mm dia) 100% rec	1.20	2	ES				. . . from 1.20m to 1.60m depth firm.		
	2.00-2.45	2	SPT	N=46			. . . from 1.90m to 2.50m depth friable and very gravelly		
2.00 - 3.00 (86mm dia) 100% rec									
	3.00-3.45	3	SPT	N=14			. . . from 3.00m to 3.50m depth friable	(4.55)	
3.00 - 4.00 (76mm dia) 90% rec									
	4.00-4.45	4	SPT	N=11					
4.00 - 5.00 (76mm dia) 70% rec									

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 28/02/20 - 13:09 | EOR1 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS104**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**02.12.19** End: **02.12.19**	**156.38**	**E:436012.0 N:401180.9**	**2** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (76mm dia) 70% rec	5.00-5.45	5	SPT	N=26			MADE GROUND: Stiff black slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone, coal and red shale. (MADE GROUND) *(stratum copied from 0.90m from previous sheet)*	5.45	
							Borehole terminated at 5.45m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS105**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**02.12.19** End: **02.12.19**	**161.36**	**E:436041.5 N:401121.9**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 85% rec	0.40	1	ES				MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets. (MADE GROUND)	(0.40) 0.40	
	1.00-1.45	1	SPT	N=20			MADE GROUND: Stiff brown and light brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of sandstone, coal and brick. (MADE GROUND)	(1.10) 1.50	
1.00 - 2.00 (101mm dia) 100% rec	1.30	2	ES						
	2.00-2.45	2	SPT	N=12			MADE GROUND: Stiff blackish and light brownish grey slightly sandy gravelly CLAY. Gravel is subangular fine to coarse of mudstone. (MADE GROUND) . . . at 2.00m depth becoming stiff.	(1.86)	
2.00 - 2.60 (86mm dia) 60% rec							. . . at 2.60m depth mudstone boulder.		
	3.00-3.36	3	SPT	N=61*				3.36	
							Borehole terminated at 3.36m depth due to SPT refusal.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS106**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.12.19** End: **03.12.19**	**145.92**	**E:435860.9 N:401181.3**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec	0.30-0.40	1	ES				MADE GROUND: Very soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	(0.40) 0.40	
	0.70	2	ES				MADE GROUND: Stiff dark greyish brown and ligt brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, sandstone and coal. (MADE GROUND)	(0.90) 1.30	
1.00 - 2.00 (86mm dia) 100% rec	1.00-1.45	1	SPT	N=23					
	2.00-2.45	2	SPT	N=36			MADE GROUND: Firm to stiff blackish grey and occasionally light brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone, coal, rare red shale and sandstone. (MADE GROUND)	(3.12) 4.42	
2.00 - 3.00 (76mm dia) 70% rec	2.60-3.05	3	SPT	N=26			. . . from 3.00m to 4.00m depth cobbles of mudstone.		
3.00 - 4.00 (76mm dia) 100% rec	4.00-4.42	4	SPT	N=56*					
							Borehole terminated at 4.42m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:30**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS107**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.12.19** End: **03.12.19**	**143.75**	**E:435735.6 N:401110.5**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec							MADE GROUND: Very soft brown slightly sandy CLAY with roots. (MADE GROUND)	0.15	
							MADE GROUND: Stiff light brown and grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse ofmudstone, sandstone and red shale. (MADE GROUND)	(0.55) 0.70	
	1.00-1.45	1	SPT	N=18			MADE GROUND: Stiff blackish grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of mudstone and coal. (MADE GROUND)	(0.80) 1.50	
1.00 - 1.75 (86mm dia) 100% rec							Very weak extremely weathered MUDSTONE. . . . from 1.50m to 1.70m depth weathered mudstone.	(0.63) 2.13	
	1.70-2.13	2	SPT	N=53*			Borehole terminated at 2.13m depth following SPT refusal on mudstone.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Rockingham	**Harworth Estates**	**WS108**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
322638	**03.12.19** End: **03.12.19**	**145.04**	**E:435698.0 N:401052.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
0.00 - 1.00 (101mm dia) 100% rec	0.00-0.55	1	ES				MADE GROUND: Soft brown slightly sandy CLAY with rootlets. (MADE GROUND)	(0.55) 0.55	
	1.00-1.45	1	SPT	N=14			MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of mudstone and siltstone. (MADE GROUND)	(0.55) 1.10	
1.00 - 2.00 (86mm dia) 100% rec	1.40	2	ES				MADE GROUND: Soft grey very gravelly CLAY. Gravel is angular fine to coarse of mudstone. (MADE GROUND)	(1.59)	
2.00 - 2.69 (76mm dia) 100% rec	2.00-2.45	2	SPT	N=64					
	2.65-2.69	3	SPT	75 blows for 40mm			. . . at 2.60m depth possible sandstone boulder - SPT refusal. Borehole terminated at 2.69m depth, unable to progress beyond sandstone boulder.	2.69	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. Backfilled with arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**Central Alliance**	**WHopkins**	A.C

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APPENDIX G
GROUND GAS MONITORING DATA

IN-SITU GAS MONITORING RESULTS

	Start Date	End Date	Pressures Previous	Pressures During	Pressures Start	Pressures End	Equipment Used & Remarks
Round G1413/01/2020	15/01/2020	Fluctuating	Fluctuating	994	985	GA5000 | Weather: Overcast | Ground: Wet | Wind: Medium | Air Temp: 6°C | Summary: 1
Round G1527/01/2020	28/01/2020	Constant	Falling	982	974	GA5000 | Weather: Cloudy | Ground: Damp | Wind: Light | Air Temp: 7°C | Summary: 1
Round G1610/02/2020	11/02/2020	-	-	978	983	GA5000 | Weather: Windy | Ground: Wet | Wind: Medium | Air Temp: 3°C | Summary: 1
Round G1727/02/2020	28/02/2020	-	-	980	989	Weather: Overcast | Ground: Dry | Air Temp: 5°C | Summary: 1

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH204	1	50	G14	3.70	3.36	1.00 to 3.70	15/01/2020 08:50:00	983	983	$0.0_{(I)}$	2.36	0.1	0.0	20.9	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	15 secs	983	983	$0.0_{(SS)}$	2.36	2.3	0.0	17.8	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	30 secs	983	983	-	2.36	2.3	0.0	11.6	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	60 secs	983	983	-	2.36	2.1	0.0	11.7	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	90 secs	983	983	-	2.36	2.0	0.0	12.2	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	120 secs	983	983	-	2.36	2.1	0.0	12.0	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	180 secs	983	983	-	2.36	2.1	0.0	12.0	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	240 secs	983	983	-	2.36	2.0	0.0	12.1	0.0	0	0
BH204	1	50	G14		3.36	1.00 to 3.70	300 secs	983	983	-	2.36	2.1	0.0	12.3	0.0	0	0
BH204	1	50	G15	3.70	3.40	1.00 to 3.70	28/01/2020 09:08:00	973	973	$0.0_{(I)}$	2.35	0.1	0.0	21.0	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	15 secs	973	973	$0.1_{(SS)}$	2.35	4.3	0.0	14.1	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	30 secs	973	973	-	2.35	4.3	0.0	8.6	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	60 secs	973	973	-	2.35	4.2	0.0	8.7	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	90 secs	973	973	-	2.35	4.2	0.0	8.5	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	120 secs	973	973	-	2.35	4.1	0.0	8.7	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	180 secs	973	973	-	2.35	4.2	0.0	8.6	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	240 secs	973	973	-	2.35	4.1	0.0	8.8	0.0	-	-
BH204	1	50	G15		3.40	1.00 to 3.70	300 secs	973	973	-	2.35	4.1	0.0	9.1	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
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Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:03 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH204	1	50	G17	3.70	---	1.00 to 3.70	27/02/2020 10:18:00	983	983	-	-	-	-	-	-	-	-
BH208	1	50	G14	13.00	11.90	1.00 to 13.00	15/01/2020 10:46:00	982	982	$0.0_{(I)}$	11.15	0.1	0.0	20.9	0.0	0	0
BH208	1	50	G14		11.56	1.00 to 13.00	15 secs	982	982	$0.0_{(SS)}$	10.81	0.5	0.0	20.3	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	30 secs	982	982	-	11.15	0.5	0.0	19.7	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	60 secs	982	982	-	11.15	0.5	0.0	19.6	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	90 secs	982	982	-	11.15	0.5	0.0	19.5	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	120 secs	982	982	-	11.15	0.6	0.0	19.4	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	180 secs	982	982	-	11.15	0.8	0.0	19.1	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	240 secs	982	982	-	11.15	1.4	0.0	18.1	0.0	0	0
BH208	1	50	G14		11.90	1.00 to 13.00	300 secs	982	982	-	11.15	1.8	0.0	17.3	0.0	0	0
BH208	1	50	G15	13.00	12.35	1.00 to 13.00	28/01/2020 11:09:00	972	972	$0.0_{(I)}$	11.59	0.2	0.0	20.6	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	15 secs	972	972	$0.0_{(SS)}$	11.59	0.3	0.0	20.4	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	30 secs	972	972	-	11.59	0.3	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	60 secs	972	972	-	11.59	0.3	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	90 secs	972	972	-	11.59	0.3	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	120 secs	972	972	-	11.59	0.3	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	180 secs	972	972	-	11.59	0.4	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	240 secs	972	972	-	11.59	0.4	0.0	20.3	0.0	-	-
BH208	1	50	G15		12.35	1.00 to 13.00	300 secs	972	972	-	11.59	0.4	0.0	20.3	0.0	-	-
BH208	1	50	G16	13.00	11.88	1.00 to 13.00	11/02/2020 11:27:00	987	980	$0.0_{(I)}$	11.13	1.0	0.1	19.7	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	15 secs	987	980	$0.3_{(SS)}$	11.13	2.7	0.1	17.0	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	30 secs	987	980	-	11.13	2.7	0.1	11.4	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	60 secs	987	980	-	11.13	2.7	0.1	10.1	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	90 secs	987	980	-	11.13	2.8	0.1	10.0	2.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
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Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:03 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH208	1	50	G16		11.88	1.00 to 13.00	120 secs	987	980	-	11.13	2.8	0.1	10.0	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	180 secs	987	980	-	11.13	2.8	0.1	9.9	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	240 secs	987	980	-	11.13	2.8	0.1	9.9	2.0	-	-
BH208	1	50	G16		11.88	1.00 to 13.00	300 secs	987	980	-	11.13	2.8	0.1	9.9	2.0	-	-
BH208	1	50	G17	13.00	11.88	1.00 to 13.00	27/02/2020 12:04:00	981	981	-	11.10	0.1	0.0	20.6	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	15 secs	981	981	-	11.10	1.4	0.0	16.7	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	30 secs	981	981	-	11.10	1.4	0.0	12.9	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	60 secs	981	981	-	11.10	1.5	0.0	12.5	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	90 secs	981	981	-	11.10	1.5	0.0	12.3	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	120 secs	981	981	-	11.10	1.5	0.0	12.2	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	180 secs	981	981	-	11.10	1.6	0.0	12.0	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	240 secs	981	981	-	11.10	1.6	0.0	11.8	0.0	-	-
BH208	1	50	G17		11.88	1.00 to 13.00	300 secs	981	981	-	11.10	1.7	0.0	11.6	0.0	-	-
BH302	1	50	G14	6.00	6.03	3.00 to 6.00	13/01/2020 15:39:00	983	979	$1.8_{(I)}$	5.08	0.3	0.0	20.9	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	15 secs	983	979	$1.8_{(SS)}$	5.08	6.4	0.0	15.3	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	30 secs	983	979	-	5.08	6.5	0.0	5.0	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	60 secs	983	979	-	5.08	6.5	0.0	2.2	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	90 secs	983	979	-	5.08	6.5	0.0	2.0	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	120 secs	983	979	-	5.08	6.6	0.0	1.9	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	180 secs	983	979	-	5.08	6.6	0.0	1.9	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	240 secs	983	979	-	5.08	6.6	0.0	1.8	0.0	0	0
BH302	1	50	G14		6.03	3.00 to 6.00	300 secs	983	979	-	5.08	6.6	0.0	1.8	0.0	0	0
BH302	1	50	G15	6.00	6.02	3.00 to 6.00	27/01/2020 14:31:00	982	981	$0.1_{(I)}$	5.12	0.3	0.0	20.6	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	15 secs	982	981	$0.7_{(SS)}$	5.12	5.5	0.0	7.2	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:04 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH302	1	50	G15		6.02	3.00 to 6.00	30 secs	982	981	-	5.12	5.6	0.0	1.4	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	60 secs	982	981	-	5.12	5.6	0.0	1.1	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	90 secs	982	981	-	5.12	5.6	0.0	1.0	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	120 secs	982	981	-	5.12	5.7	0.0	1.0	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	180 secs	982	981	-	5.12	5.8	0.0	0.9	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	240 secs	982	981	-	5.12	5.9	0.0	0.8	0.0	-	-
BH302	1	50	G15		6.02	3.00 to 6.00	300 secs	982	981	-	5.12	6.1	0.0	0.7	0.0	-	-
BH302	1	50	G16	6.00	6.01	3.00 to 6.00	10/02/2020 10:08:00	978	978	$0.0_{(I)}$	4.87	0.1	0.0	21.1	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	15 secs	978	978	$0.0_{(SS)}$	4.87	3.1	0.0	11.7	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	30 secs	978	978	-	4.87	3.2	0.0	7.8	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	60 secs	978	978	-	4.87	3.3	0.0	7.3	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	90 secs	978	978	-	4.87	3.3	0.0	7.3	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	120 secs	978	978	-	4.87	3.3	0.0	7.4	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	180 secs	978	978	-	4.87	3.3	0.0	7.6	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	240 secs	978	978	-	4.87	3.2	0.0	8.1	0.0	-	-
BH302	1	50	G16		6.01	3.00 to 6.00	300 secs	978	978	-	4.87	3.2	0.0	8.6	0.0	-	-
BH302	1	50	G17	6.00	5.93	3.00 to 6.00	28/02/2020 08:41:00	990	991	$0.0_{(I)}$	5.07	0.3	0.0	21.0	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	15 secs	990	991	$0.0_{(SS)}$	5.07	1.6	0.0	19.5	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	30 secs	990	991	-	5.07	1.6	0.0	17.7	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	60 secs	990	991	-	5.07	1.6	0.0	17.5	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	90 secs	990	991	-	5.07	1.6	0.0	17.5	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	120 secs	990	991	-	5.07	1.5	0.0	17.6	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	180 secs	990	991	-	5.07	1.5	0.0	17.8	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	240 secs	990	991	-	5.07	1.5	0.0	18.0	0.0	-	-
BH302	1	50	G17		5.93	3.00 to 6.00	300 secs	990	991	-	5.07	1.4	0.0	18.1	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH402	1	50	G14	19.00	17.30	13.00 to 19.00	15/01/2020 10:26:00	984	984	$0.0_{(I)}$	16.20	0.1	0.0	20.9	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	15 secs	984	984	$0.0_{(SS)}$	16.20	5.2	0.0	18.5	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	30 secs	984	984	-	16.20	3.6	0.0	15.8	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	60 secs	984	984	-	16.20	2.2	0.0	17.5	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	90 secs	984	984	-	16.20	1.4	0.0	18.7	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	120 secs	984	984	-	16.20	0.9	0.0	19.3	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	180 secs	984	984	-	16.20	0.4	0.0	20.1	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	240 secs	984	984	-	16.20	0.4	0.0	20.2	0.0	0	0
BH402	1	50	G14		17.30	13.00 to 19.00	300 secs	984	984	-	16.20	0.4	0.0	20.2	0.0	0	0
BH402	1	50	G15	19.00	17.33	13.00 to 19.00	28/01/2020 10:51:00	974	974	$0.0_{(I)}$	16.84	0.2	0.0	20.6	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	15 secs	974	974	$0.0_{(SS)}$	16.84	1.0	0.0	20.2	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	30 secs	974	974	-	16.84	0.6	0.0	20.1	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	60 secs	974	974	-	16.84	0.5	0.0	20.2	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	90 secs	974	974	-	16.84	0.4	0.0	20.3	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	120 secs	974	974	-	16.84	0.4	0.0	20.3	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	180 secs	974	974	-	16.84	0.4	0.0	20.3	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	240 secs	974	974	-	16.84	0.4	0.0	20.3	0.0	-	-
BH402	1	50	G15		17.33	13.00 to 19.00	300 secs	974	974	-	16.84	0.3	0.0	20.3	0.0	-	-
BH402	1	50	G16	19.00	17.29	13.00 to 19.00	11/02/2020 11:11:00	981	982	$0.0_{(I)}$	16.51	0.2	0.1	20.2	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	15 secs	981	982	$0.4_{(SS)}$	16.51	5.2	0.1	20.2	0.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	30 secs	981	982	-	16.51	5.8	0.1	18.5	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	60 secs	981	982	-	16.51	6.1	0.1	15.5	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	90 secs	981	982	-	16.51	6.1	0.1	15.1	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	120 secs	981	982	-	16.51	6.1	0.1	15.0	2.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH402	1	50	G16		17.29	13.00 to 19.00	180 secs	981	982	-	16.51	6.2	0.1	14.9	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	240 secs	981	982	-	16.51	6.3	0.1	14.9	2.0	-	-
BH402	1	50	G16		17.29	13.00 to 19.00	300 secs	981	982	-	16.51	6.3	0.1	14.8	2.0	-	-
BH402	1	50	G17	19.00	17.29	13.00 to 19.00	27/02/2020 11:47:00	982	982	$0.0_{(I)}$	16.74	0.1	0.0	20.6	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	15 secs	982	982	$-0.1_{(SS)}$	16.74	0.1	0.0	20.6	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	30 secs	982	982	-	16.74	0.1	0.0	21.0	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	60 secs	982	982	-	16.74	0.1	0.0	20.5	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	90 secs	982	982	-	16.74	0.1	0.0	20.5	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	120 secs	982	982	-	16.74	0.1	0.0	20.6	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	180 secs	982	982	-	16.74	0.1	0.0	20.6	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	240 secs	982	982	-	16.74	0.1	0.0	20.6	0.0	-	-
BH402	1	50	G17		17.29	13.00 to 19.00	300 secs	982	982	-	16.74	0.1	0.0	20.6	0.0	-	-
BH501	2	50	G14	13.00	12.16	9.00 to 13.00	13/01/2020 10:22:00	993	992	$0.1_{(I)}$	12.04	0.3	0.0	20.9	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	15 secs	993	992	$0.4_{(SS)}$	12.04	17.3	0.0	16.5	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	30 secs	993	992	-	12.04	16.3	0.0	4.7	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	60 secs	993	992	-	12.04	16.2	0.0	2.8	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	90 secs	993	992	-	12.04	16.2	0.0	2.6	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	120 secs	993	992	-	12.04	16.3	0.0	2.5	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	180 secs	993	992	-	12.04	16.3	0.0	2.4	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	240 secs	993	992	-	12.04	16.4	0.0	2.3	0.0	0	0
BH501	2	50	G14		12.16	9.00 to 13.00	300 secs	993	992	-	12.04	16.4	0.0	2.3	0.0	0	0
BH501	1	50	G14 (2)	3.00	3.04	1.00 to 3.00	13/01/2020 10:32:00	993	992	$0.1_{(I)}$	2.91	0.3	0.0	20.9	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	15 secs	993	992	$0.6_{(SS)}$	2.91	14.2	0.0	15.4	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	30 secs	993	992	-	2.91	14.4	0.0	6.7	0.0	0	0

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	60 secs	993	992	-	2.91	14.4	0.0	5.3	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	90 secs	993	992	-	2.91	14.4	0.0	5.2	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	120 secs	993	992	-	2.91	14.5	0.0	5.1	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	180 secs	993	992	-	2.91	14.7	0.0	4.9	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	240 secs	993	992	-	2.91	14.8	0.0	4.8	0.0	0	0
BH501	1	50	G14 (2)		3.04	1.00 to 3.00	300 secs	993	992	-	2.91	14.8	0.0	4.8	0.0	0	0
BH501	1	50	G15	3.00	3.07	1.00 to 3.00	27/01/2020 14:11:00	982	981	$0.1_{(I)}$	DRY	0.2	0.0	20.8	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	15 secs	982	981	$0.5_{(SS)}$	DRY	15.2	0.0	8.1	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	30 secs	982	981	-	DRY	15.3	0.0	3.7	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	60 secs	982	981	-	DRY	15.5	0.0	3.4	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	90 secs	982	981	-	DRY	15.5	0.0	3.4	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	120 secs	982	981	-	DRY	15.5	0.0	3.4	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	180 secs	982	981	-	DRY	15.6	0.0	3.3	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	240 secs	982	981	-	DRY	15.7	0.0	3.3	0.0	-	-
BH501	1	50	G15		3.07	1.00 to 3.00	300 secs	982	981	-	DRY	15.9	0.0	3.3	0.0	-	-
BH501	2	50	G15 (2)	13.00	12.15	9.00 to 13.00	27/01/2020 14:20:00	982	981	$0.1_{(I)}$	12.09	0.2	0.0	20.7	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	15 secs	982	981	$0.4_{(SS)}$	12.09	22.5	0.0	6.4	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	30 secs	982	981	-	12.09	22.8	0.0	0.3	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	60 secs	982	981	-	12.09	23.0	0.0	0.0	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	90 secs	982	981	-	12.09	22.9	0.0	0.0	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	120 secs	982	981	-	12.09	22.9	0.0	0.0	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	180 secs	982	981	-	12.09	22.8	0.0	0.0	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	240 secs	982	981	-	12.09	23.0	0.0	0.0	0.0	-	-
BH501	2	50	G15 (2)		12.15	9.00 to 13.00	300 secs	982	981	-	12.09	23.0	0.0	0.0	0.0	-	-
BH501	1	50	G16	3.00	3.07	1.00 to 3.00	10/02/2020 10:20:00	977	977	$0.0_{(I)}$	DRY	0.2	0.0	21.8	0.0	-	-

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH501	1	50	G16		3.07	1.00 to 3.00	15 secs	977	977	$0.0_{(SS)}$	DRY	0.2	0.0	21.8	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	30 secs	977	977	-	DRY	0.1	0.0	21.9	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	60 secs	977	977	-	DRY	0.1	0.0	21.9	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	90 secs	977	977	-	DRY	0.1	0.0	21.9	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	120 secs	977	977	-	DRY	0.1	0.0	21.9	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	180 secs	977	977	-	DRY	0.1	0.0	22.0	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	240 secs	977	977	-	DRY	0.1	0.0	22.0	0.0	-	-
BH501	1	50	G16		3.07	1.00 to 3.00	300 secs	977	977	-	DRY	0.1	0.0	22.1	0.0	-	-
BH501	2	50	G16 (2)	13.00	12.14	9.00 to 13.00	10/02/2020 10:30:00	978	978	$0.0_{(I)}$	12.08	0.1	0.0	20.9	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	15 secs	978	978	$0.0_{(SS)}$	12.08	0.7	0.0	20.7	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	30 secs	978	978	-	12.08	0.7	0.0	20.7	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	60 secs	978	978	-	12.08	0.5	0.0	20.8	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	90 secs	978	978	-	12.08	0.2	0.0	20.9	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	120 secs	978	978	-	12.08	0.1	0.0	20.9	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	180 secs	978	978	-	12.08	0.1	0.0	21.0	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	240 secs	978	978	-	12.08	0.1	0.0	21.0	0.0	-	-
BH501	2	50	G16 (2)		12.14	9.00 to 13.00	300 secs	978	978	-	12.08	0.1	0.0	21.0	0.0	-	-
BH501	1	50	G17	3.00	3.07	1.00 to 3.00	28/02/2020 08:22:00	991	992	$0.0_{(I)}$	3.06	0.3	0.0	21.0	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	15 secs	991	992	$-0.2_{(SS)}$	3.06	2.1	0.0	21.0	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	30 secs	991	992	-	3.06	2.3	0.0	20.8	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	60 secs	991	992	-	3.06	2.5	0.0	20.5	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	90 secs	991	992	-	3.06	2.7	0.0	20.2	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	120 secs	991	992	-	3.06	3.1	0.0	20.0	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	180 secs	991	992	-	3.06	3.6	0.0	20.0	0.0	-	-
BH501	1	50	G17		3.07	1.00 to 3.00	240 secs	991	992	-	3.06	3.7	0.0	20.0	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:05 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH501	1	50	G17		3.07	1.00 to 3.00	300 secs	991	992	-	3.06	3.7	0.0	20.0	0.0	-	-
BH501	2	50	G17 (2)	13.00	12.14	9.00 to 13.00	28/02/2020 08:31:00	991	992	$0.0_{(I)}$	12.04	0.3	0.0	21.0	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	15 secs	991	992	$-0.3_{(SS)}$	12.04	7.1	0.0	17.8	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	30 secs	991	992	-	12.04	7.3	0.0	13.0	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	60 secs	991	992	-	12.04	7.3	0.0	12.5	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	90 secs	991	992	-	12.04	7.4	0.0	12.4	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	120 secs	991	992	-	12.04	7.4	0.0	12.4	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	180 secs	991	992	-	12.04	7.3	0.0	12.5	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	240 secs	991	992	-	12.04	7.2	0.0	12.6	0.0	-	-
BH501	2	50	G17 (2)		12.14	9.00 to 13.00	300 secs	991	992	-	12.04	7.2	0.0	12.6	0.0	-	-
BH502	1	50	G14	8.00	7.67	2.00 to 8.00	13/01/2020 09:31:00	994	993	$0.1_{(I)}$	DRY	0.3	0.0	20.9	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	15 secs	994	993	$0.6_{(SS)}$	DRY	13.5	0.0	13.8	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	30 secs	994	993	-	DRY	13.7	0.0	4.2	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	60 secs	994	993	-	DRY	13.8	0.0	2.9	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	90 secs	994	993	-	DRY	13.8	0.0	2.9	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	120 secs	994	993	-	DRY	13.8	0.0	2.8	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	180 secs	994	993	-	DRY	13.8	0.0	2.8	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	240 secs	994	993	-	DRY	13.9	0.0	2.8	0.0	0	0
BH502	1	50	G14		7.67	2.00 to 8.00	300 secs	994	993	-	DRY	13.9	0.0	2.7	0.0	0	0
BH502	1	50	G15	8.00	7.67	2.00 to 8.00	27/01/2020 15:07:00	981	980	$0.1_{(I)}$	DRY	0.3	0.0	20.7	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	15 secs	981	980	$0.5_{(SS)}$	DRY	16.2	0.0	8.5	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	30 secs	981	980	-	DRY	16.4	0.0	2.2	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	60 secs	981	980	-	DRY	16.4	0.0	1.8	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	90 secs	981	980	-	DRY	16.5	0.0	1.7	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH502	1	50	G15		7.67	2.00 to 8.00	120 secs	981	980	-	DRY	16.5	0.0	1.7	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	180 secs	981	980	-	DRY	16.5	0.0	1.7	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	240 secs	981	980	-	DRY	16.6	0.0	1.7	0.0	-	-
BH502	1	50	G15		7.67	2.00 to 8.00	300 secs	981	980	-	DRY	16.6	0.0	1.7	0.0	-	-
BH502	1	50	G16	8.00	7.69	2.00 to 8.00	10/02/2020 11:06:00	977	977	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	15 secs	977	977	$0.2_{(SS)}$	DRY	0.1	0.0	20.8	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	30 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	60 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	90 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	120 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	180 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	240 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G16		7.69	2.00 to 8.00	300 secs	977	977	-	DRY	0.1	0.0	20.9	0.0	-	-
BH502	1	50	G17	8.00	7.70	2.00 to 8.00	28/02/2020 09:16:00	989	990	$0.0_{(I)}$	DRY	0.3	0.0	21.0	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	15 secs	989	990	$0.1_{(SS)}$	DRY	9.1	0.0	13.5	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	30 secs	989	990	-	DRY	9.2	0.0	4.6	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	60 secs	989	990	-	DRY	9.3	0.0	3.1	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	90 secs	989	990	-	DRY	9.3	0.0	3.0	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	120 secs	989	990	-	DRY	9.4	0.0	3.0	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	180 secs	989	990	-	DRY	9.4	0.0	2.9	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	240 secs	989	990	-	DRY	9.5	0.0	2.8	0.0	-	-
BH502	1	50	G17		7.70	2.00 to 8.00	300 secs	989	990	-	DRY	9.5	0.0	3.0	0.0	-	-
BH503	1	50	G14	19.00	18.09	17.00 to 19.00	13/01/2020 10:05:00	993	992	$0.1_{(I)}$	DRY	0.3	0.0	20.9	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	15 secs	993	992	$0.5_{(SS)}$	DRY	12.6	0.0	14.1	0.0	0	0

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RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	**18/03/20**			**322638**

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:06 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH503	1	50	G14		18.09	17.00 to 19.00	30 secs	993	992	-	DRY	12.0	0.0	3.1	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	60 secs	993	992	-	DRY	11.9	0.0	1.2	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	90 secs	993	992	-	DRY	12.0	0.0	1.1	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	120 secs	993	992	-	DRY	12.5	0.0	0.7	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	180 secs	993	992	-	DRY	12.7	0.0	0.4	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	240 secs	993	992	-	DRY	12.8	0.0	0.4	0.0	0	0
BH503	1	50	G14		18.09	17.00 to 19.00	300 secs	993	992	-	DRY	12.8	0.0	0.4	0.0	0	0
BH503	1	50	G15	19.00	18.09	17.00 to 19.00	27/01/2020 14:55:00	980	979	$0.2_{(I)}$	DRY	0.3	0.0	20.7	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	15 secs	980	979	$0.6_{(SS)}$	DRY	22.9	0.0	7.5	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	30 secs	980	979	-	DRY	23.4	0.0	1.3	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	60 secs	980	979	-	DRY	23.5	0.0	1.0	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	90 secs	980	979	-	DRY	23.5	0.0	0.9	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	120 secs	980	979	-	DRY	23.5	0.0	0.9	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	180 secs	980	979	-	DRY	23.6	0.0	0.9	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	240 secs	980	979	-	DRY	23.6	0.0	0.9	0.0	-	-
BH503	1	50	G15		18.09	17.00 to 19.00	300 secs	980	979	-	DRY	23.6	0.0	0.9	0.0	-	-
BH503	1	50	G16	19.00	18.05	17.00 to 19.00	10/02/2020 11:15:00	977	977	$0.0_{(I)}$	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	15 secs	977	977	$0.2_{(SS)}$	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	30 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	60 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	90 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	120 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	180 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	240 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-
BH503	1	50	G16		18.05	17.00 to 19.00	300 secs	977	977	-	DRY	0.1	0.0	20.8	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:07 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH503	1	50	G17	19.00	18.09	17.00 to 19.00	28/02/2020 09:05:00	989	990	$0.0_{(I)}$	DRY	0.3	0.0	21.0	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	15 secs	989	990	$0.0_{(SS)}$	DRY	1.3	0.0	21.4	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	30 secs	989	990	-	DRY	0.3	0.0	21.6	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	60 secs	989	990	-	DRY	0.3	0.0	21.7	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	90 secs	989	990	-	DRY	0.2	0.0	21.7	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	120 secs	989	990	-	DRY	0.2	0.0	21.7	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	180 secs	989	990	-	DRY	0.2	0.0	21.7	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	240 secs	989	990	-	DRY	0.2	0.0	21.7	0.0	-	-
BH503	1	50	G17		18.09	17.00 to 19.00	300 secs	989	990	-	DRY	0.3	0.0	21.6	0.0	-	-
BH506	1	50	G16	18.41	14.06	10.50 to 18.41	10/02/2020 12:00:00	976	976	$0.0_{(I)}$	14.05	0.1	0.0	20.5	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	15 secs	976	976	$0.6_{(SS)}$	14.05	0.1	0.0	20.5	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	30 secs	976	976	-	14.05	0.2	0.0	20.5	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	60 secs	976	976	-	14.05	0.2	0.0	20.5	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	90 secs	976	976	-	14.05	0.2	0.0	20.4	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	120 secs	976	976	-	14.05	0.2	0.0	20.4	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	180 secs	976	976	-	14.05	0.3	0.0	20.4	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	240 secs	976	976	-	14.05	0.5	0.0	20.3	0.0	-	-
BH506	1	50	G16		14.06	10.50 to 18.41	300 secs	976	976	-	14.05	0.6	0.0	20.2	0.0	-	-
BH506	1	50	G17	18.41	19.31	10.50 to 18.41	28/02/2020 09:27:00	988	989	$0.0_{(I)}$	19.29	0.3	0.0	20.6	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	15 secs	988	989	$0.1_{(SS)}$	19.29	3.4	0.0	19.2	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	30 secs	988	989	-	19.29	3.8	0.0	17.4	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	60 secs	988	989	-	19.29	5.0	0.0	16.0	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	90 secs	988	989	-	19.29	6.4	0.0	14.4	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	120 secs	988	989	-	19.29	8.1	0.0	12.7	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:07 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH506	1	50	G17		19.31	10.50 to 18.41	180 secs	988	989	-	19.29	10.2	0.0	10.1	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	240 secs	988	989	-	19.29	10.2	0.0	10.4	0.0	-	-
BH506	1	50	G17		19.31	10.50 to 18.41	300 secs	988	989	-	19.29	10.1	0.0	10.4	0.0	-	-
BH507	1	50	G14	19.91	19.30	10.00 to 19.91	13/01/2020 09:49:00	993	992	$0.0_{(I)}$	19.22	0.2	0.0	20.9	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	15 secs	993	992	$0.2_{(SS)}$	19.22	18.1	0.0	14.1	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	30 secs	993	992	-	19.22	18.4	0.0	4.2	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	60 secs	993	992	-	19.22	18.5	0.0	2.8	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	90 secs	993	992	-	19.22	18.5	0.0	2.6	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	120 secs	993	992	-	19.22	18.6	0.0	2.6	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	180 secs	993	992	-	19.22	18.6	0.0	2.5	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	240 secs	993	992	-	19.22	18.6	0.0	2.5	0.0	0	0
BH507	1	50	G14		19.30	10.00 to 19.91	300 secs	993	992	-	19.22	18.6	0.0	2.5	0.0	0	0
BH507	1	50	G15	19.91	19.30	10.00 to 19.91	27/01/2020 15:20:00	979	979	$0.0_{(I)}$	19.26	0.3	0.0	20.8	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	15 secs	979	979	$0.1_{(SS)}$	19.26	24.0	0.0	10.4	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	30 secs	979	979	-	19.26	24.5	0.0	1.4	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	60 secs	979	979	-	19.26	24.6	0.0	0.8	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	90 secs	979	979	-	19.26	24.6	0.0	0.8	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	120 secs	979	979	-	19.26	24.6	0.0	0.7	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	180 secs	979	979	-	19.26	24.6	0.0	0.7	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	240 secs	979	979	-	19.26	24.6	0.0	0.7	0.0	-	-
BH507	1	50	G15		19.30	10.00 to 19.91	300 secs	979	979	-	19.26	24.6	0.0	0.7	0.0	-	-
BH507	1	50	G16	19.91	19.30	10.00 to 19.91	10/02/2020 11:49:00	975	975	$0.0_{(I)}$	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	15 secs	975	975	$0.4_{(SS)}$	19.28	0.1	0.0	20.5	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	30 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-

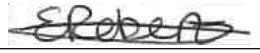
Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH507	1	50	G16		19.30	10.00 to 19.91	60 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	90 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	120 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	180 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	240 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH507	1	50	G16		19.30	10.00 to 19.91	300 secs	975	975	-	19.28	0.1	0.0	20.6	0.0	-	-
BH508	1	50	G14	7.00	6.27	5.00 to 7.00	15/01/2020 08:37:00	983	983	$0.0_{(I)}$	5.11	0.2	0.0	20.9	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	15 secs	983	983	$0.0_{(SS)}$	5.11	1.9	0.0	19.3	0.0	1	0
BH508	1	50	G14		6.27	5.00 to 7.00	30 secs	983	983	-	5.11	1.7	0.0	17.7	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	60 secs	983	983	-	5.11	1.1	0.0	18.7	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	90 secs	983	983	-	5.11	0.9	0.0	19.3	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	120 secs	983	983	-	5.11	0.7	0.0	19.7	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	180 secs	983	983	-	5.11	0.6	0.0	20.1	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	240 secs	983	983	-	5.11	0.5	0.0	20.3	0.0	0	0
BH508	1	50	G14		6.27	5.00 to 7.00	300 secs	983	983	-	5.11	0.6	0.0	20.3	0.0	0	0
BH508	1	50	G15	7.00	6.28	5.00 to 7.00	28/01/2020 08:56:00	972	972	$0.0_{(I)}$	5.19	0.3	0.0	20.6	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	15 secs	972	972	$-0.1_{(SS)}$	5.19	1.6	0.0	19.5	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	30 secs	972	972	-	5.19	1.7	0.0	18.5	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	60 secs	972	972	-	5.19	1.7	0.0	18.4	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	90 secs	972	972	-	5.19	1.8	0.0	18.2	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	120 secs	972	972	-	5.19	1.9	0.0	18.0	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	180 secs	972	972	-	5.19	2.4	0.0	17.3	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	240 secs	972	972	-	5.19	3.2	0.0	16.0	0.0	-	-
BH508	1	50	G15		6.28	5.00 to 7.00	300 secs	972	972	-	5.19	4.3	0.0	13.9	0.0	-	-

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Compiled By	Date	Checked By	Date	Contract Ref:
	**18/03/20**			**322638**

Contract: **Rockingham**

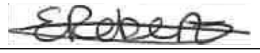
Page: **14** of **38**

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH508	1	50	G16	7.00	6.28	5.00 to 7.00	11/02/2020 09:29:00	982	982	$0.0_{(I)}$	5.20	0.3	0.2	21.5	4.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	15 secs	982	982	$0.2_{(SS)}$	5.20	3.6	0.2	17.6	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	30 secs	982	982	-	5.20	1.7	0.0	20.3	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	60 secs	982	982	-	5.20	1.9	0.0	20.2	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	90 secs	982	982	-	5.20	2.1	0.0	19.9	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	120 secs	982	982	-	5.20	2.3	0.0	19.6	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	180 secs	982	982	-	5.20	3.2	0.0	18.3	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	240 secs	982	982	-	5.20	3.7	0.0	17.7	0.0	-	-
BH508	1	50	G16		6.28	5.00 to 7.00	300 secs	982	982	-	5.20	4.0	0.0	17.1	0.0	-	-
BH508	1	50	G17	7.00	6.26	5.00 to 7.00	27/02/2020 10:06:00	982	982	$0.0_{(I)}$	5.16	0.2	0.0	21.0	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	15 secs	982	982	-0.1	5.16	0.2	0.0	21.0	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	30 secs	982	982	-	5.16	0.1	0.0	21.7	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	60 secs	982	982	-	5.16	0.1	0.0	21.8	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	90 secs	982	982	-	5.16	0.1	0.0	21.9	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	120 secs	982	982	-	5.16	0.1	0.0	21.9	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	180 secs	982	982	-	5.16	0.1	0.0	21.9	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	240 secs	982	982	-	5.16	0.1	0.0	21.9	0.0	-	-
BH508	1	50	G17		6.26	5.00 to 7.00	300 secs	982	982	-	5.16	0.1	0.0	21.9	0.0	-	-
BH511	1	50	G14	13.40	12.60	7.40 to 13.40	15/01/2020 11:51:00	984	985	$0.0_{(I)}$	10.20	0.3	0.0	20.9	0.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	15 secs	984	985	$-0.1_{(SS)}$	10.20	2.2	0.1	17.8	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	30 secs	984	985	-	10.20	2.2	0.1	11.8	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	60 secs	984	985	-	10.20	2.3	0.1	10.2	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	90 secs	984	985	-	10.20	2.5	0.1	9.4	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	120 secs	984	985	-	10.20	2.8	0.1	8.6	2.0	0	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	**18/03/20**			**322638**

Contract: **Rockingham**

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH511	1	50	G14		12.60	7.40 to 13.40	180 secs	984	985	-	10.20	3.3	0.1	6.6	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	240 secs	984	985	-	10.20	3.9	0.1	4.6	2.0	0	0
BH511	1	50	G14		12.60	7.40 to 13.40	300 secs	984	985	-	10.20	4.5	0.1	2.9	2.0	0	0
BH511	1	50	G15	13.40	12.61	7.40 to 13.40	28/01/2020 12:42:00	974	974	$0.0_{(I)}$	10.19	0.3	0.0	20.6	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	15 secs	974	974	$0.0_{(SS)}$	10.19	7.2	0.0	16.4	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	30 secs	974	974	-	10.19	7.3	0.0	7.2	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	60 secs	974	974	-	10.19	7.4	0.0	5.8	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	90 secs	974	974	-	10.19	7.4	0.0	5.7	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	120 secs	974	974	-	10.19	7.4	0.0	5.7	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	180 secs	974	974	-	10.19	7.5	0.0	5.6	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	240 secs	974	974	-	10.19	7.5	0.0	5.5	0.0	-	-
BH511	1	50	G15		12.61	7.40 to 13.40	300 secs	974	974	-	10.19	7.6	0.0	5.4	0.0	-	-
BH511	1	50	G17	13.40	12.58	7.40 to 13.40	27/02/2020 09:45:00	980	980	$0.0_{(I)}$	10.13	0.2	0.0	21.0	0.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	15 secs	980	980	$0.3_{(SS)}$	10.13	7.8	0.1	12.1	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	30 secs	980	980	-	10.13	8.0	0.1	1.9	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	60 secs	980	980	-	10.13	8.1	0.1	0.2	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	90 secs	980	980	-	10.13	8.3	0.1	0.0	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	120 secs	980	980	-	10.13	8.4	0.1	0.0	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	180 secs	980	980	-	10.13	8.6	0.1	0.0	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	240 secs	980	980	-	10.13	8.8	0.1	0.0	2.0	-	-
BH511	1	50	G17		12.58	7.40 to 13.40	300 secs	980	980	-	10.13	9.0	0.1	0.0	2.0	-	-
BH516	1	50	G14	2.45	2.57	2.00 to 2.45	15/01/2020 09:03:00	983	983	$-0.1_{(I)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	15 secs	983	983	$-0.2_{(SS)}$	DRY	4.4	1.2	14.0	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	30 secs	983	983	-	DRY	4.5	1.2	3.4	24.0	1	0

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH516	1	50	G14		2.57	2.00 to 2.45	60 secs	983	983	-	DRY	4.5	1.2	1.9	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	90 secs	983	983	-	DRY	4.6	1.2	1.6	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	120 secs	983	983	-	DRY	4.6	1.2	1.5	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	180 secs	983	983	-	DRY	4.6	1.2	1.4	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	240 secs	983	983	-	DRY	4.7	1.2	1.3	24.0	0	0
BH516	1	50	G14		2.57	2.00 to 2.45	300 secs	983	983	-	DRY	4.8	1.2	1.2	24.0	0	0
BH516	1	50	G15	2.45	2.57	2.00 to 2.45	28/01/2020 09:23:00	974	974	$0.0_{(I)}$	DRY	0.3	0.0	20.9	0.0	-	-
BH516	1	50	G15		2.57	2.00 to 2.45	15 secs	974	974	$0.0_{(SS)}$	DRY	7.2	1.7	11.0	34.0	-	-
BH516	1	50	G15		2.57	2.00 to 2.45	30 secs	974	974	-	DRY	7.3	1.7	1.3	34.0	-	-
BH516	1	50	G15		2.57	2.00 to 2.45	60 secs	974	974	-	DRY	7.3	1.7	0.2	34.0	-	-
BH516	1	50	G15		2.57	2.00 to 2.45	90 secs	974	974	-	DRY	7.4	1.7	0.1	34.0	-	-
BH516	1	50	G15		2.57	2.00 to 2.45	120 secs	974	974	-	DRY	7.4	1.7	0.0	34.0	-	-
BH516	1	50	G16	2.45	2.61	2.00 to 2.45	11/02/2020 09:43:00	982	982	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	15 secs	982	982	$0.1_{(SS)}$	DRY	8.7	1.3	5.7	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	30 secs	982	982	-	DRY	8.8	1.3	0.6	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	60 secs	982	982	-	DRY	8.9	1.3	0.1	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	90 secs	982	982	-	DRY	8.9	1.3	0.0	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	120 secs	982	982	-	DRY	8.9	1.3	0.0	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	180 secs	982	982	-	DRY	8.9	1.3	0.0	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	240 secs	982	982	-	DRY	8.9	1.3	0.0	26.0	-	-
BH516	1	50	G16		2.61	2.00 to 2.45	300 secs	982	982	-	DRY	8.8	1.3	0.0	26.0	-	-
BH516	1	50	G17	2.45	2.62	2.00 to 2.45	27/02/2020 10:21:00	981	982	$0.0_{(I)}$	2.61	0.1	0.0	20.9	0.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	15 secs	981	982	$-0.2_{(SS)}$	2.61	8.6	0.9	11.3	18.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	30 secs	981	982	-	2.61	8.8	0.9	1.8	18.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	60 secs	981	982	-	2.61	8.9	0.9	0.1	18.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH516	1	50	G17		2.62	2.00 to 2.45	90 secs	981	982	-	2.61	8.9	0.9	0.0	18.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	120 secs	981	982	-	2.61	9.0	1.0	0.0	20.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	180 secs	981	982	-	2.61	9.0	1.0	0.1	18.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	240 secs	981	982	-	2.61	8.9	0.9	0.3	18.0	-	-
BH516	1	50	G17		2.62	2.00 to 2.45	300 secs	981	982	-	2.61	8.8	0.9	0.3	18.0	-	-
BH519	1	50	G14	6.00	5.87	1.00 to 6.00	15/01/2020 09:17:00	983	983	$0.0_{(I)}$	5.79	0.3	0.0	20.9	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	15 secs	983	983	$-0.1_{(SS)}$	5.79	3.2	0.0	19.6	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	30 secs	983	983	-	5.79	3.3	0.0	17.7	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	60 secs	983	983	-	5.79	3.5	0.0	17.3	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	90 secs	983	983	-	5.79	3.6	0.0	17.2	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	120 secs	983	983	-	5.79	3.6	0.0	17.1	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	180 secs	983	983	-	5.79	3.6	0.0	17.1	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	240 secs	983	983	-	5.79	3.6	0.0	17.1	0.0	0	0
BH519	1	50	G14		5.87	1.00 to 6.00	300 secs	983	983	-	5.79	3.7	0.0	17.1	0.0	0	0
BH519	1	50	G15	6.00	5.87	1.00 to 6.00	28/01/2020 09:33:00	974	974	$0.0_{(I)}$	DRY	0.3	0.0	20.7	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	15 secs	974	974	$-0.1_{(SS)}$	DRY	0.2	0.0	20.8	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	30 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	60 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	90 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	120 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	180 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	240 secs	974	974	-	DRY	0.1	0.0	20.9	0.0	-	-
BH519	1	50	G15		5.87	1.00 to 6.00	300 secs	974	974	-	DRY	0.2	0.0	20.9	0.0	-	-
BH519	1	50	G16	6.00	5.87	1.00 to 6.00	11/02/2020 09:58:00	982	982	$0.0_{(I)}$	DRY	0.6	0.1	20.4	2.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH519	1	50	G16		5.87	1.00 to 6.00	15 secs	982	982	$0.1_{(SS)}$	DRY	3.4	0.1	18.5	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	30 secs	982	982	-	DRY	3.5	0.0	17.5	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	60 secs	982	982	-	DRY	3.5	0.0	17.4	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	90 secs	982	982	-	DRY	3.5	0.0	17.4	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	120 secs	982	982	-	DRY	3.6	0.0	17.3	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	180 secs	982	982	-	DRY	3.6	0.0	17.2	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	240 secs	982	982	-	DRY	3.7	0.0	17.2	0.0	-	-
BH519	1	50	G16		5.87	1.00 to 6.00	300 secs	982	982	-	DRY	3.8	0.0	17.1	0.0	-	-
BH519	1	50	G17	6.00	5.86	1.00 to 6.00	27/02/2020 10:32:00	981	982	$0.0_{(I)}$	DRY	0.3	0.0	20.6	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	15 secs	981	982	$0.0_{(SS)}$	DRY	0.6	0.0	20.6	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	30 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	60 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	90 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	120 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	180 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	240 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH519	1	50	G17		5.86	1.00 to 6.00	300 secs	981	982	-	DRY	0.1	0.0	20.8	0.0	-	-
BH520	1	50	G14	8.00	7.58	3.00 to 8.00	15/01/2020 09:54:00	984	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH520	1	50	G15	8.00	7.58	3.00 to 8.00	28/01/2020 10:17:00	-	-	-	DRY	-	-	-	-	-	-
BH520	1	50	G16	8.00	7.58	3.00 to 8.00	11/02/2020 10:40:00	-	-	-	DRY	-	-	-	-	-	-
BH521	1	50	G14	6.00	5.83	3.00 to 6.00	15/01/2020 09:31:00	983	984	$0.0_{(I)}$	DRY	0.3	0.0	20.9	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	15 secs	983	984	$-0.2_{(SS)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	30 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:10 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH521	1	50	G14		5.83	3.00 to 6.00	60 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	90 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	120 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	180 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	240 secs	983	984	-	DRY	0.1	0.0	21.1	0.0	0	0
BH521	1	50	G14		5.83	3.00 to 6.00	300 secs	983	984	-	DRY	0.1	0.0	21.0	0.0	0	0
BH521	1	50	G15	6.00	5.83	3.00 to 6.00	28/01/2020 09:45:00	974	974	$0.0_{(I)}$	DRY	0.2	0.0	20.9	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	15 secs	974	974	$-0.1_{(SS)}$	DRY	10.0	0.0	16.9	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	30 secs	974	974	-	DRY	10.1	0.0	11.0	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	60 secs	974	974	-	DRY	10.2	0.0	10.2	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	90 secs	974	974	-	DRY	10.3	0.0	10.1	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	120 secs	974	974	-	DRY	10.3	0.0	10.0	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	180 secs	974	974	-	DRY	10.3	0.0	9.9	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	240 secs	974	974	-	DRY	10.4	0.0	9.8	0.0	-	-
BH521	1	50	G15		5.83	3.00 to 6.00	300 secs	974	974	-	DRY	10.5	0.0	9.7	0.0	-	-
BH521	1	50	G16	6.00	5.82	3.00 to 6.00	11/02/2020 10:07:00	981	982	$0.0_{(I)}$	DRY	0.3	0.0	20.7	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	15 secs	981	982	$0.1_{(SS)}$	DRY	0.4	0.0	20.7	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	30 secs	981	982	-	DRY	0.2	0.0	20.8	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	60 secs	981	982	-	DRY	0.2	0.0	20.8	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	90 secs	981	982	-	DRY	0.2	0.0	20.8	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	120 secs	981	982	-	DRY	0.2	0.0	20.8	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	180 secs	981	982	-	DRY	0.2	0.0	20.8	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	240 secs	981	982	-	DRY	0.2	0.0	20.7	0.0	-	-
BH521	1	50	G16		5.82	3.00 to 6.00	300 secs	981	982	-	DRY	0.2	0.0	20.7	0.0	-	-
BH521	1	50	G17	6.00	5.82	3.00 to 6.00	27/02/2020 10:48:00	980	981	$0.0_{(I)}$	DRY	0.1	0.0	20.7	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH521	1	50	G17		5.82	3.00 to 6.00	15 secs	980	981	$-0.1_{(SS)}$	DRY	0.8	0.0	20.2	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	30 secs	980	981	-	DRY	0.9	0.0	20.0	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	60 secs	980	981	-	DRY	1.0	0.0	19.8	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	90 secs	980	981	-	DRY	1.1	0.0	19.7	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	120 secs	980	981	-	DRY	1.2	0.0	19.5	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	180 secs	980	981	-	DRY	1.6	0.0	19.1	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	240 secs	980	981	-	DRY	2.0	0.0	18.6	0.0	-	-
BH521	1	50	G17		5.82	3.00 to 6.00	300 secs	980	981	-	DRY	2.4	0.0	18.1	0.0	-	-
BH522	1	50	G14	11.00	11.16	6.00 to 11.00	15/01/2020 09:43:00	983	984	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	15 secs	983	984	$-0.1_{(SS)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	30 secs	983	984	-	DRY	0.1	0.0	21.0	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	60 secs	983	984	-	DRY	0.0	0.0	21.0	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	90 secs	983	984	-	DRY	0.0	0.0	20.9	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	120 secs	983	984	-	DRY	0.0	0.0	21.0	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	180 secs	983	984	-	DRY	0.0	0.0	21.0	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	240 secs	983	984	-	DRY	0.0	0.0	20.9	0.0	0	0
BH522	1	50	G14		11.16	6.00 to 11.00	300 secs	983	984	-	DRY	0.0	0.0	20.9	0.0	0	0
BH522	1	50	G15	11.00	11.17	6.00 to 11.00	28/01/2020 09:56:00	974	974	$0.0_{(I)}$	DRY	0.2	0.0	20.9	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	15 secs	974	974	$-0.1_{(SS)}$	DRY	0.1	0.0	20.6	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	30 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	60 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	90 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	120 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	180 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:11 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH522	1	50	G15		11.17	6.00 to 11.00	240 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G15		11.17	6.00 to 11.00	300 secs	974	974	-	DRY	0.1	0.0	20.7	0.0	-	-
BH522	1	50	G16	11.00	11.14	6.00 to 11.00	11/02/2020 10:19:00	981	982	$0.0_{(I)}$	11.13	0.1	0.1	20.9	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	15 secs	981	982	$0.2_{(SS)}$	11.13	6.4	0.1	16.4	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	30 secs	981	982	-	11.13	6.5	0.1	8.9	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	60 secs	981	982	-	11.13	6.7	0.1	7.9	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	90 secs	981	982	-	11.13	6.7	0.1	7.8	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	120 secs	981	982	-	11.13	6.8	0.1	7.7	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	180 secs	981	982	-	11.13	7.0	0.1	7.5	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	240 secs	981	982	-	11.13	7.3	0.1	7.2	2.0	-	-
BH522	1	50	G16		11.14	6.00 to 11.00	300 secs	981	982	-	11.13	7.5	0.1	7.0	2.0	-	-
BH522	1	50	G17	11.00	11.13	6.00 to 11.00	27/02/2020 10:58:00	982	982	$0.0_{(I)}$	DRY	0.3	0.0	20.6	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	15 secs	982	982	$0.0_{(SS)}$	DRY	0.5	0.0	20.0	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	30 secs	982	982	-	DRY	0.2	0.0	20.2	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	60 secs	982	982	-	DRY	0.1	0.0	20.3	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	90 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	120 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	180 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	240 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH522	1	50	G17		11.13	6.00 to 11.00	300 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH523	1	50	G14	11.50	11.19	3.00 to 11.50	15/01/2020 09:57:00	983	984	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	15 secs	983	984	$-0.2_{(SS)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	30 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	60 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH523	1	50	G14		11.19	3.00 to 11.50	90 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	120 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	180 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	240 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G14		11.19	3.00 to 11.50	300 secs	983	984	-	DRY	0.1	0.0	20.9	0.0	0	0
BH523	1	50	G15	11.50	11.20	3.00 to 11.50	28/01/2020 10:08:00	974	974	$0.0_{(I)}$	DRY	0.2	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	15 secs	974	974	$-0.2_{(SS)}$	DRY	0.2	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	30 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	60 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	90 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	120 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	180 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	240 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G15		11.20	3.00 to 11.50	300 secs	974	974	-	DRY	0.1	0.0	20.8	0.0	-	-
BH523	1	50	G16	11.50	11.14	3.00 to 11.50	11/02/2020 10:46:00	981	982	$0.0_{(I)}$	DRY	0.2	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	15 secs	981	982	$0.3_{(SS)}$	DRY	0.2	0.1	20.4	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	30 secs	981	982	-	DRY	0.1	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	60 secs	981	982	-	DRY	0.1	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	90 secs	981	982	-	DRY	0.1	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	120 secs	981	982	-	DRY	0.1	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	180 secs	981	982	-	DRY	0.1	0.1	20.5	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	240 secs	981	982	-	DRY	0.1	0.1	20.4	2.0	-	-
BH523	1	50	G16		11.14	3.00 to 11.50	300 secs	981	982	-	DRY	0.1	0.1	20.4	2.0	-	-
BH523	1	50	G17	11.50	11.15	3.00 to 11.50	27/02/2020 11:10:00	982	982	$0.0_{(I)}$	DRY	0.1	0.0	20.6	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	15 secs	982	982	$0.2_{(SS)}$	DRY	0.3	0.0	19.2	0.0	-	-

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH523	1	50	G17		11.15	3.00 to 11.50	30 secs	982	982	-	DRY	0.2	0.0	20.0	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	60 secs	982	982	-	DRY	0.1	0.0	20.1	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	90 secs	982	982	-	DRY	0.1	0.0	20.1	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	120 secs	982	982	-	DRY	0.1	0.0	20.1	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	180 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	240 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH523	1	50	G17		11.15	3.00 to 11.50	300 secs	982	982	-	DRY	0.1	0.0	20.2	0.0	-	-
BH524	1	50	G14	19.96	19.40	14.00 to 19.96	15/01/2020 10:11:00	984	984	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	15 secs	984	984	$-0.2_{(SS)}$	DRY	0.1	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	30 secs	984	984	-	DRY	0.1	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	60 secs	984	984	-	DRY	0.0	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	90 secs	984	984	-	DRY	0.0	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	120 secs	984	984	-	DRY	0.0	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	180 secs	984	984	-	DRY	0.0	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	240 secs	984	984	-	DRY	0.0	0.0	20.8	0.0	0	0
BH524	1	50	G14		19.40	14.00 to 19.96	300 secs	984	984	-	DRY	0.0	0.0	20.7	0.0	0	0
BH524	1	50	G15	19.96	19.40	14.00 to 19.96	28/01/2020 10:36:00	975	975	$0.0_{(I)}$	DRY	0.2	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	15 secs	975	975	$-0.1_{(SS)}$	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	30 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	60 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	90 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	120 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	180 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G15		19.40	14.00 to 19.96	240 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-

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RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:12 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH524	1	50	G15		19.40	14.00 to 19.96	300 secs	975	975	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G16	19.96	19.39	14.00 to 19.96	11/02/2020 10:57:00	981	982	$0.0_{(I)}$	DRY	0.1	0.1	20.3	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	15 secs	981	982	$0.4_{(SS)}$	DRY	0.9	0.1	20.3	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	30 secs	981	982	-	DRY	0.8	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	60 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	90 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	120 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	180 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	240 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G16		19.39	14.00 to 19.96	300 secs	981	982	-	DRY	0.1	0.1	20.2	2.0	-	-
BH524	1	50	G17	19.96	19.37	14.00 to 19.96	27/02/2020 11:33:00	982	982	$0.0_{(I)}$	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	15 secs	982	982	$0.0_{(SS)}$	DRY	3.5	0.0	20.2	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	30 secs	982	982	-	DRY	0.3	0.0	19.8	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	60 secs	982	982	-	DRY	0.2	0.0	20.5	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	90 secs	982	982	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	120 secs	982	982	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	180 secs	982	982	-	DRY	0.1	0.0	20.6	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	240 secs	982	982	-	DRY	0.1	0.0	20.7	0.0	-	-
BH524	1	50	G17		19.37	14.00 to 19.96	300 secs	982	982	-	DRY	0.1	0.0	20.7	0.0	-	-
BH535A	1	50	G16	14.70	13.97	4.70 to 14.70	11/02/2020 12:09:00	980	980	$0.0_{(I)}$	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	15 secs	980	980	$0.3_{(SS)}$	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	30 secs	980	980	-	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	60 secs	980	980	-	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	90 secs	980	980	-	13.82	0.1	0.0	19.6	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BH535A	1	50	G16		13.97	4.70 to 14.70	120 secs	980	980	-	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	180 secs	980	980	-	13.82	0.1	0.0	19.6	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	240 secs	980	980	-	13.82	0.1	0.0	19.5	0.0	-	-
BH535A	1	50	G16		13.97	4.70 to 14.70	300 secs	980	980	-	13.82	0.1	0.0	19.5	0.0	-	-
RBH209	1	50	G14	24.00	23.50	3.00 to 24.00	15/01/2020 11:34:00	987	984	$0.0_{(I)}$	23.42	0.1	0.0	20.9	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	15 secs	987	984	$0.0_{(SS)}$	23.42	12.2	0.0	15.9	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	30 secs	987	984	-	23.42	12.4	0.0	3.6	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	60 secs	987	984	-	23.42	12.5	0.0	1.2	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	90 secs	987	984	-	23.42	12.5	0.0	1.1	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	120 secs	987	984	-	23.42	12.5	0.0	1.1	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	180 secs	987	984	-	23.42	12.5	0.0	1.0	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	240 secs	987	984	-	23.42	12.5	0.0	1.0	0.0	0	0
RBH209	1	50	G14		23.50	3.00 to 24.00	300 secs	987	984	-	23.42	12.5	0.0	0.9	0.0	0	0
RBH209	1	50	G15	24.00	23.50	3.00 to 24.00	28/01/2020 12:27:00	973	973	$0.0_{(I)}$	23.41	0.2	0.0	20.7	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	15 secs	973	973	$0.1_{(SS)}$	23.41	9.2	0.0	15.2	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	30 secs	973	973	-	23.41	9.3	0.0	6.9	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	60 secs	973	973	-	23.41	9.3	0.0	5.5	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	90 secs	973	973	-	23.41	9.3	0.0	5.4	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	120 secs	973	973	-	23.41	9.4	0.0	5.3	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	180 secs	973	973	-	23.41	9.4	0.0	5.2	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	240 secs	973	973	-	23.41	9.4	0.0	5.1	0.0	-	-
RBH209	1	50	G15		23.50	3.00 to 24.00	300 secs	973	973	-	23.41	9.5	0.0	5.0	0.0	-	-
RBH209	1	50	G16	24.00	23.46	3.00 to 24.00	11/02/2020 12:31:00	981	981	$0.0_{(I)}$	23.40	0.3	0.0	19.6	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	15 secs	981	981	$0.3_{(SS)}$	23.40	3.5	0.0	15.2	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:12 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH209	1	50	G16		23.46	3.00 to 24.00	30 secs	981	981	-	23.40	0.3	0.0	18.9	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	60 secs	981	981	-	23.40	2.3	0.0	17.4	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	90 secs	981	981	-	23.40	2.7	0.0	17.9	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	120 secs	981	981	-	23.40	4.0	0.0	17.6	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	180 secs	981	981	-	23.40	5.6	0.0	18.2	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	240 secs	981	981	-	23.40	5.0	0.0	19.8	0.0	-	-
RBH209	1	50	G16		23.46	3.00 to 24.00	300 secs	981	981	-	23.40	0.1	0.0	19.9	0.0	-	-
RBH209	1	50	G17	24.00	23.49	3.00 to 24.00	27/02/2020 12:58:00	981	981	$0.0_{(I)}$	23.42	0.3	0.0	20.8	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	15 secs	981	981	$0.0_{(SS)}$	23.42	6.4	0.0	15.4	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	30 secs	981	981	-	23.42	6.8	0.0	10.1	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	60 secs	981	981	-	23.42	7.0	0.0	9.3	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	90 secs	981	981	-	23.42	7.2	0.0	9.1	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	120 secs	981	981	-	23.42	7.3	0.0	8.8	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	180 secs	981	981	-	23.42	7.6	0.0	8.4	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	240 secs	981	981	-	23.42	7.9	0.0	7.9	0.0	-	-
RBH209	1	50	G17		23.49	3.00 to 24.00	300 secs	981	981	-	23.42	8.2	0.0	7.4	0.0	-	-
RBH210	1	50	G14	20.00	14.63	3.00 to 20.00	15/01/2020 11:20:00	983	983	$0.0_{(I)}$	13.50	0.1	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	15 secs	983	983	$0.0_{(SS)}$	13.50	0.1	0.0	21.0	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	30 secs	983	983	-	13.50	0.1	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	60 secs	983	983	-	13.50	0.1	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	90 secs	983	983	-	13.50	0.1	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	120 secs	983	983	-	13.50	0.1	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	180 secs	983	983	-	13.50	0.2	0.0	20.9	0.0	0	0
RBH210	1	50	G14		14.63	3.00 to 20.00	240 secs	983	983	-	13.50	0.3	0.0	20.8	0.0	0	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
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Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:13 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH210	1	50	G14		14.63	3.00 to 20.00	300 secs	983	983	-	13.50	0.6	0.0	20.7	0.0	0	0
RBH210	1	50	G15	20.00	14.63	3.00 to 20.00	28/01/2020 12:14:00	972	972	$0.0_{(I)}$	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	15 secs	972	972	$-0.1_{(SS)}$	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	30 secs	972	972	-	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	60 secs	972	972	-	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	90 secs	972	972	-	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	120 secs	972	972	-	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	180 secs	972	972	-	13.24	0.2	0.0	20.7	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	240 secs	972	972	-	13.24	0.2	0.0	20.6	0.0	-	-
RBH210	1	50	G15		14.63	3.00 to 20.00	300 secs	972	972	-	13.24	0.5	0.0	20.4	0.0	-	-
RBH210	1	50	G16	20.00	14.80	3.00 to 20.00	11/02/2020 12:20:00	979	980	$0.0_{(I)}$	13.34	0.2	0.0	19.5	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	15 secs	979	980	$0.3_{(SS)}$	13.34	0.2	0.0	19.5	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	30 secs	979	980	-	13.34	0.2	0.0	19.5	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	60 secs	979	980	-	13.34	0.2	0.0	19.5	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	90 secs	979	980	-	13.34	0.4	0.0	19.3	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	120 secs	979	980	-	13.34	0.9	0.0	18.9	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	180 secs	979	980	-	13.34	1.9	0.0	17.6	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	240 secs	979	980	-	13.34	2.6	0.0	16.6	0.0	-	-
RBH210	1	50	G16		14.80	3.00 to 20.00	300 secs	979	980	-	13.34	3.4	0.0	15.4	0.0	-	-
RBH210	1	50	G17	20.00	14.18	3.00 to 20.00	27/02/2020 12:46:00	980	981	$0.0_{(I)}$	13.15	0.1	0.0	20.8	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	15 secs	980	981	$-0.1_{(SS)}$	13.15	0.1	0.0	20.9	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	30 secs	980	981	-	13.15	0.1	0.0	20.9	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	60 secs	980	981	-	13.15	0.1	0.0	20.8	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	90 secs	980	981	-	13.15	0.2	0.0	20.8	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	120 secs	980	981	-	13.15	0.2	0.0	20.8	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
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WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:13 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH210	1	50	G17		14.18	3.00 to 20.00	180 secs	980	981	-	13.15	0.2	0.0	20.8	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	240 secs	980	981	-	13.15	0.9	0.0	20.2	0.0	-	-
RBH210	1	50	G17		14.18	3.00 to 20.00	300 secs	980	981	-	13.15	4.8	0.0	16.4	0.0	-	-
RBH211	1	50	G14	15.00	17.29	3.00 to 15.00	15/01/2020 11:06:00	983	983	$0.0_{(I)}$	14.14	0.1	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	15 secs	983	983	$0.0_{(SS)}$	14.14	0.1	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	30 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	60 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	90 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	120 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	180 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	240 secs	983	983	-	14.14	0.0	0.0	20.9	0.0	0	0
RBH211	1	50	G14		17.29	3.00 to 15.00	300 secs	983	983	-	14.14	0.0	0.0	21.0	0.0	0	0
RBH211	1	50	G15	15.00	17.29	3.00 to 15.00	28/01/2020 12:02:00	972	972	$0.0_{(I)}$	14.37	0.3	0.0	20.7	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	15 secs	972	972	$0.1_{(SS)}$	14.37	0.2	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	30 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	60 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	90 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	120 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	180 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	240 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G15		17.29	3.00 to 15.00	300 secs	972	972	-	14.37	0.1	0.0	20.8	0.0	-	-
RBH211	1	50	G16	15.00	17.29	3.00 to 15.00	11/02/2020 11:44:00	979	980	$0.0_{(I)}$	14.04	0.2	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	15 secs	979	980	$0.4_{(SS)}$	14.04	0.2	0.1	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	30 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH211	1	50	G16		17.29	3.00 to 15.00	60 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	90 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	120 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	180 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	240 secs	979	980	-	14.04	0.1	0.0	19.8	0.0	-	-
RBH211	1	50	G16		17.29	3.00 to 15.00	300 secs	979	980	-	14.04	0.1	0.0	19.7	0.0	-	-
RBH211	1	50	G17	15.00	17.27	3.00 to 15.00	27/02/2020 12:33:00	980	981	$0.0_{(I)}$	14.37	0.2	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	15 secs	980	981	$-0.1_{(SS)}$	14.37	0.1	0.0	20.5	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	30 secs	980	981	-	14.37	0.1	0.0	20.5	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	60 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	90 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	120 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	180 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	240 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH211	1	50	G17		17.27	3.00 to 15.00	300 secs	980	981	-	14.37	0.1	0.0	20.6	0.0	-	-
RBH305	1	50	G14	39.00	36.57	3.00 to 39.00	13/01/2020 15:21:00	980	979	$0.1_{(I)}$	32.30	0.1	0.0	20.9	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	15 secs	980	979	$0.5_{(SS)}$	32.30	18.7	0.0	15.5	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	30 secs	980	979	-	32.30	19.0	0.0	3.8	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	60 secs	980	979	-	32.30	19.1	0.0	1.3	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	90 secs	980	979	-	32.30	19.2	0.0	1.1	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	120 secs	980	979	-	32.30	19.2	0.0	1.1	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	180 secs	980	979	-	32.30	19.2	0.0	1.0	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	240 secs	980	979	-	32.30	19.2	0.0	1.0	0.0	0	0
RBH305	1	50	G14		36.57	3.00 to 39.00	300 secs	980	979	-	32.30	19.2	0.0	1.0	0.0	0	0

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Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:14 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH305	1	50	G15	39.00	36.57	3.00 to 39.00	27/01/2020 14:43:00	980	979	$0.1_{(I)}$	31.94	0.9	0.0	19.9	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	15 secs	980	979	$0.5_{(SS)}$	31.94	23.5	0.0	6.3	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	30 secs	980	979	-	31.94	23.8	0.0	0.7	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	60 secs	980	979	-	31.94	24.0	0.0	0.4	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	90 secs	980	979	-	31.94	24.0	0.0	0.3	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	120 secs	980	979	-	31.94	23.9	0.0	0.3	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	180 secs	980	979	-	31.94	24.0	0.0	0.3	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	240 secs	980	979	-	31.94	24.0	0.0	0.3	0.0	-	-
RBH305	1	50	G15		36.57	3.00 to 39.00	300 secs	980	979	-	31.94	24.1	0.0	0.3	0.0	-	-
RBH305	1	50	G16	39.00	36.59	3.00 to 39.00	10/02/2020 11:25:00	977	977	$0.0_{(I)}$	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	15 secs	977	977	$0.2_{(SS)}$	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	30 secs	977	977	-	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	60 secs	977	977	-	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	90 secs	977	977	-	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	120 secs	977	977	-	28.92	0.1	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	180 secs	977	977	-	28.92	0.3	0.0	20.8	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	240 secs	977	977	-	28.92	0.6	0.0	20.7	0.0	-	-
RBH305	1	50	G16		36.59	3.00 to 39.00	300 secs	977	977	-	28.92	1.1	0.0	20.7	0.0	-	-
RBH305	1	50	G17	39.00	36.58	3.00 to 39.00	28/02/2020 08:53:00	989	990	$0.0_{(I)}$	18.83	0.3	0.0	21.0	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	15 secs	989	990	$0.0_{(SS)}$	18.83	16.5	0.0	3.3	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	30 secs	989	990	-	18.83	17.8	0.0	1.5	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	60 secs	989	990	-	18.83	17.9	0.0	1.4	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	90 secs	989	990	-	18.83	17.9	0.0	1.4	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	120 secs	989	990	-	18.83	17.9	0.0	1.3	0.0	-	-
RBH305	1	50	G17		36.58	3.00 to 39.00	180 secs	989	990	-	18.83	17.9	0.0	1.3	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:14 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH305	1	50	G17		36.58	3.00 to 39.00	240 secs	989	990	-	18.83	17.9	0.0	1.3	0.0	-	-
RBH306	1	50	G14	36.00	35.01	6.00 to 36.00	13/01/2020 09:16:00	994	994	$0.0_{(I)}$	26.81	0.1	0.0	20.9	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	15 secs	994	994	$0.0_{(SS)}$	26.81	6.6	0.0	17.6	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	30 secs	994	994	-	26.81	6.7	0.0	12.7	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	60 secs	994	994	-	26.81	6.7	0.0	12.1	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	90 secs	994	994	-	26.81	6.7	0.0	12.0	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	120 secs	994	994	-	26.81	6.8	0.0	12.0	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	180 secs	994	994	-	26.81	6.8	0.0	11.8	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	240 secs	994	994	-	26.81	6.9	0.0	11.7	0.0	0	0
RBH306	1	50	G14		35.01	6.00 to 36.00	300 secs	994	994	-	26.81	7.1	0.0	11.4	0.0	0	0
RBH306	1	50	G15	36.00	35.01	6.00 to 36.00	27/01/2020 13:56:00	983	982	$0.1_{(I)}$	27.02	0.2	0.0	20.6	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	15 secs	983	982	$0.4_{(SS)}$	27.02	19.2	0.0	10.1	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	30 secs	983	982	-	27.02	19.4	0.0	7.2	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	60 secs	983	982	-	27.02	19.5	0.0	7.1	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	90 secs	983	982	-	27.02	19.5	0.0	7.0	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	120 secs	983	982	-	27.02	19.6	0.0	7.0	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	180 secs	983	982	-	27.02	19.7	0.0	6.9	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	240 secs	983	982	-	27.02	19.8	0.0	6.8	0.0	-	-
RBH306	1	50	G15		35.01	6.00 to 36.00	300 secs	983	982	-	27.02	19.8	0.0	6.8	0.0	-	-
RBH306	1	50	G16	36.00	34.85	6.00 to 36.00	10/02/2020 10:52:00	978	978	$0.0_{(I)}$	26.95	0.1	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	15 secs	978	978	$0.2_{(SS)}$	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	30 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	60 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	90 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:15 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH306	1	50	G16		34.85	6.00 to 36.00	120 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	180 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	240 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G16		34.85	6.00 to 36.00	300 secs	978	978	-	26.95	0.2	0.0	20.9	0.0	-	-
RBH306	1	50	G17	36.00	35.87	6.00 to 36.00	28/02/2020 08:09:00	992	992	$0.0_{(I)}$	26.05	0.3	0.0	21.0	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	15 secs	992	992	$-0.2_{(SS)}$	26.05	14.1	0.0	12.3	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	30 secs	992	992	-	26.05	14.2	0.0	8.5	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	60 secs	992	992	-	26.05	14.3	0.0	8.0	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	90 secs	992	992	-	26.05	14.3	0.0	7.9	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	120 secs	992	992	-	26.05	14.3	0.0	7.9	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	180 secs	992	992	-	26.05	14.3	0.0	8.1	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	240 secs	992	992	-	26.05	14.1	0.0	8.2	0.0	-	-
RBH306	1	50	G17		35.87	6.00 to 36.00	300 secs	992	992	-	26.05	14.1	0.0	8.0	0.0	-	-
RBH307	1	50	G14	21.00	23.76	2.00 to 21.00	13/01/2020 10:46:00	993	992	$0.1_{(I)}$	DRY	0.3	0.0	20.9	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	15 secs	993	992	$0.4_{(SS)}$	DRY	16.2	0.0	14.2	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	30 secs	993	992	-	DRY	16.0	0.0	2.7	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	60 secs	993	992	-	DRY	16.0	0.0	0.8	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	90 secs	993	992	-	DRY	16.0	0.0	0.7	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	120 secs	993	992	-	DRY	15.9	0.0	0.7	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	180 secs	993	992	-	DRY	15.9	0.0	0.6	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	240 secs	993	992	-	DRY	15.8	0.0	0.5	0.0	0	0
RBH307	1	50	G14		23.76	2.00 to 21.00	300 secs	993	992	-	DRY	15.8	0.0	0.5	0.0	0	0
RBH307	1	50	G15	21.00	23.76	2.00 to 21.00	27/01/2020 13:42:00	982	982	$0.0_{(I)}$	23.04	0.2	0.0	20.6	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	15 secs	982	982	$0.2_{(SS)}$	23.04	20.6	0.0	5.3	0.0	-	-

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RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:15 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH307	1	50	G15		23.76	2.00 to 21.00	30 secs	982	982	-	23.04	21.0	0.0	0.3	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	60 secs	982	982	-	23.04	21.2	0.0	0.1	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	90 secs	982	982	-	23.04	21.2	0.0	0.0	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	120 secs	982	982	-	23.04	21.3	0.0	0.0	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	180 secs	982	982	-	23.04	21.3	0.0	0.0	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	240 secs	982	982	-	23.04	21.4	0.0	0.0	0.0	-	-
RBH307	1	50	G15		23.76	2.00 to 21.00	300 secs	982	982	-	23.04	21.5	0.0	0.0	0.0	-	-
RBH307	1	50	G16	21.00	23.76	2.00 to 21.00	10/02/2020 10:41:00	978	978	$0.0_{(I)}$	23.04	0.1	0.0	21.0	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	15 secs	978	978	$0.2_{(SS)}$	23.04	0.1	0.0	21.0	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	30 secs	978	978	-	23.04	0.1	0.0	21.0	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	60 secs	978	978	-	23.04	0.2	0.0	20.9	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	90 secs	978	978	-	23.04	0.2	0.0	20.9	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	120 secs	978	978	-	23.04	0.3	0.0	20.8	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	180 secs	978	978	-	23.04	0.3	0.0	20.8	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	240 secs	978	978	-	23.04	0.4	0.0	20.7	0.0	-	-
RBH307	1	50	G16		23.76	2.00 to 21.00	300 secs	978	978	-	23.04	0.7	0.0	20.4	0.0	-	-
RBH307	1	50	G17	21.00	23.75	2.00 to 21.00	28/02/2020 07:57:00	993	993	$0.0_{(I)}$	23.03	0.2	0.0	20.9	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	15 secs	993	993	$-0.1_{(SS)}$	23.03	6.0	0.1	19.8	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	30 secs	993	993	-	23.03	6.3	0.0	17.1	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	60 secs	993	993	-	23.03	7.0	0.0	16.1	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	90 secs	993	993	-	23.03	7.8	0.0	15.1	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	120 secs	993	993	-	23.03	8.5	0.0	14.0	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	180 secs	993	993	-	23.03	9.1	0.0	12.7	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	240 secs	993	993	-	23.03	9.1	0.0	12.8	0.0	-	-
RBH307	1	50	G17		23.75	2.00 to 21.00	300 secs	993	993	-	23.03	9.1	0.0	12.8	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
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Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:16 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH405	1	50	G14	60.00	53.99	3.00 to 60.00	14/01/2020 15:12:00	966	964	$0.2_{(I)}$	DRY	0.2	0.0	20.9	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	15 secs	966	964	$0.9_{(SS)}$	DRY	6.5	0.0	18.9	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	30 secs	966	964	-	DRY	6.6	0.0	13.1	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	60 secs	966	964	-	DRY	6.5	0.0	12.2	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	90 secs	966	964	-	DRY	6.5	0.0	12.2	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	120 secs	966	964	-	DRY	6.4	0.0	12.2	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	180 secs	966	964	-	DRY	6.3	0.0	12.3	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	240 secs	966	964	-	DRY	6.1	0.0	12.4	0.0	0	0
RBH405	1	50	G14		53.99	3.00 to 60.00	300 secs	966	964	-	DRY	6.0	0.0	12.5	0.0	0	0
RBH405	1	50	G15	60.00	53.98	3.00 to 60.00	28/01/2020 11:22:00	973	973	$0.0_{(I)}$	DRY	0.1	0.0	20.9	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	15 secs	973	973	$0.0_{(SS)}$	DRY	4.3	0.0	18.2	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	30 secs	973	973	-	DRY	4.2	0.0	13.9	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	60 secs	973	973	-	DRY	4.3	0.0	12.9	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	90 secs	973	973	-	DRY	4.3	0.0	12.8	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	120 secs	973	973	-	DRY	4.3	0.0	12.8	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	180 secs	973	973	-	DRY	4.5	0.0	12.4	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	240 secs	973	973	-	DRY	5.0	0.0	11.5	0.0	-	-
RBH405	1	50	G15		53.98	3.00 to 60.00	300 secs	973	973	-	DRY	5.8	0.0	9.8	0.0	-	-
RBH405	1	50	G17	60.00	53.98	3.00 to 60.00	27/02/2020 12:17:00	981	982	$0.0_{(I)}$	DRY	0.3	0.0	20.6	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	15 secs	981	982	$-0.1_{(SS)}$	DRY	0.4	0.0	19.9	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	30 secs	981	982	-	DRY	0.4	0.0	19.8	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	60 secs	981	982	-	DRY	0.5	0.0	19.8	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	90 secs	981	982	-	DRY	0.5	0.0	19.8	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	120 secs	981	982	-	DRY	0.5	0.0	19.8	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH405	1	50	G17		53.98	3.00 to 60.00	180 secs	981	982	-	DRY	0.5	0.0	19.7	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	240 secs	981	982	-	DRY	0.6	0.0	19.5	0.0	-	-
RBH405	1	50	G17		53.98	3.00 to 60.00	300 secs	981	982	-	DRY	0.8	0.0	19.1	0.0	-	-
RBH503	1	50	G15	54.00	56.12	40.00 to 54.00	28/01/2020 10:20:00	974	974	$0.0_{(I)}$	45.59	0.2	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	15 secs	974	974	$-0.2_{(SS)}$	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	30 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	60 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	90 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	120 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	180 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	240 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G15		56.12	40.00 to 54.00	300 secs	974	974	-	45.59	0.1	0.0	20.7	0.0	-	-
RBH503	1	50	G16	54.00	56.08	40.00 to 54.00	11/02/2020 10:31:00	981	982	$0.0_{(I)}$	45.96	0.9	0.1	20.1	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	15 secs	981	982	$0.3_{(SS)}$	45.96	0.9	0.1	20.3	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	30 secs	981	982	-	45.96	0.2	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	60 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	90 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	120 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	180 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	240 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G16		56.08	40.00 to 54.00	300 secs	981	982	-	45.96	0.1	0.1	20.6	2.0	-	-
RBH503	1	50	G17	54.00	56.11	40.00 to 54.00	27/02/2020 11:18:00	981	982	$0.0_{(I)}$	45.27	0.1	0.0	20.6	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	15 secs	981	982	$-0.1_{(SS)}$	45.27	0.1	0.0	20.2	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	30 secs	981	982	-	45.27	0.2	0.0	20.2	0.0	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
RBH503	1	50	G17		56.11	40.00 to 54.00	60 secs	981	982	-	45.27	0.2	0.0	20.1	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	90 secs	981	982	-	45.27	0.2	0.0	20.1	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	120 secs	981	982	-	45.27	0.2	0.0	20.1	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	180 secs	981	982	-	45.27	0.3	0.0	20.1	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	240 secs	981	982	-	45.27	0.3	0.0	20.1	0.0	-	-
RBH503	1	50	G17		56.11	40.00 to 54.00	300 secs	981	982	-	45.27	0.5	0.0	20.0	0.0	-	-
RBH504	1	50	G16	40.00	39.42	20.00 to 40.00	11/02/2020 12:51:00	982	983	$0.0_{(I)}$	18.20	0.2	0.0	19.8	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	15 secs	982	983	$0.3_{(SS)}$	18.20	0.4	0.0	19.6	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	30 secs	982	983	-	18.20	0.4	0.0	19.3	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	60 secs	982	983	-	18.20	0.5	0.0	19.2	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	90 secs	982	983	-	18.20	0.5	0.0	19.2	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	120 secs	982	983	-	18.20	0.5	0.0	19.2	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	180 secs	982	983	-	18.20	0.5	0.0	19.2	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	240 secs	982	983	-	18.20	0.5	0.0	19.1	0.0	-	-
RBH504	1	50	G16		39.42	20.00 to 40.00	300 secs	982	983	-	18.20	0.6	0.0	19.0	0.0	-	-
RBH504	1	50	G17	40.00	39.63	20.00 to 40.00	27/02/2020 09:56:00	981	981	$0.0_{(I)}$	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	15 secs	981	981	$0.0_{(SS)}$	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	30 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	60 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	90 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	120 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	180 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	240 secs	981	981	-	17.80	-	-	-	-	-	-
RBH504	1	50	G17		39.63	20.00 to 40.00	300 secs	981	981	-	17.80	-	-	-	-	-	-

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
172 Chester Road
Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

GINT_LIBRARY_V8_07.GLB : E - GAS MON - STANDARD - 6A - A4L : 322638 - HARWORTH ESTATE.GPJ : 18/03/20 17:17 : EOR1 :

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
Spring Lodge
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Helsby, Cheshire
WA6 0AR

Compiled By	Date	Checked By	Date	Contract Ref:
	18/03/20			322638

Contract: **Rockingham**

Page: **38** of **38**

APPENDIX H
GROUNDWATER GAUGING RECORDS

Location	GL m AOD	Depth to Rockhead m	Rock Level m AOD	Plain m	Slotted m	Reported Depth of Well m	Reported Base of Well m AOD	Measured Depth of Well m	Measured Base of Well m AOD	G7 20/02/2014	G8 30/06/2014	G9 04/07/2014	G10 15/08/2014	G11 29/08/2014	G12 10/09/2014	G13 24/11/2014	B 07/10/2019	G01 13/01/2019	G02 27/01/2020	G03 11/02/2020	Av. Water Level m	Water Level Position
BH208	161.65			1.00	12.00	13.00	148.65	11.92	149.73	150.42	150.08	150.11	150.55	150.54	150.40				150.56	150.57	150.40	
RBH209	158.72	20.70	138.02	3.00	21.00	24.00	134.72	24.55	134.17		134.60	134.64		135.13	135.13	135.15			135.20	135.21	135.01	
RBH210	159.43	19.75	139.68	3.00	17.00	20.00	139.43	18.12	141.31		141.59	141.64	144.65	144.51	144.40	145.15			146.00	146.09	144.25	
RBH211	160.51	15.20	145.31	3.00	12.00	15.00	145.51	15.38	145.13		146.06	146.00	146.60	147.37	151.16	146.64	145.51		145.85	146.18	146.82	
BH301A	129.48			3.00	3.00	6.00	123.48	5.92	123.56	dry	123.26	123.28	123.56	123.72	125.40		destroyed				123.84	In backfill
BH302	122.87			3.00	3.00	6.00	116.87	5.94	116.93	117.88	117.80	117.82	117.88	117.95	118.04			117.87	117.83	118.08	117.91	In backfill
RBH305	130.96	39.20	91.76	3.00	36.00	39.00	91.96	39.78	91.18		91.71	91.64	93.23	93.26	93.26	93.32	101.96	98.44	98.80	101.82	95.74	In backfill
RBH306	122.47	41.50	80.97	6.00	30.00	36.00	86.47	36.34	86.13		94.15	94.10	94.06	94.03	93.84	94.18	94.47	95.66	95.45	95.35	94.53	In backfill
RBH307	119.16	18.10	101.06	2.00	19.00	21.00	98.16	19.52	99.64		100.18	100.04			99.42	98.23	95.66	Dry	95.91	95.92	97.91	In rock
RBH404	140.81	41.45	99.36	3.00	38.00	41.00	99.81	39.65	101.16		104.39	104.53	104.78	112.78	112.85	112.85	destroyed				108.70	In backfill
2019/2020																						
BH508	141.245			5.0	2.0	7.0	134.25	6.31	134.94									136.10	136.02	136.03	136.05	In backfill
BH511	148.14			7.4	6.0	13.4	134.74	12.42	135.72									138.12	138.13		138.13	In backfill
RBH503	145.1	54.00	91.10	14.0	40.0	54.0	91.10	56.24	88.86									99.91	99.91	99.00	99.61	In backfill
RBH504	142.468	1.50	140.97	20.0	20.0	40.0	102.47	39.55	102.92											124.14	124.14	In rock

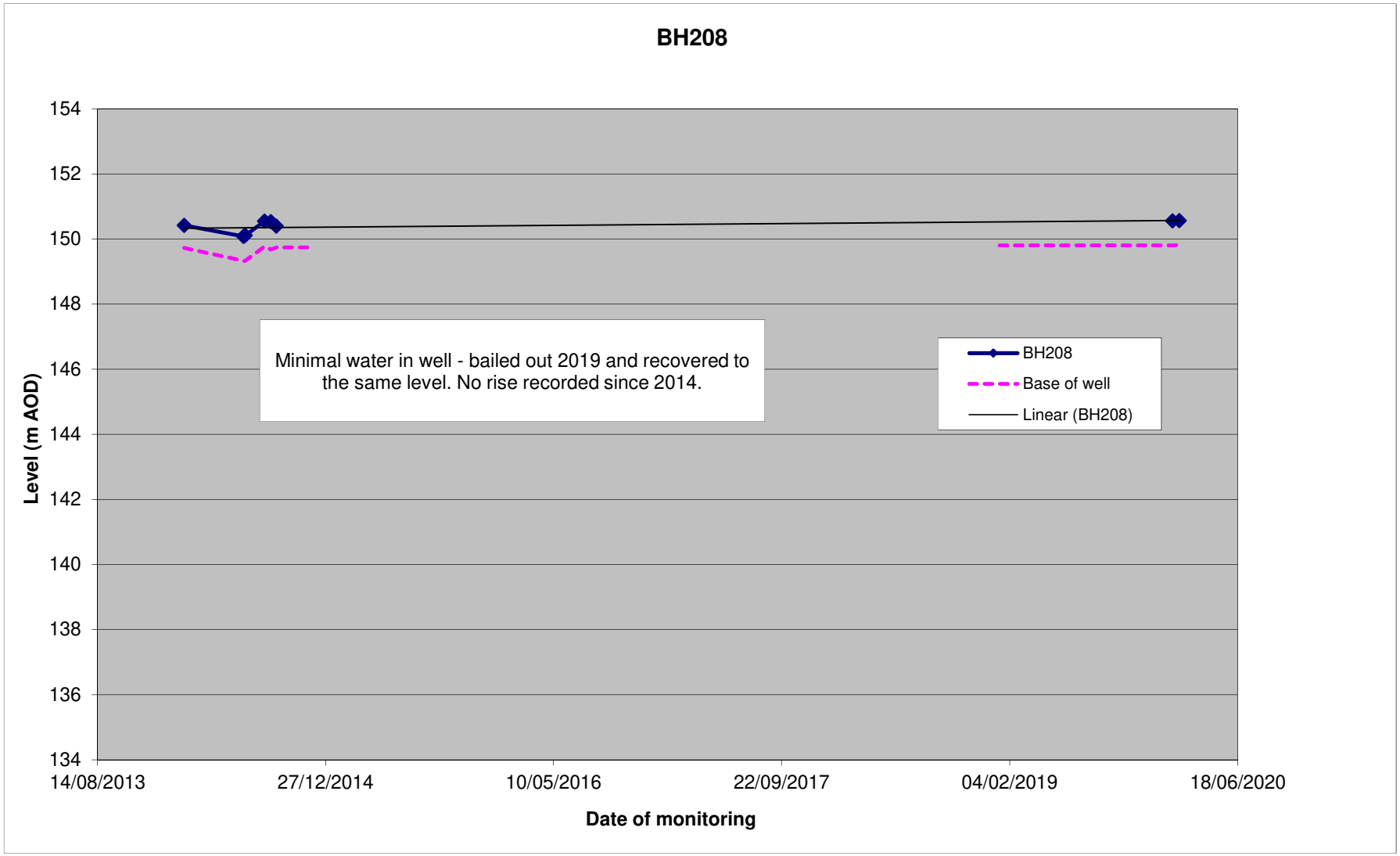
The majority of well installations at the site did not capture any groundwater and as such have been removed from this analysis. The full suite of monitoring data is available on request.

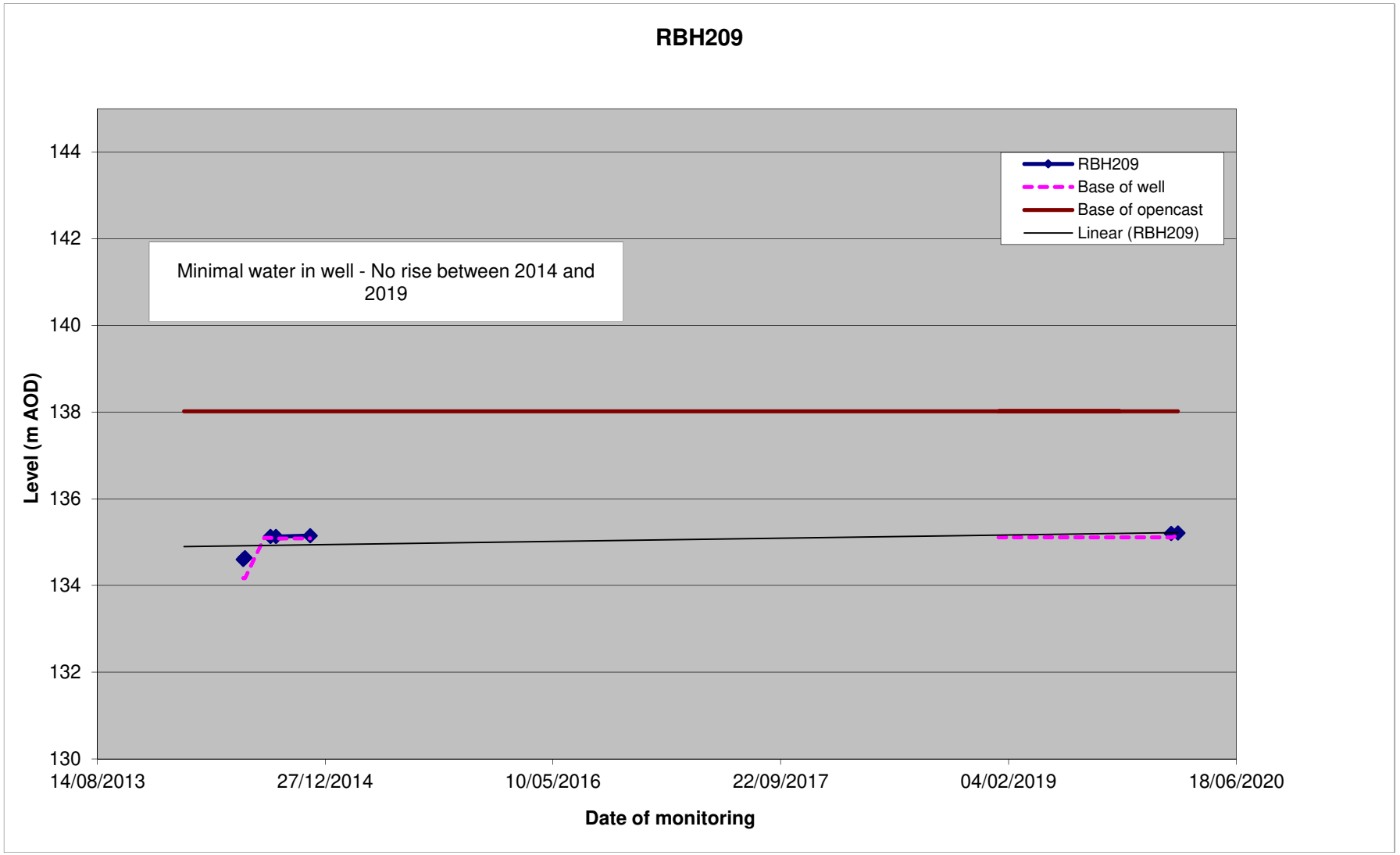
Base of well

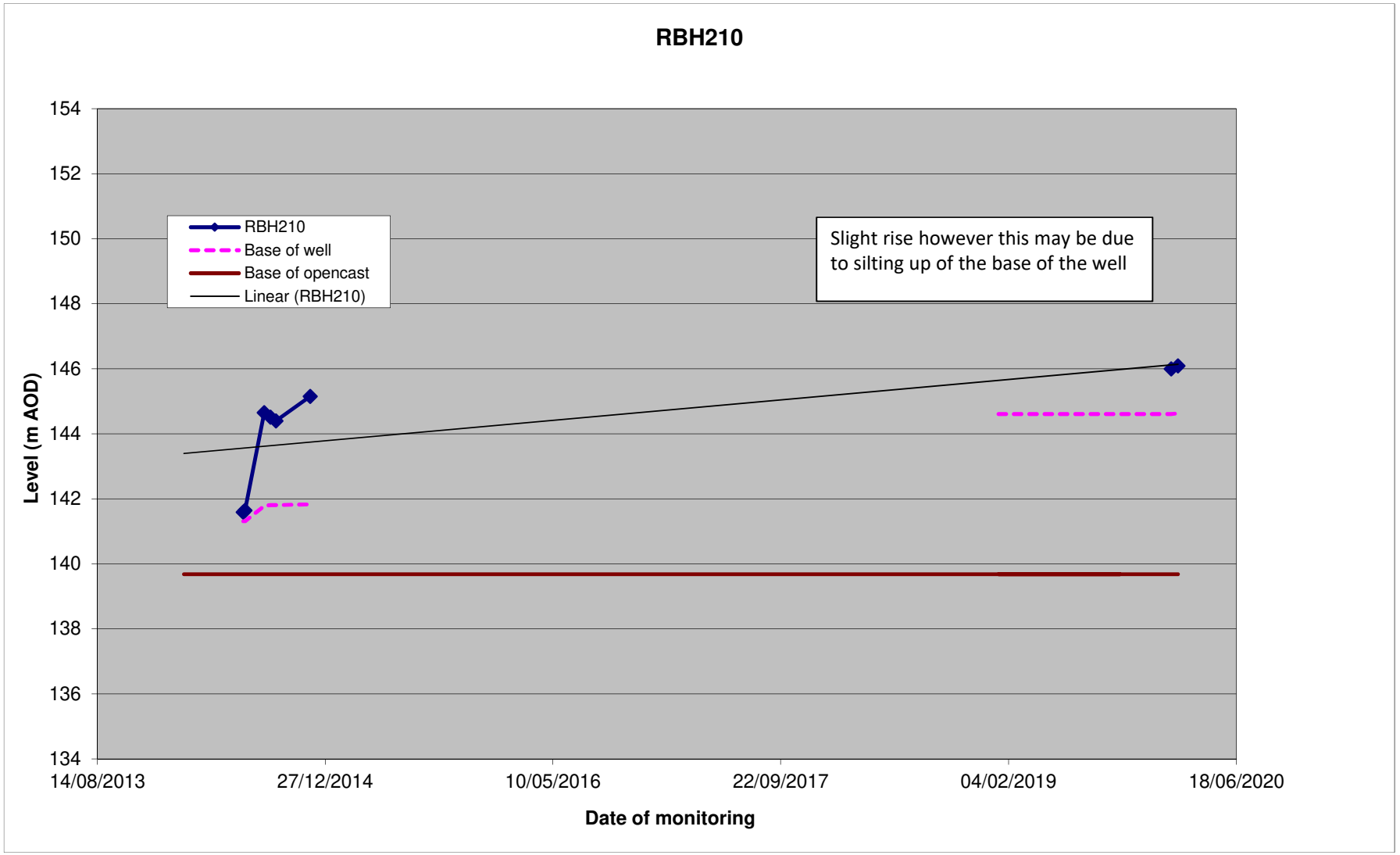
BH208	149.73	149.33	149.33	149.77	149.68	149.74	149.74		149.8	149.8	149.82
RBH209		134.17	134.17	135.1	135.1	135.08	135.09		135.11	135.11	135.15
RBH210		141.31	141.31	141.78	141.81	141.81	141.83		144.61	144.61	144.63
RBH211		145.13	145.13	145.66	145.64	146.2	145.68		142.93	142.93	142.93
BH301A	123.56	123.56	123.56	123.56	123.56	123.56					
BH302	116.93	116.93	116.93	116.93	116.93	116.93			116.92	116.93	116.94
BH303	118.96	118.96	118.96	118.96	118.96	118.96					
BH304	115.75	115.75	115.75	115.75	115.75	115.75					
RBH305		91.18	91.2	92.53	92.56	92.62	92.63		94.17	94.17	94.15
RBH306		86.13	86.18	87.24	87.21	86.69	87.3		87.46	87.46	87.45
RBH307		99.64	99.64	100.15	99.44	98.25	98.21		95.19	95.19	95.2
BH401	137.05	137.05	137.05	137.05	137.05	137.05					
BH402	128.48	128.13	128.13	128.61	128.57	128.57					
BH403	131.56	131.56	131.56	131.56	131.56	131.56					
RBH404		101.16	101.16	99.19	99.35	99.25	99.38				
RBH405		95.96	95.99		97.31	97.31	96.8				

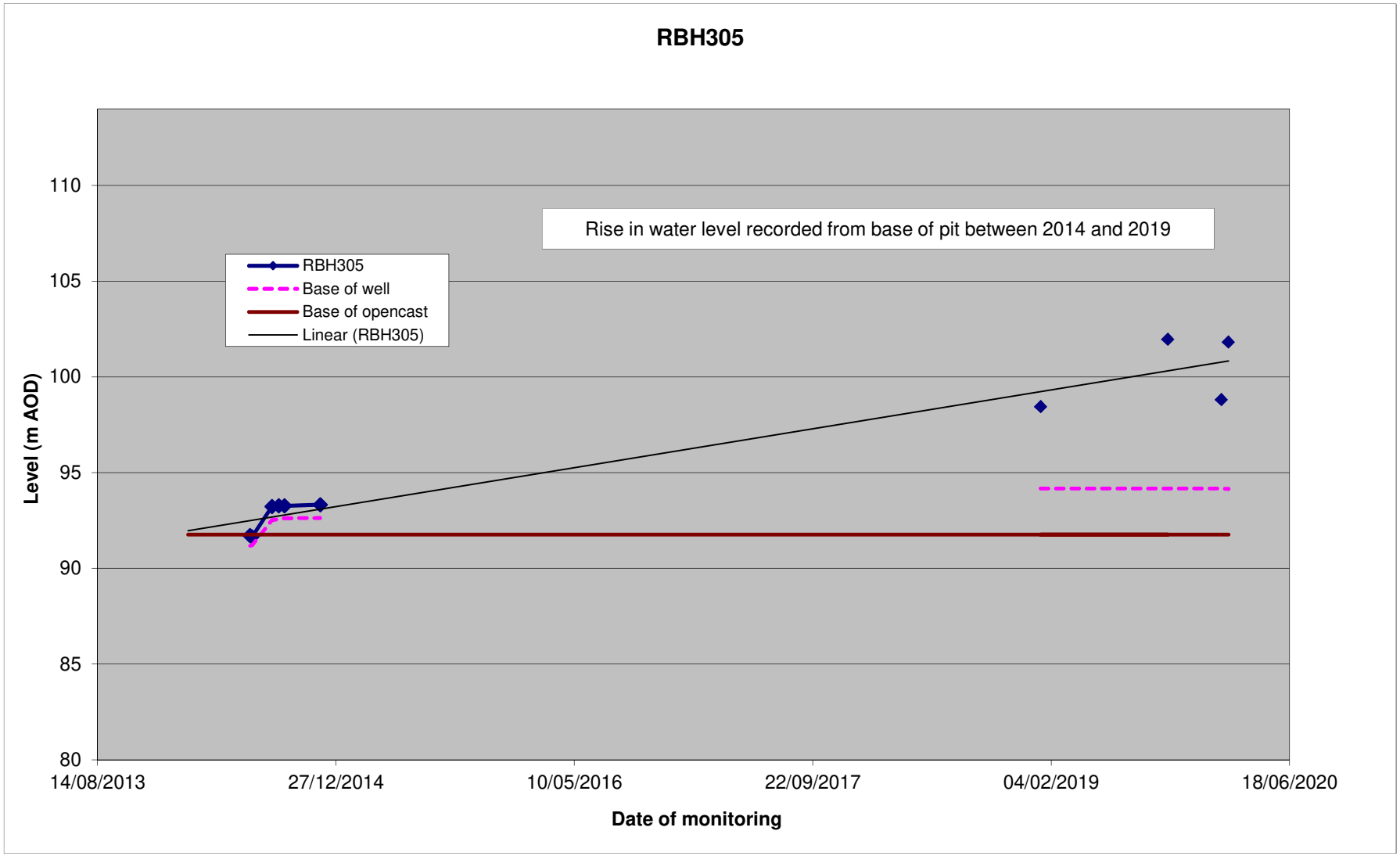
Base of opencast

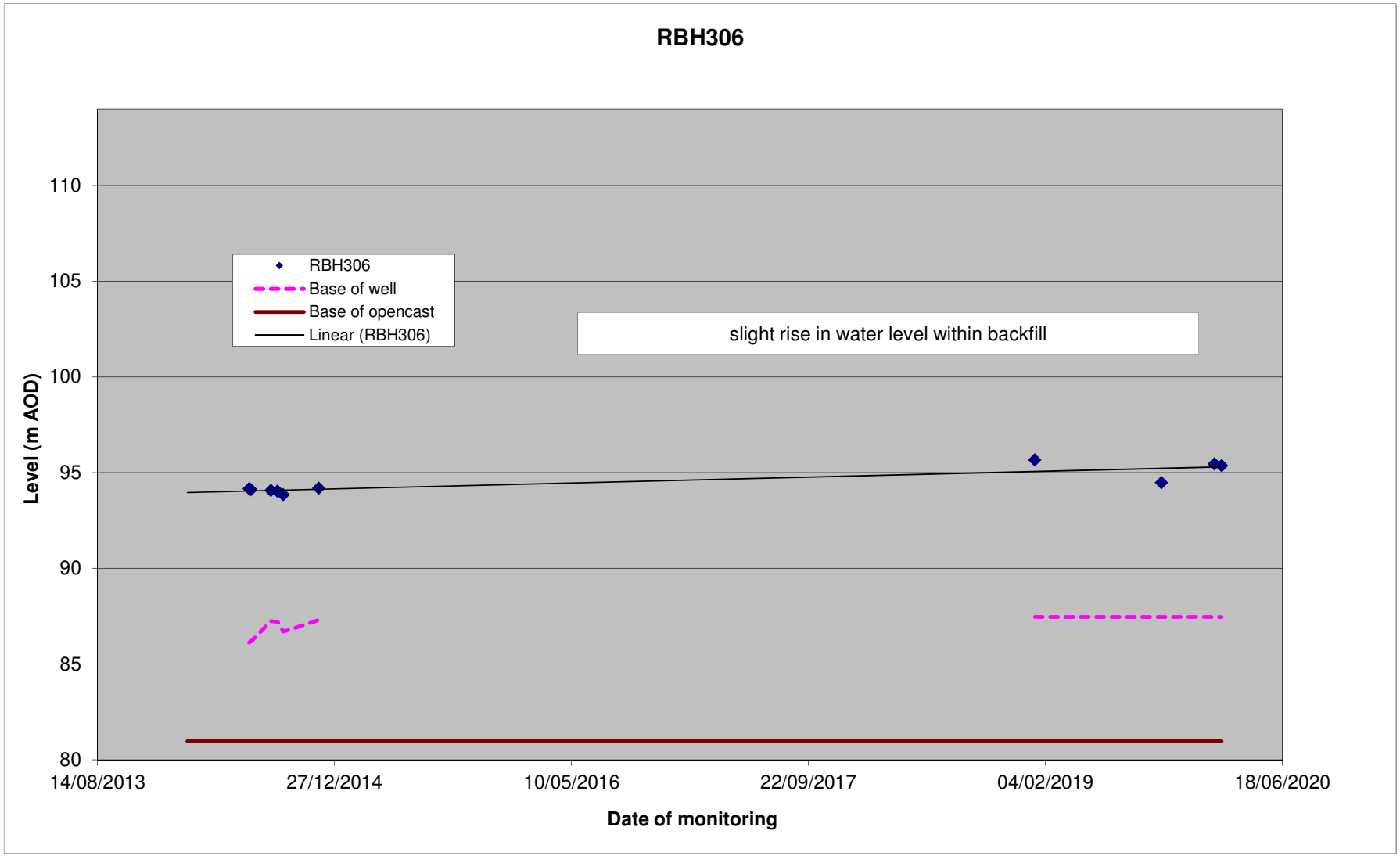
BH208											
RBH209	138.02	138.02	138.02	138.02	138.02	138.02	138.02	138.02	138.02	138.02	138.02
RBH210	139.68	139.68	139.68	139.68	139.68	139.68	139.68	139.68	139.68	139.68	139.68
RBH211	145.31	145.31	145.31	145.31	145.31	145.31	145.31	145.31	145.31	145.31	145.31
BH301A											
BH302											
BH303											
BH304											
RBH305	91.76	91.76	91.76	91.76	91.76	91.76	91.76	91.76	91.76	91.76	91.76
RBH306	80.97	80.97	80.97	80.97	80.97	80.97	80.97	80.97	80.97	80.97	80.97
RBH307	101.06	101.06	101.06	101.06	101.06	101.06	101.06	101.06	101.06	101.06	101.06
BH401											
BH402											
BH403											
RBH404	99.36	99.36	99.36	99.36	99.36	99.36	99.36	99.36	99.36	99.36	99.36
RBH405	85.71	85.71	85.71	85.71	85.71	85.71	85.71	85.71	85.71	85.71	85.71

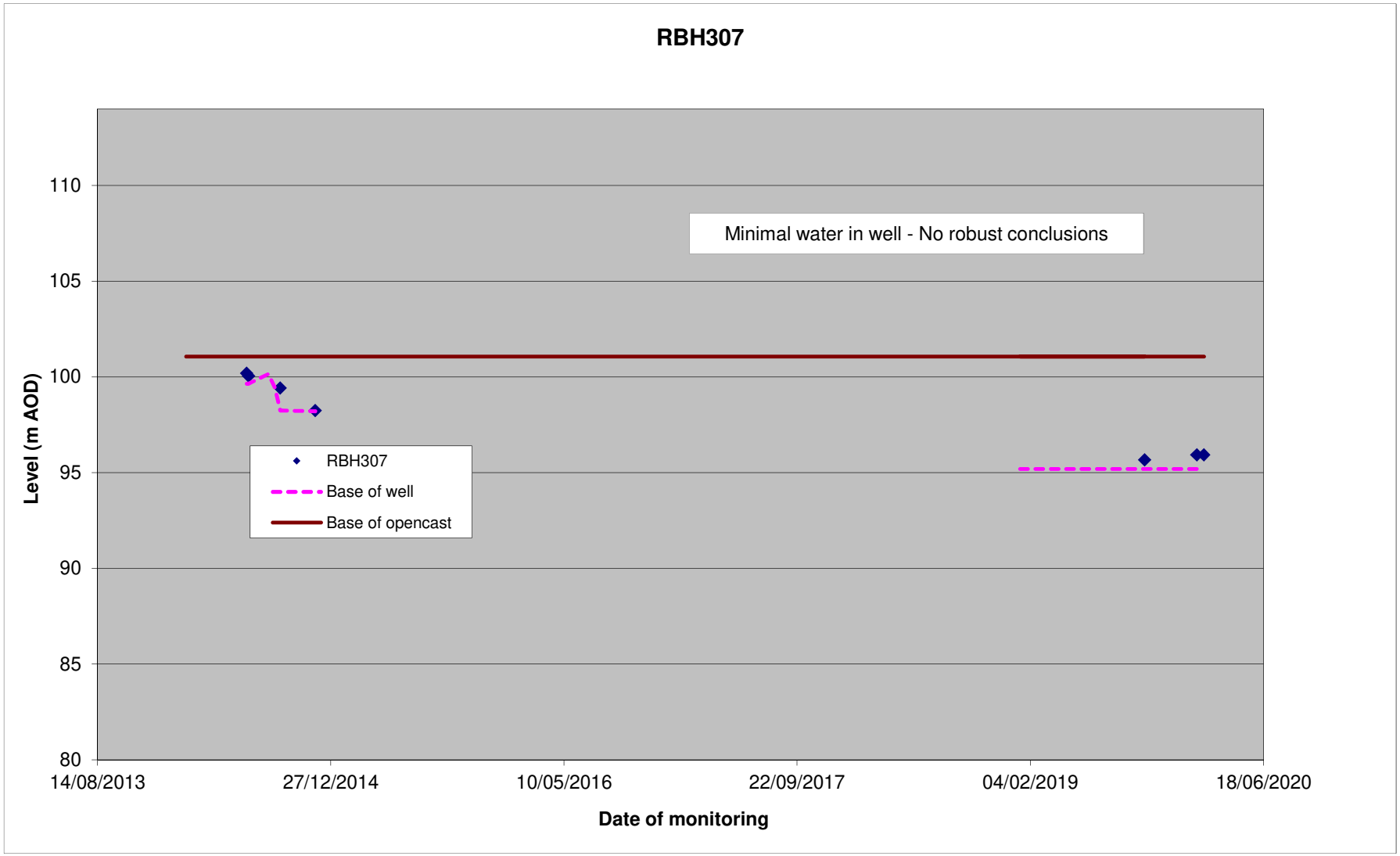

BH208
154
152
150
148
146
144
142
140
138
136
134
Level (m AOD)
Minimal water in well - bailed out 2019 and recovered to the same level. No rise recorded since 2014.
BH208
Base of well
Linear (BH208)
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring

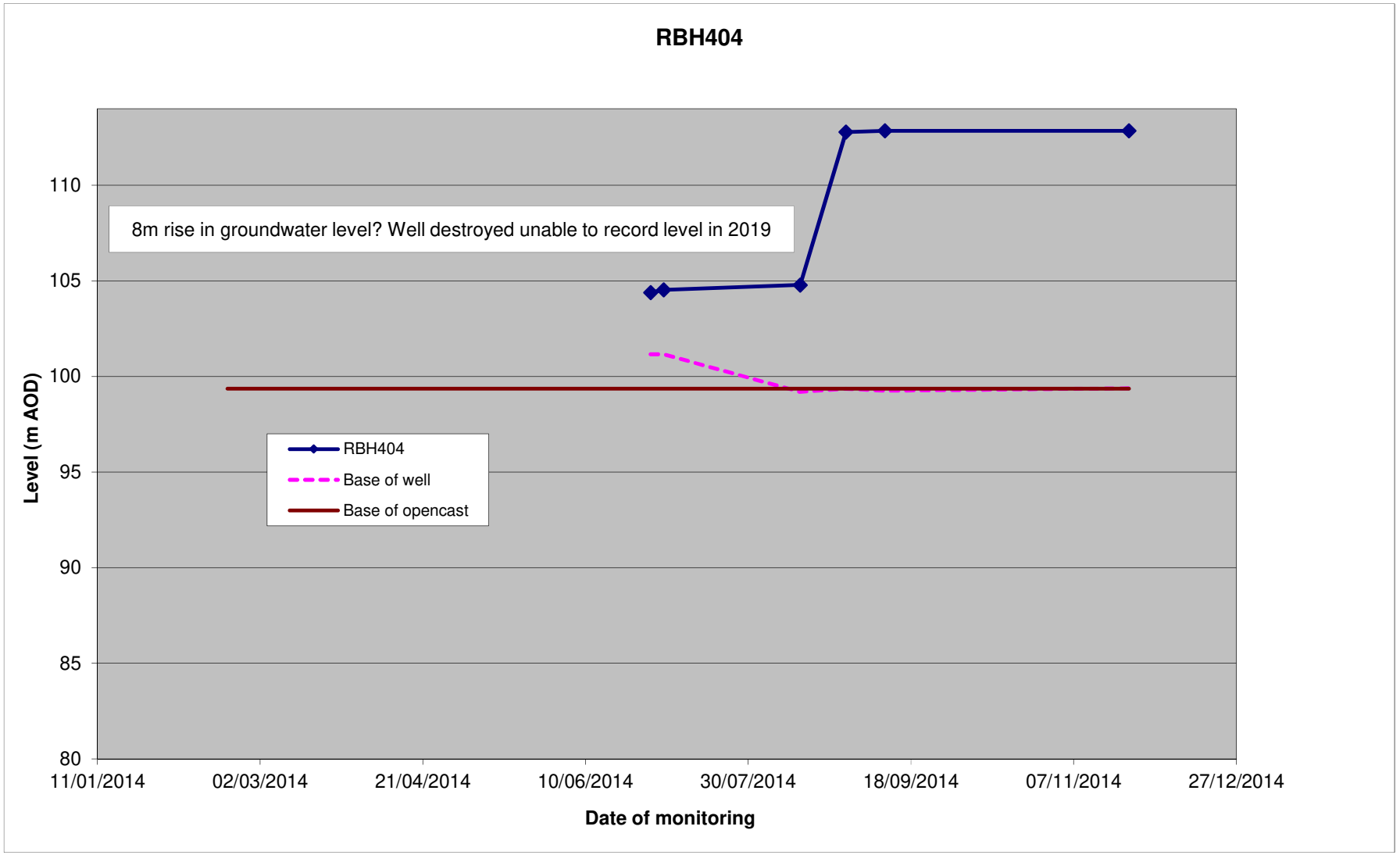

RBH209
Minimal water in well - No rise between 2014 and 2019
RBH209
Base of well
Base of opencast
Linear (RBH209)
Level (m AOD)
144
142
140
138
136
134
132
130
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring


RBH210
154
152
150
148
146
144
142
140
138
136
134
Level (m AOD)
RBH210
Base of well
Base of opencast
Linear (RBH210)
Slight rise however this may be due to silting up of the base of the well
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring


RBH305
Rise in water level recorded from base of pit between 2014 and 2019
RBH305
Base of well
Base of opencast
Linear (RBH305)
Level (m AOD)
110
105
100
95
90
85
80
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring


RBH306
110
105
100
95
90
85
80
Level (m AOD)
RBH306
Base of well
Base of opencast
Linear (RBH306)
slight rise in water level within backfill
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring


RBH307
Minimal water in well - No robust conclusions
RBH307
Base of well
Base of opencast
Level (m AOD)
110
105
100
95
90
85
80
14/08/2013
27/12/2014
10/05/2016
22/09/2017
04/02/2019
18/06/2020
Date of monitoring


RBH404
8m rise in groundwater level? Well destroyed unable to record level in 2019
RBH404
Base of well
Base of opencast
Level (m AOD)
110
105
100
95
90
85
80
11/01/2014
02/03/2014
21/04/2014
10/06/2014
30/07/2014
18/09/2014
07/11/2014
27/12/2014
Date of monitoring

APPENDIX I
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/10013
Issue Number: 1 **Date:** 07 November, 2019

Client:
RSK Environment Helsby
Spring Lodge
172 Chester Road
Helsby
Cheshire
UK
WA6 0AR

Project Manager: Alex Cox
Project Name: Rockingham
Project Ref: 322638
Order No: N/A
Date Samples Received: 23/10/19
Date Instructions Received: 23/10/19
Date Analysis Completed: 07/11/19

Prepared by:
Melanie Marshall
Laboratory Coordinator

Approved by:
Iain Haslock
Analytical Consultant

Envirolab Job Number: 19/10013

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/10013/1	19/10013/2	19/10013/3	19/10013/4	19/10013/5	19/10013/6	19/10013/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH501	BH501	BH501	BH507	BH507	BH502	BH502			
Depth to Top	0.50	1.20	3.95	1.40	3.50	0.40	4.50			
Depth To Bottom										
Date Sampled	17-Oct-19	17-Oct-19	17-Oct-19	18-Oct-19	18-Oct-19	16-Oct-19	16-Oct-19			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	5AE	5ABE	5ABE	5A	5A	5ABE	5A			
% Stones >10mm$_A$	4.1	5.3	7.6	1.7	20.3	3.6	2.0	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	6.59	5.23	-	-	8.63	7.33	-	pH	0.01	A-T-031s
pH BRE$_D$$^{M\#}$	-	-	8.21	8.51	-	-	8.39	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	-	0.16	-	-	-	0.07	-	g/l	0.01	A-T-026s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	-	-	1010	125	-	-	596	mg/l	10	A-T-026s
Sulphate (acid soluble)$_D$$^{M\#}$	-	5900	-	-	-	770	-	mg/kg	200	A-T-028s
Sulphate BRE (acid sol)$_D$$^{M\#}$	-	-	0.79	0.04	-	-	0.26	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	-	-	0.67	0.04	-	-	0.55	% w/w	0.01	A-T-024s
Total Organic Carbon$_D$$^{M\#}$	4.16	7.54	-	1.67	-	-	-	% w/w	0.03	A-T-032s
Arsenic$_D$$^{M\#}$	12	27	-	-	<1	11	-	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	0.6	0.6	-	-	<0.5	0.7	-	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	33	36	-	-	23	25	-	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	18	15	-	-	14	17	-	mg/kg	1	A-T-024s
Lead$_D$$^{M\#}$	27	25	-	-	14	33	-	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	-	-	<0.17	<0.17	-	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	26	23	-	-	33	21	-	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	-	-	2	2	-	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	76	54	-	-	61	69	-	mg/kg	5	A-T-024s

Envirolab Job Number: 19/10013

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/10013/1	19/10013/2	19/10013/3	19/10013/4	19/10013/5	19/10013/6	19/10013/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH501	BH501	BH501	BH507	BH507	BH502	BH502			
Depth to Top	0.50	1.20	3.95	1.40	3.50	0.40	4.50			
Depth To Bottom										
Date Sampled	17-Oct-19	17-Oct-19	17-Oct-19	18-Oct-19	18-Oct-19	16-Oct-19	16-Oct-19			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	5AE	5ABE	5ABE	5A	5A	5ABE	5A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	-	-	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	-	-	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	-	-	<0.02	<0.02	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	-	-	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	-	-	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	-	-	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	-	-	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	-	-	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	-	-	<0.06	<0.06	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	-	-	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	-	-	<0.08	<0.08	-	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	-	-	0.02	<0.01	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	-	-	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	-	-	0.08	0.05	-	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	<0.03	-	-	0.05	0.06	-	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	-	-	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	-	-	0.15	0.11	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 19/10013

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/10013/1	19/10013/2	19/10013/3	19/10013/4	19/10013/5	19/10013/6	19/10013/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH501	BH501	BH501	BH507	BH507	BH502	BH502			
Depth to Top	0.50	1.20	3.95	1.40	3.50	0.40	4.50			
Depth To Bottom										
Date Sampled	17-Oct-19	17-Oct-19	17-Oct-19	18-Oct-19	18-Oct-19	16-Oct-19	16-Oct-19			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	5AE	5ABE	5ABE	5A	5A	5ABE	5A			
TPH CWG										
Ali >C5-C6$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	-	<1	8	2	-	1	-	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	-	<1	4	2	-	<1	-	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	-	<1	6	2	-	<1	-	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	-	<1	4	1	-	<1	-	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	-	5	6	5	-	5	-	mg/kg	1	A-T-055s
Total Aliphatics$_A$	-	5	29	13	-	6	-	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	-	2	10	2	-	2	-	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	-	<1	8	2	-	2	-	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	-	2	24	8	-	5	-	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	-	2	21	7	-	5	-	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	-	5	32	12	-	12	-	mg/kg	1	A-T-055s
Total Aromatics$_A$	-	12	96	30	-	27	-	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	-	16	125	43	-	33	-	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	-	<0.05	<0.05	<0.05	-	<0.05	-	mg/kg	0.01	A-T-022s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Helsby, Spring Lodge, 172 Chester Road, Helsby, Cheshire, UK, WA6 0AR

Project: Rockingham

Clients Project No: 322638

Project No: 19/10013

Date Received: 23/10/2019 (am)

Cool Box Temperatures (°C): 9.6

Lab Sample ID	19/10013/2	19/10013/3	19/10013/4	19/10013/6
Client Sample No				
Client Sample ID/Depth	BH501 1.20m	BH501 3.95m	BH507 1.40m	BH502 0.40m
Date Sampled	17/10/19	17/10/19	18/10/19	16/10/19
Deviation Code				
F	✓	✓	✓	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	19/10013/2	19/10013/3	19/10013/4	19/10013/6
Client Sample No				
Client Sample ID/Depth	BH501 1.20m	BH501 3.95m	BH507 1.40m	BH502 0.40m
Date Sampled	17/10/19	17/10/19	18/10/19	16/10/19
VPHCWG	✓	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/11030
Issue Number: 1 **Date:** 03 December, 2019

Client:
RSK Environment Helsby
Spring Lodge
172 Chester Road
Helsby
Cheshire
UK
WA6 0AR

Project Manager: Alex Cox
Project Name: Rockingham
Project Ref: 322683
Order No: N/A
Date Samples Received: 12/11/19
Date Instructions Received: 20/11/19
Date Analysis Completed: 03/12/19

Prepared by:
Melanie Marshall
Laboratory Coordinator

Approved by:
Iain Haslock
Analytical Consultant

Envirolab Job Number: 19/11030

Client Project Name: Rockingham

Client Project Ref: 322683

Lab Sample ID	19/11030/3	19/11030/4	19/11030/6	19/11030/7	19/11030/10	19/11030/11	19/11030/12	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP502	TP503	TP505	TP505	TP507	BH512	BH512			
Depth to Top	1.00	0.50	0.10	1.10	1.40	2.50	10.00			
Depth To Bottom	1.10	0.60	0.20	1.20	1.50					
Date Sampled	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19	30-Oct-19			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5AE	5AE	5A	5A	5AE	5A			
% Stones >10mm$_A$	4.0	27.1	8.8	13.9	6.8	3.8	13.5	% w/w	0.1	A-T-044
pH$_D^{M\#}$	-	7.08	6.28	7.02	7.77	7.74	7.77	pH	0.01	A-T-031s
pH BRE$_D^{M\#}$	-	-	-	7.02	7.77	7.74	7.77	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	-	-	-	65	267	708	368	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	-	-	-	0.04	0.06	0.17	0.10	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	-	-	-	0.02	0.28	0.30	0.22	% w/w	0.01	A-T-024s
Total Organic Carbon$_D^{M\#}$	1.38	-	0.66	0.67	-	-	7.57	% w/w	0.03	A-T-032s
Calorific Value$_A$	1.3	-	-	0.4	-	-	3.4	MJ/kg	0.1	Subcon Chemtest
Arsenic$_D^{M\#}$	-	4	3	11	13	-	-	mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	-	<0.5	<0.5	<0.5	0.7	-	-	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	-	12	17	20	25	-	-	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	-	15	23	17	22	-	-	mg/kg	1	A-T-024s
Lead$_D^{M\#}$	-	7	10	11	13	-	-	mg/kg	1	A-T-024s
Mercury$_D$	-	<0.17	<0.17	<0.17	<0.17	-	-	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	-	19	28	23	43	-	-	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	-	<1	<1	<1	<1	-	-	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	-	34	66	49	88	-	-	mg/kg	5	A-T-024s

Envirolab Job Number: 19/11030

Client Project Name: Rockingham

Client Project Ref: 322683

Lab Sample ID	19/11030/13							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH517									
Depth to Top	0.50									
Depth To Bottom										
Date Sampled	04-Nov-19									
Sample Type	Soil									
Sample Matrix Code	5AE									
% Stones >10mm$_A$	8.0							% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.54							pH	0.01	A-T-031s
Arsenic$_D$$^{M\#}$	6							mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	0.6							mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	25							mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	24							mg/kg	1	A-T-024s
Lead$_D$$^{M\#}$	24							mg/kg	1	A-T-024s
Mercury$_D$	<0.17							mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	29							mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1							mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	72							mg/kg	5	A-T-024s

REPORT NOTES

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Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Helsby, Spring Lodge, 172 Chester Road, Helsby, Cheshire, UK, WA6 0AR

Project: Rockingham

Clients Project No: 322683

Project No: 19/11030

Date Received: 20/11/2019 (am)

Cool Box Temperatures (°C): 10.4 - 11.0

Lab Sample ID	19/11030/3	19/11030/7	19/11030/12
Client Sample No			
Client Sample ID/Depth	TP502 1.00-1.10m	TP505 1.10-1.20m	BH512 10.00m
Date Sampled	30/10/19	30/10/19	30/10/19
Deviation Code			
F	✓	✓	✓

Key

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	19/11030/3	19/11030/7	19/11030/12
Client Sample No			
Client Sample ID/Depth	TP502 1.00-1.10m	TP505 1.10-1.20m	BH512 10.00m
Date Sampled	30/10/19	30/10/19	30/10/19
Calorific Value	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/11614
Issue Number: 1 **Date:** 17 December, 2019

Client:
RSK Environment Helsby
Spring Lodge
172 Chester Road
Helsby
Cheshire
UK
WA6 0AR

Project Manager: Alex Cox
Project Name: Rockingham
Project Ref: 322638
Order No: N/A
Date Samples Received: 04/12/19
Date Instructions Received: 06/12/19
Date Analysis Completed: 17/12/19

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Danielle Brierley
Client Manager

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106			
Depth to Top	0.40	0.40	0.20	1.20	0.00	1.30	0.30			
Depth To Bottom					0.40					
Date Sampled	03-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	03-Dec-19			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5ABE	5A	5AE	5A	5ADE			
% Stones >10mm$_A$	7.6	10.2	12.1	24.1	8.4	14.0	3.2	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.43	7.75	7.53	7.82	6.88	-	7.49	pH	0.01	A-T-031s
Total Organic Carbon$_D$$^{M\#}$	-	-	-	-	-	4.50	-	% w/w	0.03	A-T-032s
Arsenic$_D$$^{M\#}$	4	8	8	15	9	-	10	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	1.1	1.4	1.1	<0.5	1.5	-	1.5	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	21	30	25	37	33	-	33	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	18	56	18	10	21	-	23	mg/kg	1	A-T-024s
Lead$_D$$^{M\#}$	15	20	32	17	53	-	55	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17	-	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	34	31	25	22	18	-	19	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	2	<1	2	-	3	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	77	75	69	35	88	-	92	mg/kg	5	A-T-024s

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106			
Depth to Top	0.40	0.40	0.20	1.20	0.00	1.30	0.30			
Depth To Bottom					0.40					
Date Sampled	03-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	03-Dec-19			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5ABE	5A	5AE	5A	5ADE			
SVOC										
Hexachlorobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Diethyl phthalate$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Dimethyl phthalate$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Dibenzofuran$_A$	<100	106	-	340	<100	-	-	µg/kg	100	A-T-052s
Carbazole$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate$_A$	<500	<500	-	<500	<500	-	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
4-Nitrophenol$_A$	<1000	<1000	-	<1000	<1000	-	-	µg/kg	100	A-T-052s
3+4-Methylphenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2-Nitrophenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2-Methylphenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
1,2,4-Trichlorobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2-Chlorophenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
1,4-Dichlorobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
1,3-Dichlorobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
1,2-Dichlorobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2-Chloronaphthalene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
2-Methylnaphthalene$_A$	<100	192	-	1090	<100	-	-	µg/kg	100	A-T-052s
Acenaphthylene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Acenaphthene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Anthracene$_A$	<100	145	-	<100	136	-	-	µg/kg	100	A-T-052s
Benzo(a)anthracene$_A$	<100	811	-	<100	743	-	-	µg/kg	100	A-T-052s
Benzo(b)fluoranthene$_A$	<100	1230	-	<100	1040	-	-	µg/kg	100	A-T-052s

Lab Sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106			
Depth to Top	0.40	0.40	0.20	1.20	0.00	1.30	0.30			
Depth To Bottom					0.40					
Date Sampled	03-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	03-Dec-19			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5ABE	5A	5AE	5A	5ADE			
Benzo(k)fluoranthene$_A$	<100	252	-	<100	212	-	-	µg/kg	100	A-T-052s
Benzo(a)pyrene$_A$	<100	913	-	<100	677	-	-	µg/kg	100	A-T-052s
Benzo(ghi)perylene$_A$	<100	504	-	<100	291	-	-	µg/kg	100	A-T-052s
Chrysene$_A$	<100	754	-	104	743	-	-	µg/kg	100	A-T-052s
Fluoranthene$_A$	<100	1350	-	107	1570	-	-	µg/kg	100	A-T-052s
Fluorene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Indeno(1,2,3-cd)pyrene$_A$	<100	520	-	<100	316	-	-	µg/kg	100	A-T-052s
Phenanthrene$_A$	<100	524	-	529	649	-	-	µg/kg	100	A-T-052s
Pyrene$_A$	<100	1260	-	112	1370	-	-	µg/kg	100	A-T-052s
Naphthalene$_A$	<100	131	-	642	<100	-	-	µg/kg	100	A-T-052s
Dibenzo(ah)anthracene$_A$	<100	145	-	<100	<100	-	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Phenol$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Pentachlorophenol (SVOC)$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
n-Dioctylphthalate$_A$	<500	<500	-	<500	<500	-	-	µg/kg	500	A-T-052s
n-Dibutylphthalate$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Nitrobenzene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Isophorone$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Hexachloroethane$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Hexachlorocyclopentadiene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Hexachlorobutadiene$_A$	<100	<100	-	<100	<100	-	-	µg/kg	100	A-T-052s
Perylene$_A$	<100	256	-	<100	170	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106			
Depth to Top	0.40	0.40	0.20	1.20	0.00	1.30	0.30			
Depth To Bottom					0.40					
Date Sampled	03-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	02-Dec-19	03-Dec-19			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5ABE	5A	5AE	5A	5ADE			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	-	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	-	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	-	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	-	1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	1	-	5	-	-	-	-	mg/kg	1	A-T-055s
Total Aliphatics$_A$	1	-	7	-	-	-	-	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	-	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	<1	-	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	2	-	2	-	-	-	-	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	2	-	4	-	-	-	-	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	4	-	22	-	-	-	-	mg/kg	1	A-T-055s
Total Aromatics$_A$	8	-	29	-	-	-	-	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	11	-	37	-	-	-	-	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/10	19/11614/12	19/11614/13					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	WS107	WS108							
Depth to Top	0.70	0.50	0.20							
Depth To Bottom										
Date Sampled	03-Dec-19	03-Dec-19	03-Dec-19							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	5A	5A	6AE							
% Stones >10mm$_A$	20.3	26.4	1.5					% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.35	7.46	7.67					pH	0.01	A-T-031s
Total Organic Carbon$_D$$^{M\#}$	5.26	-	4.17					% w/w	0.03	A-T-032s
Arsenic$_D$$^{M\#}$	4	3	5					mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	0.9	1.2	1.1					mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	18	15	21					mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	17	15	19					mg/kg	1	A-T-024s
Lead$_D$$^{M\#}$	14	15	30					mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17					mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	25	24	17					mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	<1					mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	55	60	77					mg/kg	5	A-T-024s

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/10	19/11614/12	19/11614/13					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	WS107	WS108							
Depth to Top	0.70	0.50	0.20							
Depth To Bottom										
Date Sampled	03-Dec-19	03-Dec-19	03-Dec-19							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	5A	5A	6AE							
SVOC										
Hexachlorobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Diethyl phthalate$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Dimethyl phthalate$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Dibenzofuran$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Carbazole$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Butylbenzyl phthalate$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate$_A$	<500	<500	<500					µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether$_A$	<100	<100	<100					µg/kg	100	A-T-052s
4-Nitrophenol$_A$	<1000	<1000	<1000					µg/kg	100	A-T-052s
3+4-Methylphenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
4-Chloro-3-methylphenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2-Nitrophenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2-Methylphenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
1,2,4-Trichlorobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2-Chlorophenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,6-Dinitrotoluene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,4-Dinitrotoluene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,4-Dimethylphenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,4-Dichlorophenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,4,6-Trichlorophenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2,4,5-Trichlorophenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
1,4-Dichlorobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
1,3-Dichlorobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
1,2-Dichlorobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2-Chloronaphthalene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
2-Methylnaphthalene$_A$	123	<100	<100					µg/kg	100	A-T-052s
Acenaphthylene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Acenaphthene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Anthracene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Benzo(a)anthracene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Benzo(b)fluoranthene$_A$	<100	<100	136					µg/kg	100	A-T-052s

Envirolab Job Number: 19/11614 **Client Project Name: Rockingham**

Client Project Ref: 322638

Lab Sample ID	19/11614/10	19/11614/12	19/11614/13					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	WS107	WS108							
Depth to Top	0.70	0.50	0.20							
Depth To Bottom										
Date Sampled	03-Dec-19	03-Dec-19	03-Dec-19							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	5A	5A	6AE							
Benzo(k)fluoranthene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Benzo(a)pyrene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Benzo(ghi)perylene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Chrysene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Fluoranthene$_A$	127	125	157					µg/kg	100	A-T-052s
Fluorene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Indeno(1,2,3-cd)pyrene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Phenanthrene$_A$	129	<100	<100					µg/kg	100	A-T-052s
Pyrene$_A$	116	111	141					µg/kg	100	A-T-052s
Naphthalene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Dibenzo(ah)anthracene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Phenol$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Pentachlorophenol (SVOC)$_A$	<100	<100	<100					µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine$_A$	<100	<100	<100					µg/kg	100	A-T-052s
n-Dioctylphthalate$_A$	<500	<500	<500					µg/kg	500	A-T-052s
n-Dibutylphthalate$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Nitrobenzene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Isophorone$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Hexachloroethane$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Hexachlorocyclopentadiene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Hexachlorobutadiene$_A$	<100	<100	<100					µg/kg	100	A-T-052s
Perylene$_A$	<100	<100	<100					µg/kg	100	A-T-052s

Envirolab Job Number: 19/11614

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/11614/10	19/11614/12	19/11614/13					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS106	WS107	WS108							
Depth to Top	0.70	0.50	0.20							
Depth To Bottom										
Date Sampled	03-Dec-19	03-Dec-19	03-Dec-19							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	5A	5A	6AE							
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	-	<1					mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	-	<1					mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	-	<1					mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	-	<1					mg/kg	1	A-T-055s
Ali >C21-C35$_A$	2	-	5					mg/kg	1	A-T-055s
Total Aliphatics$_A$	2	-	5					mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	-	<1					mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	<1	-	<1					mg/kg	1	A-T-055s
Aro >C12-C16$_A$	3	-	1					mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	2	-	4					mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	4	-	7					mg/kg	1	A-T-055s
Total Aromatics$_A$	8	-	12					mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	10	-	16					mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	-	<0.01					mg/kg	0.01	A-T-022s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Helsby, Spring Lodge, 172 Chester Road, Helsby, Cheshire, UK, WA6 0AR

Project: Rockingham

Clients Project No: 322638

Project No: 19/11614

Date Received: 06/12/2019 (am)

Cool Box Temperatures (°C): 10.0 & 11.9

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/12092
Issue Number: 1 **Date:** 07 January, 2020

Client: RSK Environment Ltd Castleford
The Potteries
Pottery Street
Castleford
WF10 1NJ

Project Manager: Alex Cox
Project Name: Rockingham
Project Ref: 322638
Order No: N/A
Date Samples Received: 17/12/19
Date Instructions Received: 19/12/19
Date Analysis Completed: 07/01/20

Prepared by:

Sophie France
Admin Assistant

Approved by:

Danielle Brierley
Client Manager

Envirolab Job Number: 19/12092

Client Project Name: Rockingham

Client Project Ref: 322638

Lab Sample ID	19/12092/1	19/12092/2	19/12092/8	19/12092/14	19/12092/16			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP508	TP509	TP517	TP524	TP525					
Depth to Top	2.00	2.00	1.50	3.50	2.50					
Depth To Bottom										
Date Sampled	10-Dec-19	10-Dec-19	12-Dec-19	11-Dec-19	11-Dec-19					
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES					
Sample Matrix Code	6AE	6ABE	6AE	6AE	6AE					
% Stones >10mm$_A$	3.2	30.4	6.0	5.2	31.3			% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	7.26	7.27	6.19	8.06	7.05			pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	374	842	141	288	142			mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.13	0.24	0.06	0.09	0.05			% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.10	0.26	0.04	0.37	0.02			% w/w	0.01	A-T-024s

REPORT NOTES

General
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Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
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A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
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For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
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Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Castleford, The Potteries, Pottery Street, Castleford, WF10 1NJ

Project: Rockingham

Clients Project No: 322638

Project No: 19/12092

Date Received: 19/12/2019 (am)

Cool Box Temperatures (°C): 12.2, 11.9, 12.6

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

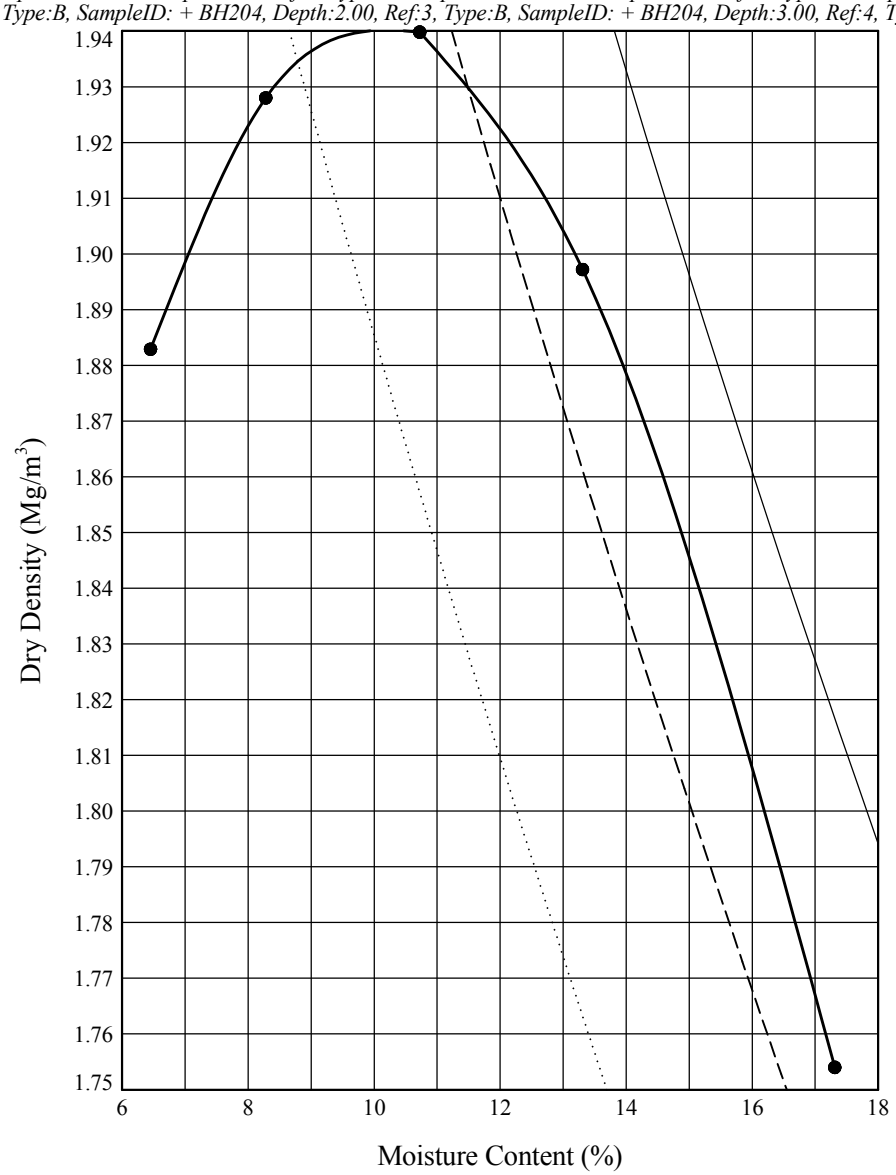
APPENDIX J
LABORATORY CERTIFICATES FOR GEOTECHNICAL ANALYSIS

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Position ID : **Test 1** Sample Ref: **1** Sample Type: **B** Depth (m): **-**

Amalgamation comprises: BH202, Depth:2.00, Ref:3, Type:B, SampleID:. + BH202, Depth:3.00, Ref:4, Type:B, SampleID: + BH204, Depth:1.20, Ref:2, Type:B, SampleID: + BH204, Depth:2.00, Ref:3, Type:B, SampleID: + BH204, Depth:3.00, Ref:4, Type:B, SampleID:



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **17**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m³)	: **1.94**
% Retained on 37.5mm BS Sieve	: **7**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **10**
% Retained on 20.0mm BS Sieve	: **16**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**	
Particle Density - assumed (Mg/m³)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

Sample Description	Key to Air Voids Lines		
Brown grey shaley CLAY/MUDSTONE	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	**MAUREEN FISHER**	**01/04/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

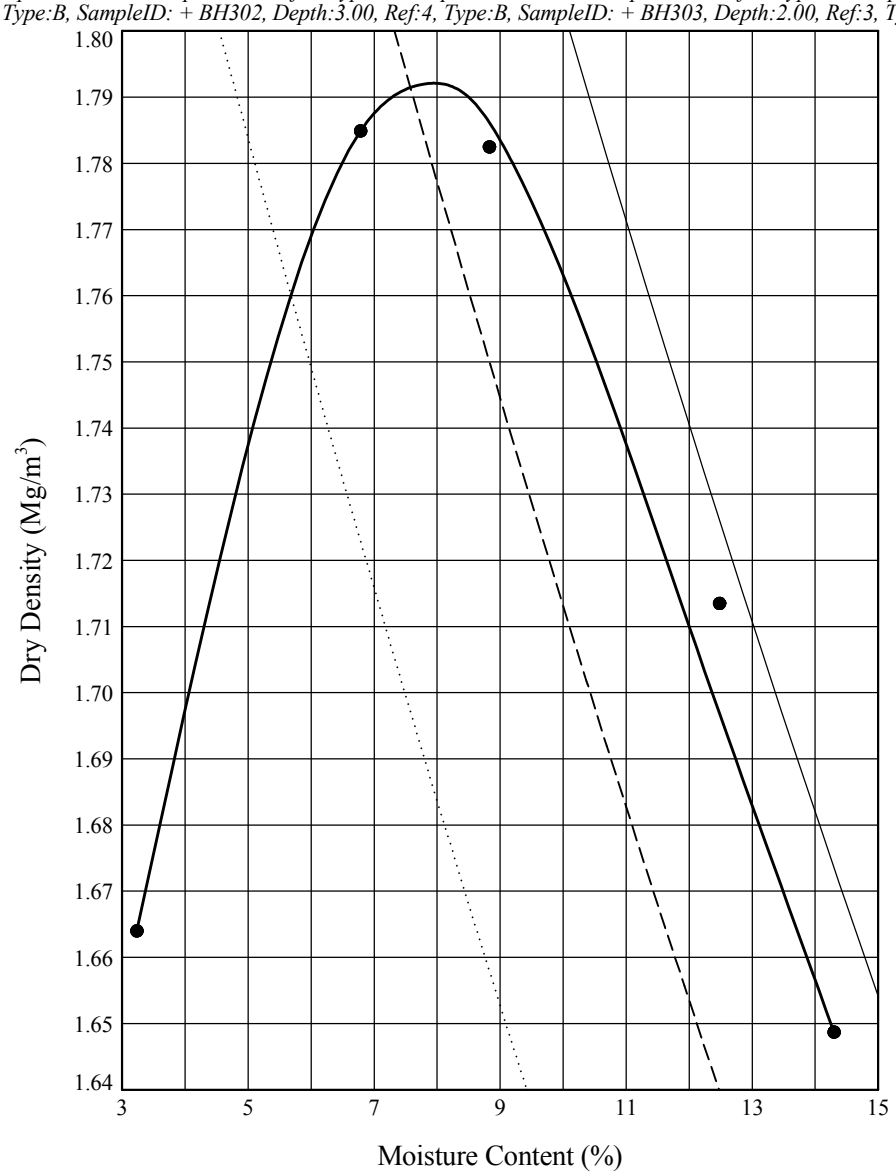
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Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk.

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Position ID : **Test 2** Sample Ref: **1** Sample Type: **AMAL** Depth (m): **1.20**

Amalgamation comprises: BH301, Depth:2.00, Ref:3, Type:B, SampleID:. + BH301, Depth:4.00, Ref:5, Type:B, SampleID: + BH302, Depth:2.00, Ref:3, Type:B, SampleID: + BH302, Depth:3.00, Ref:4, Type:B, SampleID: + BH303, Depth:2.00, Ref:3, Type:B, SampleID:



Initial Sample Conditions			Test Details		Test Results		
Initial Moisture Content (%)	:	**14**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m³)	:	**1.79**
% Retained on 37.5mm BS Sieve	:	**3**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	:	**8.0**
% Retained on 20.0mm BS Sieve	:	**9**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.20**			Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.				

Sample Description	Key to Air Voids Lines		
Dark grey brown slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	**MAUREEN FISHER**	**01/04/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

AGS

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | Graph L - COMPACTIONS | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 01/04/14 - 13:50 | MF.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk.

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 781125 R1

Date 14-March-2014 Contract Rockingham

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire WA6 0AR

For the Attention of Emily Jones

Samples submitted by client	19/02/2014	Client Reference	321393
Testing Started	20/02/2014	Client Order No.	
Testing Completed	14/03/2014	Instruction Type	Written

Ukas Accredited Tests Underatken

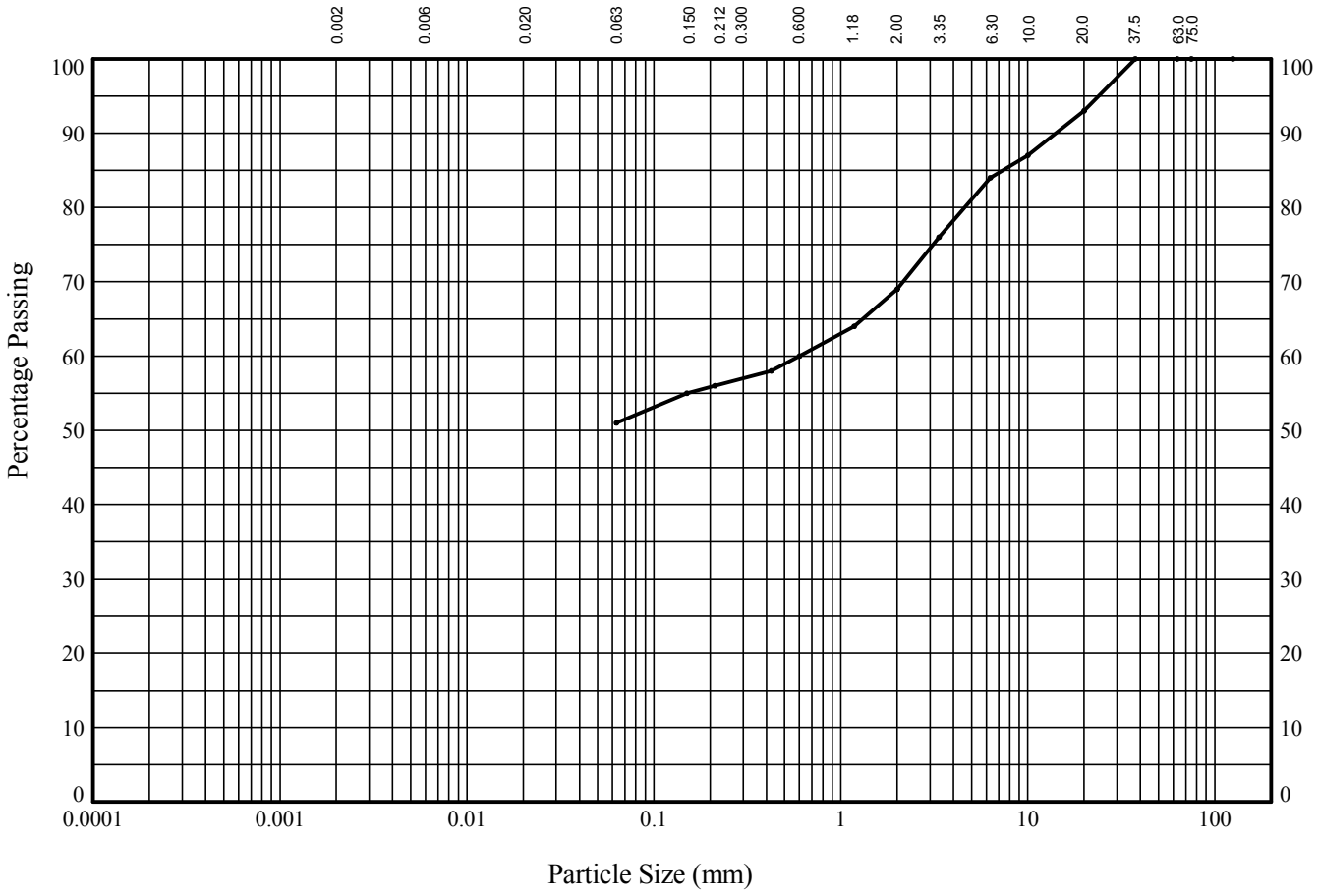
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Dry density/moisture content relationship 2.5kg rammer method BS1377:Part 4:1990, clause 3.3/3.4

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Borehole : **BH203** Sample Ref: **3** Sample Type: **B** Depth (m): **4.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	100
20.0	93
10.0	87
6.30	84
3.35	76
2.00	69
1.18	64
0.600	60
0.425	58
0.212	56
0.150	55
0.063	51

Particle Diameter	Percentage Passing

Soil Fraction	Sieve Percentage
GRAVEL	**31**
SAND	**18**
SILT/CLAY	**51**

Soil Description:
Grey brown slightly sandy slightly gravelly CLAY

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	**MAUREEN FISHER**	**14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

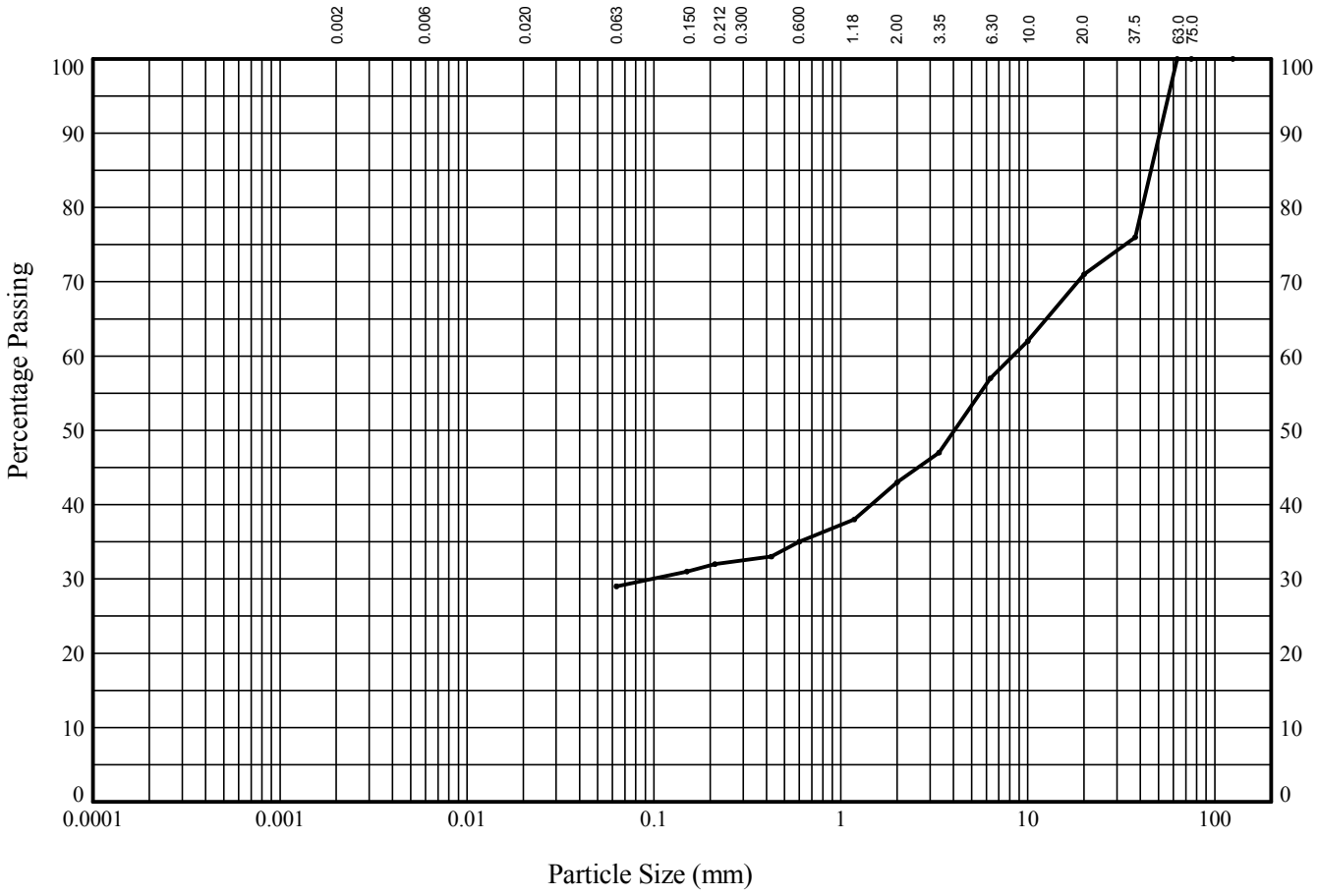
AGS

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | Graph L - PSD - EC7 | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 14/03/14 - 10:05 | MF.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk.

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Borehole : **BH206** Sample Ref: **11** Sample Type: **B** Depth (m): **5.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	76
20.0	71
10.0	62
6.30	57
3.35	47
2.00	43
1.18	38
0.600	35
0.425	33
0.212	32
0.150	31
0.063	29

Particle Diameter	Percentage Passing

Soil Fraction	Sieve Percentage
GRAVEL	**57**
SAND	**14**
SILT/CLAY	**29**

Soil Description:
Grey brown slightly sandy gravelly CLAY

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	**MAUREEN FISHER**	**14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

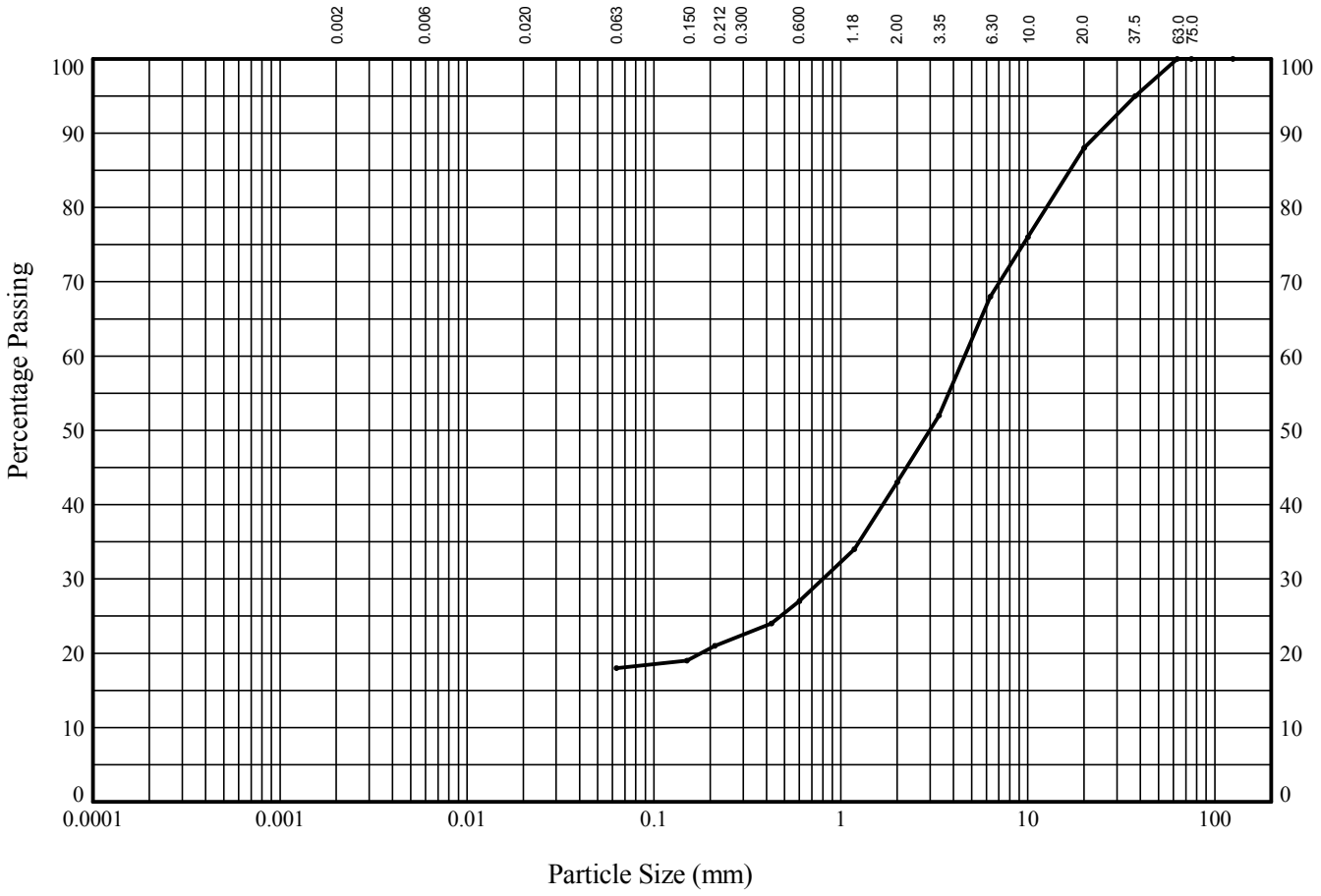
AGS

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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit : **TP305** Sample Ref: **1** Sample Type: **B** Depth (m): **1.80**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	95
20.0	88
10.0	76
6.30	68
3.35	52
2.00	43
1.18	34
0.600	27
0.425	24
0.212	21
0.150	19
0.063	18

Particle Diameter	Percentage Passing

Soil Fraction	Sieve Percentage
GRAVEL	**57**
SAND	**25**
SILT/CLAY	**18**

Soil Description:
Grey brown clayey very sandy GRAVEL

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	**MAUREEN FISHER**	**14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

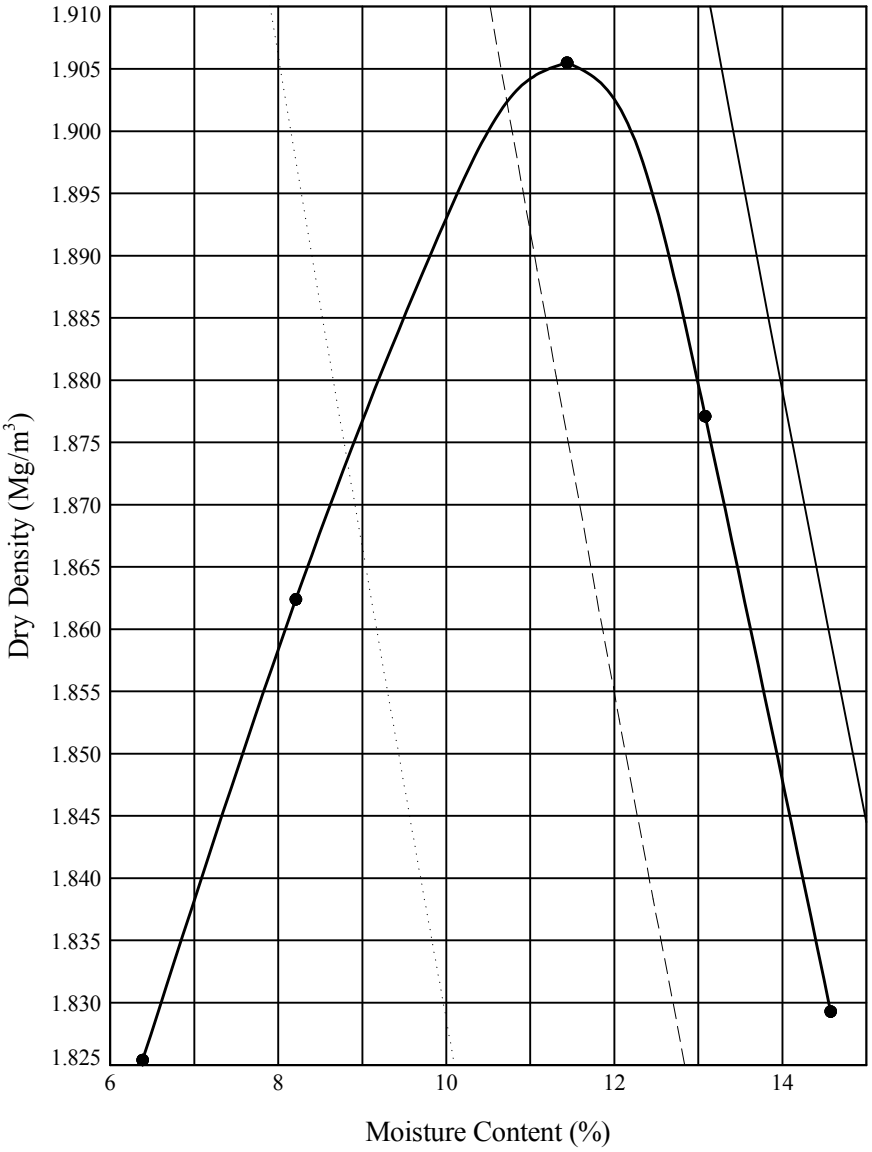
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Borehole : **BH206 & TP211** Sample Ref: **2 & 5** Sample Type: **AMAL** Depth (m): **2.00**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**Light**	Maximum Dry Density (Mg/m^3)	:	**1.91**
% Retained on 37.5mm BS Sieve	:	**11**	Mass of Rammer (kg):		**2.5**	Optimum Moisture Content (%)	:	**11.0**
% Retained on 20.0mm BS Sieve	:	**14**	Type of Mould	:	**CBR**	Method Used: **Clause 3.4**		
Particle Density - assumed (Mg/m^3)	:	**2.55**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Grey silty CLAY/MUDSTONE	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

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Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
MRanderson	**MICK RANDERSON**	**14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

AGS

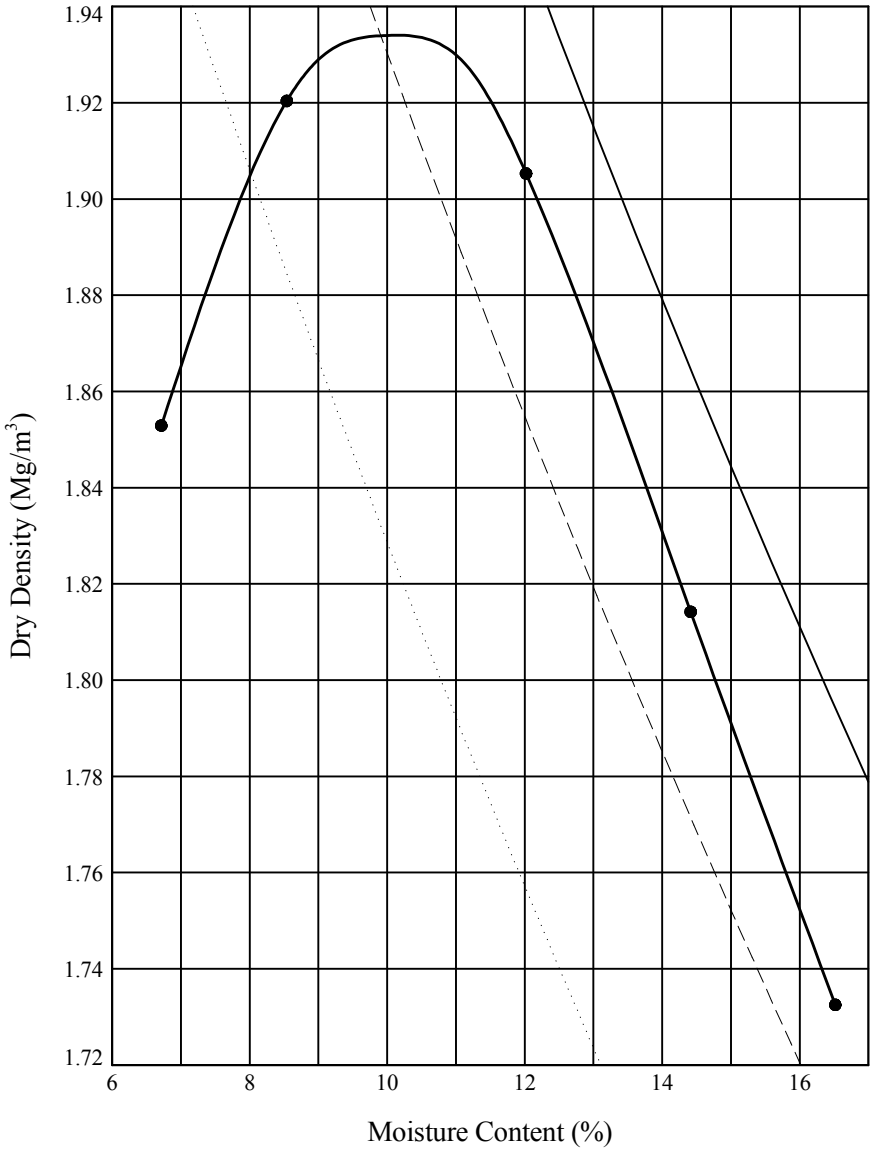
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit : **TP303 & 304** Sample Ref: **1** Sample Type: **AMAL** Depth (m): **2.00**

Amalgamation comprises: TP303, Depth:2.00, Ref:, Type:, SampleID:. + TP303, Depth:2.40, Ref:, Type:, SampleID: + TP304, Depth:2.40, Ref:, Type:, SampleID:



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**8.5**	Compaction Type	:	**Light**	Maximum Dry Density (Mg/m^3)	:	**1.93**
% Retained on 37.5mm BS Sieve	:	**17**	Mass of Rammer (kg):		**2.5**	Optimum Moisture Content (%)	:	**10**
% Retained on 20.0mm BS Sieve	:	**33**	Type of Mould	:	**CBR**	Method Used: **Clause 3.4**		
Particle Density - assumed (Mg/m^3)	:	**2.55**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Grey silty CLAY/MUDSTONE	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MRanderson	**MICK RANDERSON** **14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

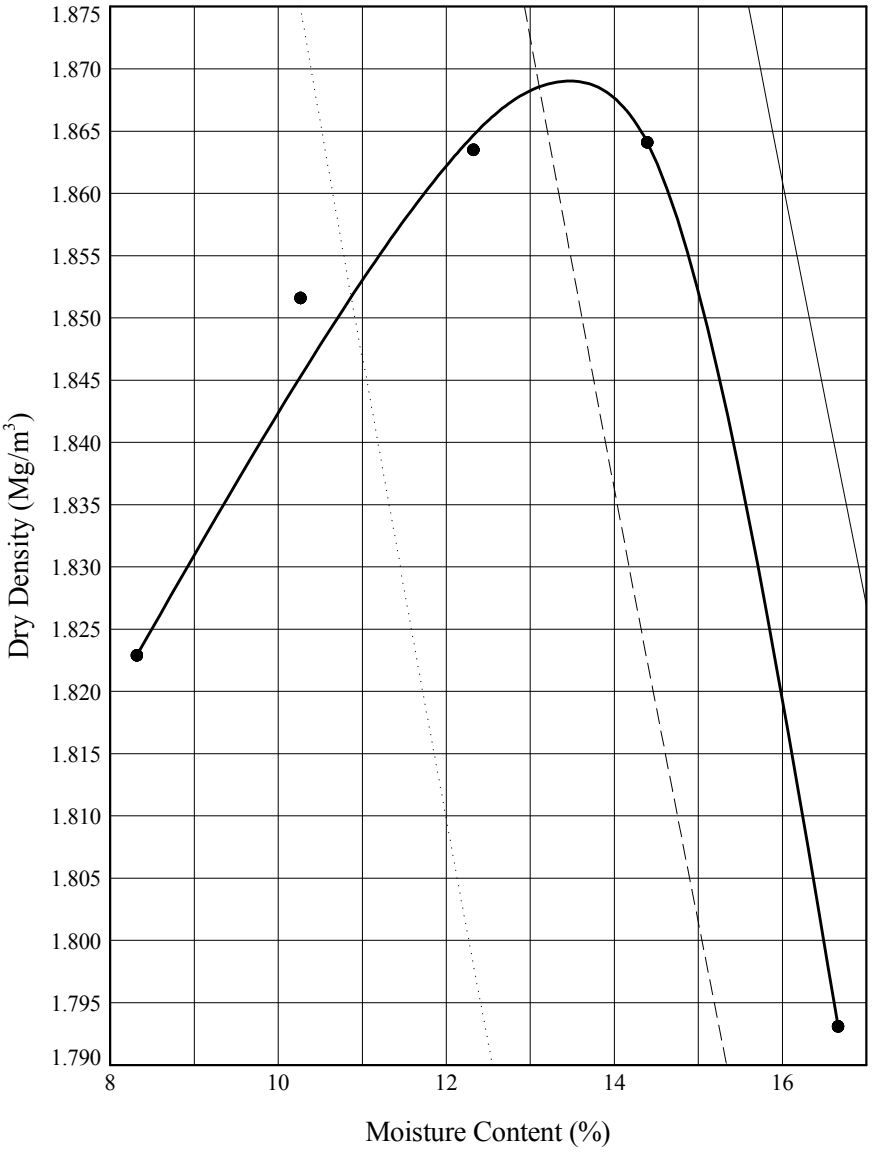
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GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | Graph L - COMPACTIONS | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 14/03/14 - 16:52 | MAA.
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit : **TP401** Sample Ref: **1** Sample Type: **B** Depth (m): **2.00**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **12**	Compaction Type	: **Light**	Maximum Dry Density (Mg/m^3)	: **1.87**
% Retained on 37.5mm BS Sieve	: **10**	Mass of Rammer (kg):	**2.5**	Optimum Moisture Content (%)	: **13**
% Retained on 20.0mm BS Sieve	: **15**	Type of Mould	: **CBR**	Method Used: **Clause 3.4**	
Particle Density - assumed (Mg/m^3)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

Sample Description	Key to Air Voids Lines		
Grey CLAY/Mudstone with fine to coarse gravel.	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

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Compiled By	Date
MRanderson	**MICK RANDERSON**	**14/03/14**

Contract	Contract Ref:
Rockingham Barnsley	**781125**

AGS

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | Graph L - COMPACTIONS | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 14/03/14 - 14:38 | MR.
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TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with Structural Soils Ltd Laboratory Quality Assurance Manual, Issue 6, January 2010 all results sheets and summaries of results issued by the laboratory are checked by an approved signatory. This check will also involve checking of at least 10% of calculations for each test type to ensure that data has been correctly entered into the computer and calculated. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Assurance Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **01/04/2014 17:24:17**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Mark Athorne (Laboratory Quality Manager)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Contract:	Job No:
Rockingham Barnsley	**781125**

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | GrfcText L - LAB VERIFICATION REPORT | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 01/04/14 - 17:24 | MAA.
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TESTING VERIFICATION CERTIFICATE

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The test results included in this report are certified as:-

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This testing verification certificate covers all testing compiled on or before the following datetime: **14/03/2014 17:04:47**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Mark Athorne (Laboratory Quality Manager)

STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Contract: **Rockingham Barnsley**	Job No: **781125**

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Geotech Lab-Castleford - 0002 | GrfcText L - LAB VERIFICATION REPORT | 781125 - ROCKINGHAM, BARNSLEY.GPJ - v8_05 | 14/03/14 - 17:05 | MAA.
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STRUCTURAL SOILS LTD

TEST REPORT

1774

Report No. 784270 R1

Date 24-January-2020 Contract Rockingham

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire WA6 0AR

For the Attention of A Cox

Samples submitted by client	12/12/2019	Client Reference	322638
Testing Started	19/12/2019	Client Order No.	
Testing Completed	24/01/2020	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

Ukas Accredited Tests Underatken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded)**
Liquid Limit (one point method) BS1377:Part 2:1990,clause 4.4
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail mark.athorne@soils.co.uk

SUMMARY OF MOISTURE CONTENT TESTS

In accordance with clause 3.2 of BS1377:Part 2

Exploratory Position ID	Sample Ref	Depth (m)	Sample Type	Moisture Content %	Lab
BH511	**6**	**8.00**	**D**	**18**	**C**
BH517	**2**	**3.00**	**D**	**16**	**C**
BH519	**1**	**2.00**	**D**	**24**	**C**
BH523	**1**	**4.00**	**D**	**20**	**C**
BH523	**2**	**6.50**	**D**	**11**	**C**
BH523	**3**	**8.00**	**D**	**15**	**C**
BH524	**1**	**12.00**	**D**	**21**	**C**
BH524	**3**	**13.00**	**D**	**16**	**C**

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	**24/01/20**

Contract:	Contract Ref:
Rockingham	**784270**

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | GrfcTbl L - SUMMARY OF STANDALONE MC - A4P | 784270 - ROCKINGHAM.GPJ - v8_07.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 24/01/20 - 15:15 | LW5 |

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BH511	2	D	2.00	18	39	19	20	61	Black slightly sandy slightly gravelly CLAY
BH511	4	D	3.00	16	40	19	21	61	Dark brown slightly sandy slightly gravelly CLAY
BH519	3	D	3.50	11	34	19	15	72	Light brown slightly gravelly slightly sandy CLAY

STRUCTURAL SOILS LTD

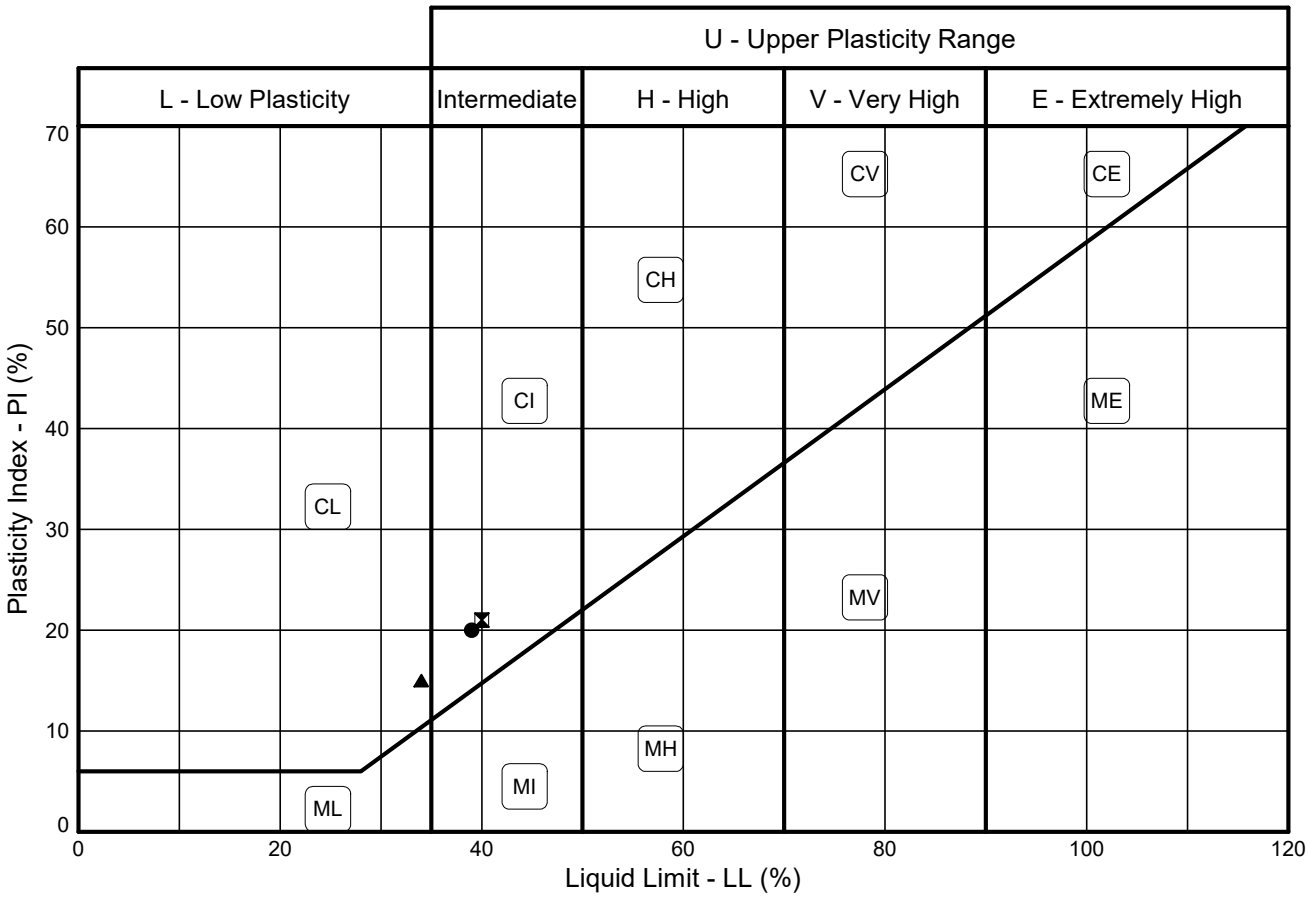
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Contract Ref: **784270**

AGS

PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	Lab location	
	Exploratory Position ID	Sample	Depth (m)									
●	BH511	2D	2.00	3.2/4.4/5.3/5.4	4.2.4	18	39	19	20	61	C	
⊠	BH511	4D	3.00	3.2/4.4/5.3/5.4	4.2.4	16	40	19	21	61	C	
▲	BH519	3D	3.50	3.2/4.4/5.3/5.4	4.2.4	11	34	19	15	72	C	

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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Compiled By		Date
	LORNA WHITWORTH	24/01/20

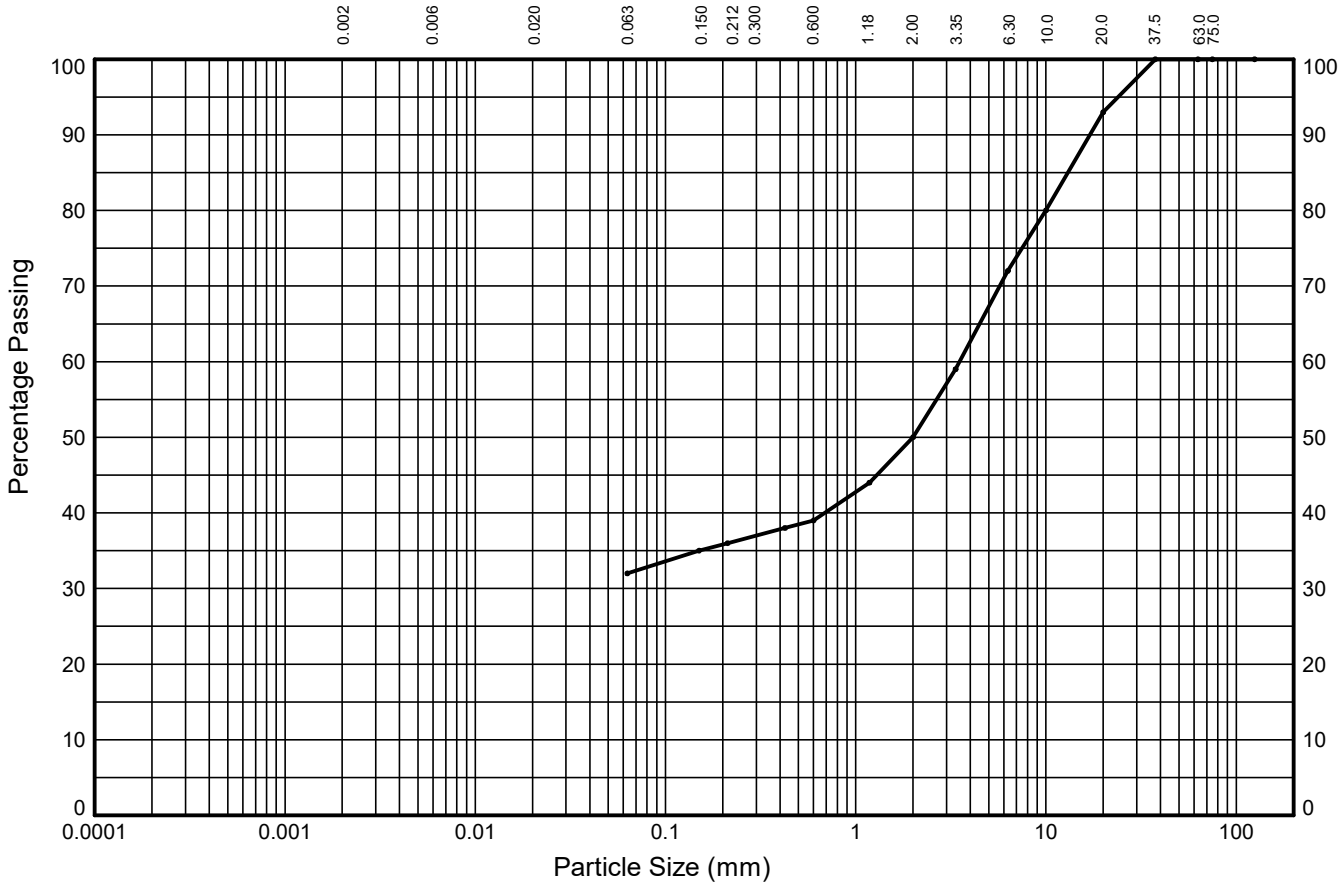
Contract	Contract Ref:
Rockingham	**784270**

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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH501** Sample Ref: **2** Sample Type: **B** Depth (m): **4.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	4%	3%	11%	22%	21%	7%	
	SILT			SAND			GRAVEL			
32%				18%			50%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**93**
10.0	**80**
6.30	**72**
3.35	**59**
2.00	**50**
1.18	**44**
0.600	**39**
0.425	**38**
0.212	**36**
0.150	**35**
0.063	**32**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**2.000**
D_{60} (mm)	**3.517**
D_{85} (mm)	**13.055**
D_{90} (mm)	**17.044**
C_U	**NA**
C_C	**NA**

Soil Description:

Dark grey sandy very clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	24/01/20

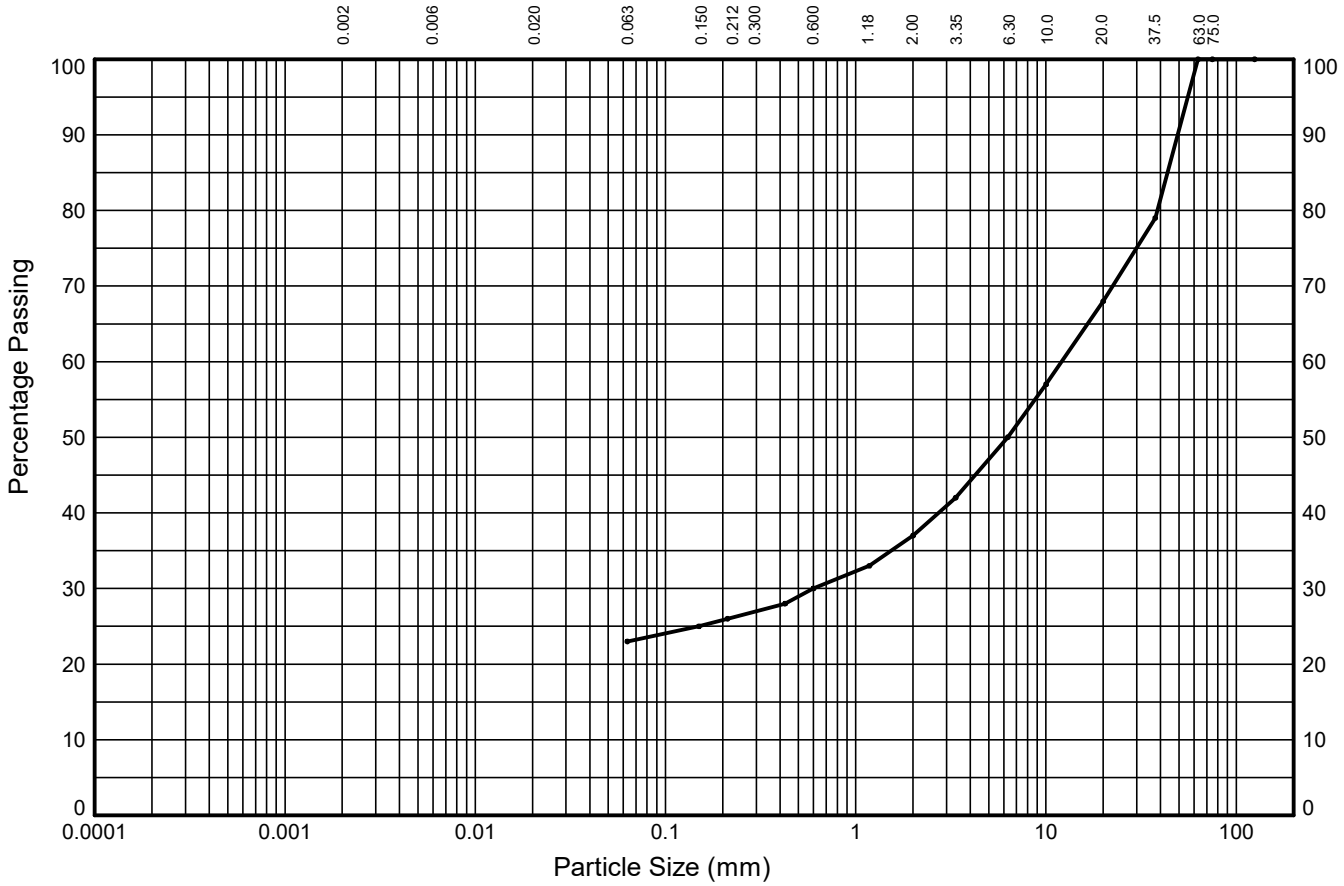
Contract	Contract Ref:
Rockingham	**784270**

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07_| Graph L - PSD - A4P | 784270 - ROCKINGHAM.GPJ - v8_07.
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH501** Sample Ref: **3** Sample Type: **B** Depth (m): **7.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	3%	4%	7%	13%	18%	32%	
	SILT			SAND			GRAVEL			
23%				14%			63%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**79**
20.0	**68**
10.0	**57**
6.30	**50**
3.35	**42**
2.00	**37**
1.18	**33**
0.600	**30**
0.425	**28**
0.212	**26**
0.150	**25**
0.063	**23**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.600**
D_{50} (mm)	**6.300**
D_{60} (mm)	**12.081**
D_{85} (mm)	**43.492**
D_{90} (mm)	**49.210**
C_U	**NA**
C_C	**NA**

Soil Description:

Grey sandy very clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

STRUCTURAL SOILS
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Compiled By	Date
LORNA WHITWORTH	24/01/20

Contract	Contract Ref:
Rockingham	**784270**

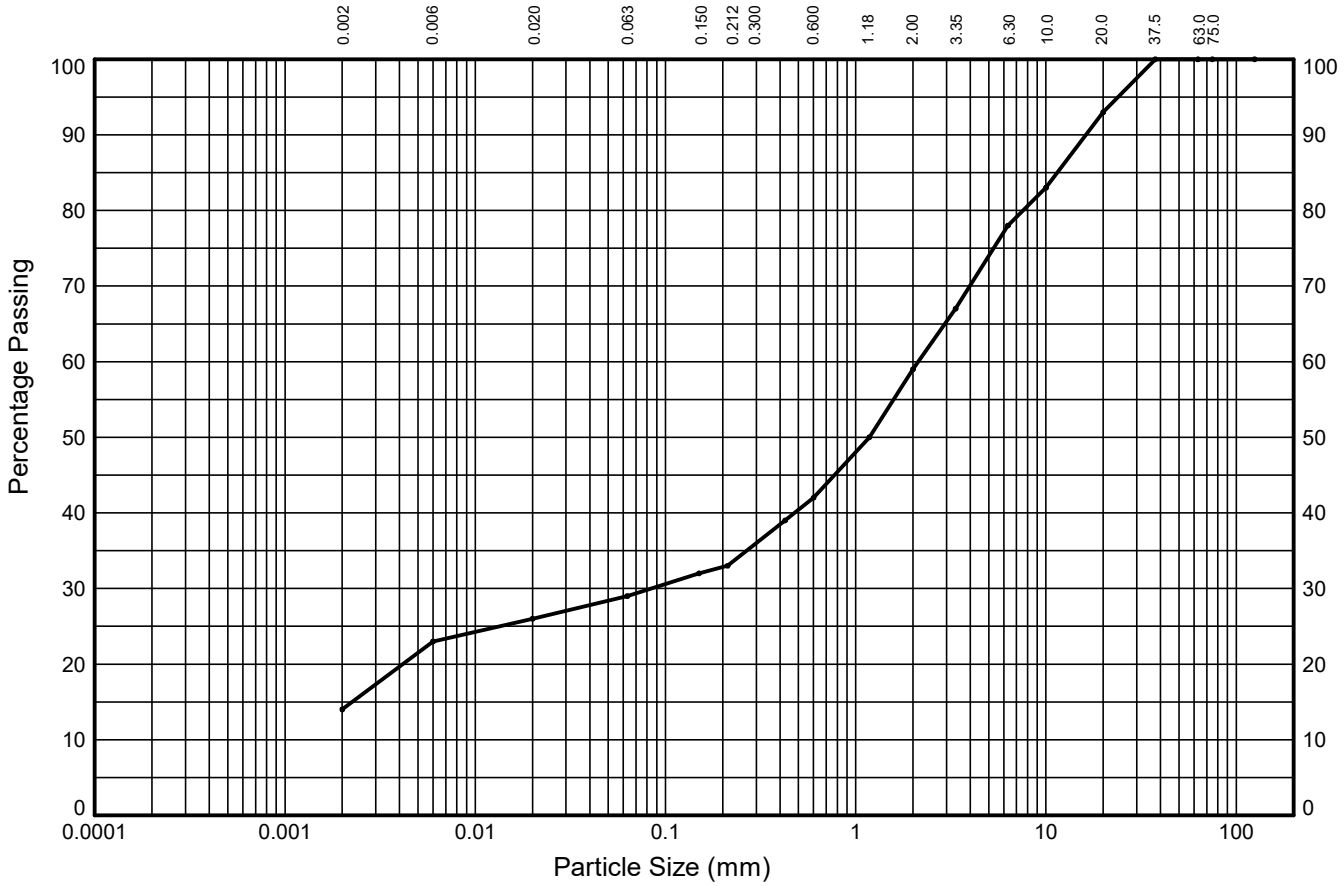
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH506** Sample Ref: **1** Sample Type: **B** Depth (m): **2.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	9%	3%	3%	4%	10%	17%	19%	15%	7%	
	SILT			SAND			GRAVEL			
14%	15%			30%			41%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**93**
10.0	**83**
6.30	**78**
3.35	**67**
2.00	**59**
1.18	**50**
0.600	**42**
0.425	**39**
0.212	**33**
0.150	**32**
0.063	**29**

Particle Diameter (mm)	Percent Passing (%)
0.02	**26**
0.006	**23**
0.002	**14**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.002**
D_{30} (mm)	**0.084**
D_{50} (mm)	**1.180**
D_{60} (mm)	**2.133**
D_{85} (mm)	**11.487**
D_{90} (mm)	**16.245**
C_U	**NA**
C_C	**NA**

Soil Description:

Black very clayey very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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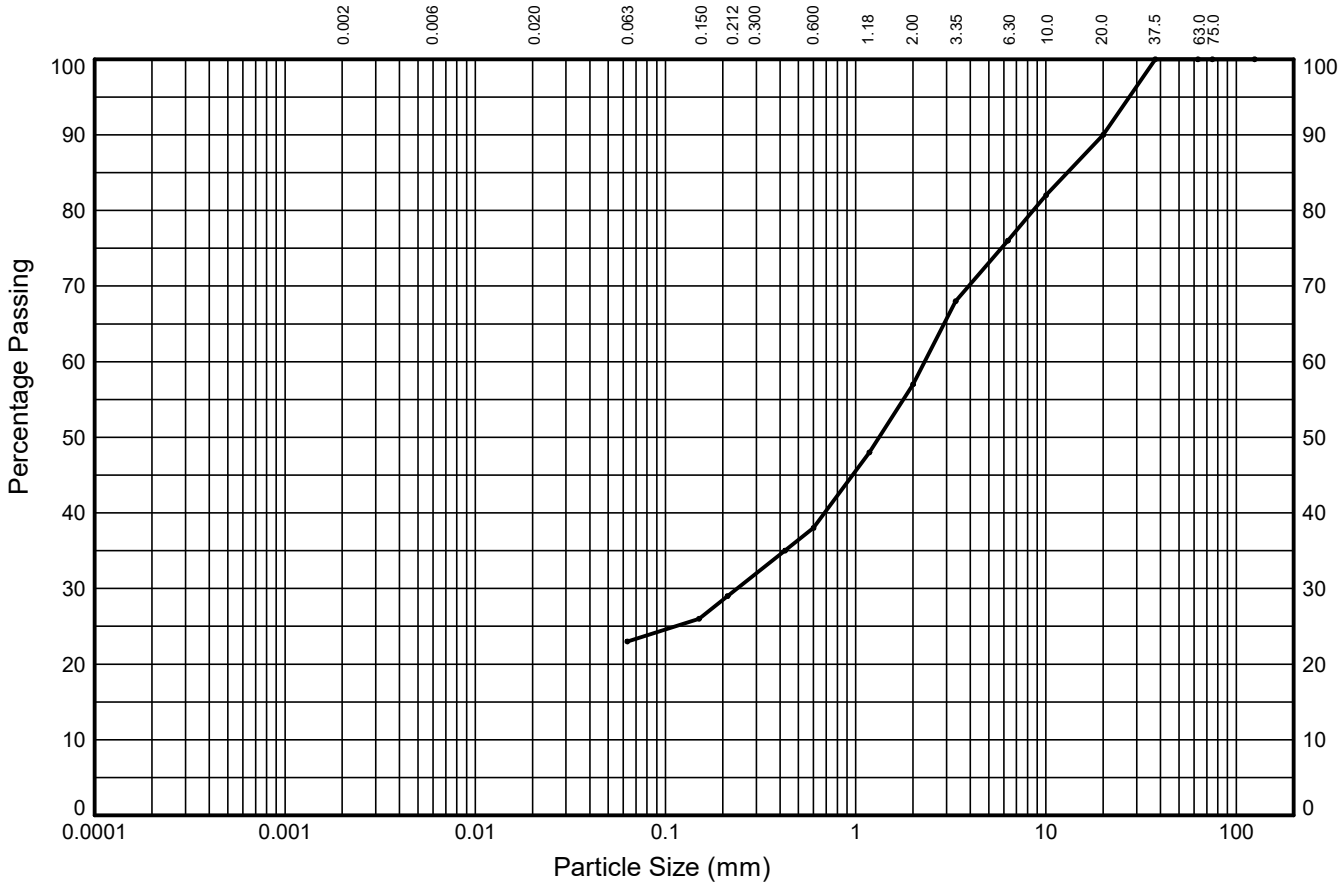
Contract	Contract Ref:
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH506** Sample Ref: **2** Sample Type: **B** Depth (m): **4.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	5%	10%	18%	19%	14%	10%	
	SILT			SAND			GRAVEL			
23%				34%			43%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**90**
10.0	**82**
6.30	**76**
3.35	**68**
2.00	**57**
1.18	**48**
0.600	**38**
0.425	**35**
0.212	**29**
0.150	**26**
0.063	**23**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.238**
D_{50} (mm)	**1.327**
D_{60} (mm)	**2.302**
D_{85} (mm)	**12.968**
D_{90} (mm)	**20.000**
C_U	**NA**
C_C	**NA**

Soil Description:

Black clayey very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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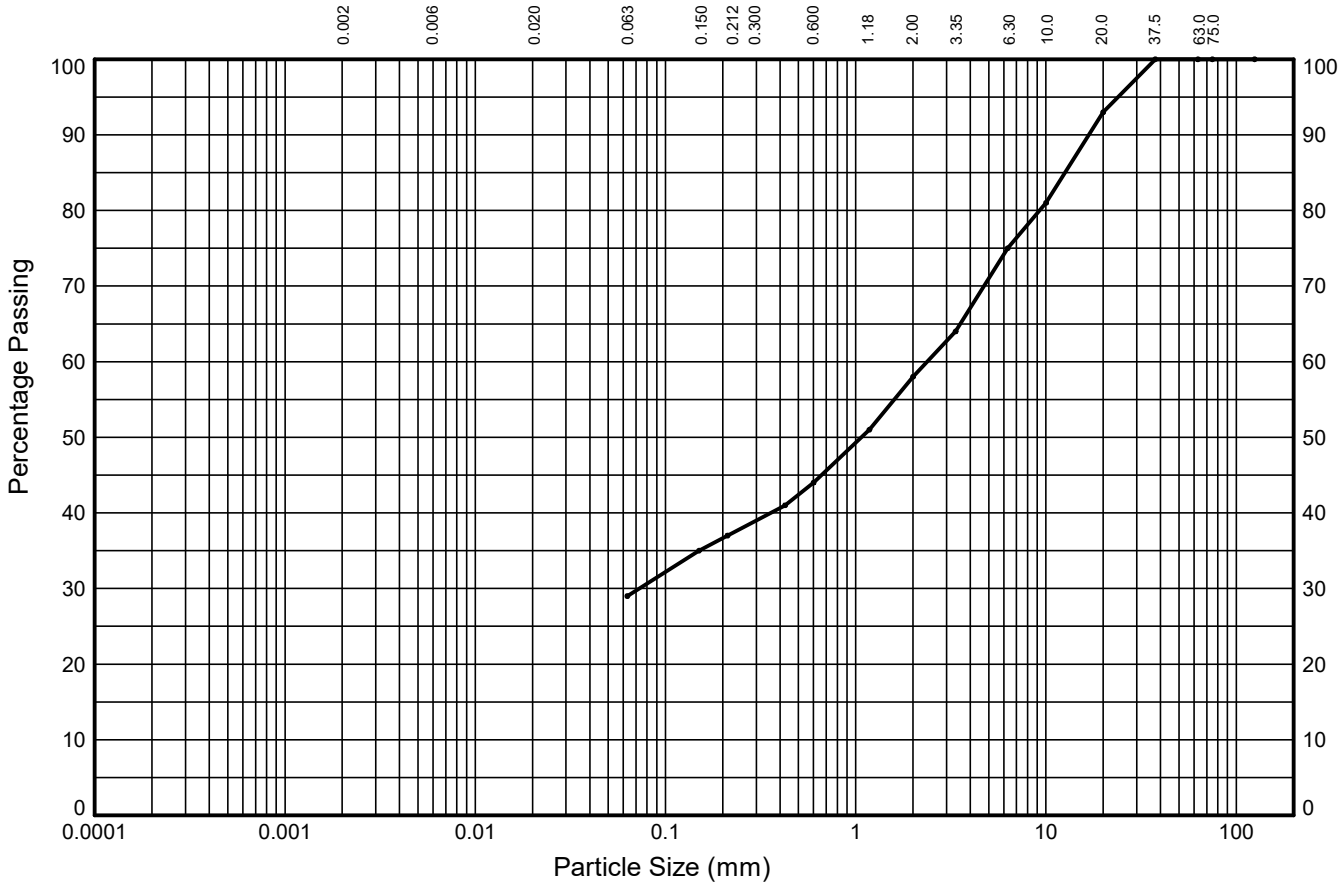
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH511** Sample Ref: **7** Sample Type: **D** Depth (m): **8.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	8%	8%	14%	17%	18%	7%	
	SILT			SAND			GRAVEL			
29%				29%			42%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**93**
10.0	**81**
6.30	**75**
3.35	**64**
2.00	**58**
1.18	**51**
0.600	**44**
0.425	**41**
0.212	**37**
0.150	**35**
0.063	**29**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.073**
D_{50} (mm)	**1.071**
D_{60} (mm)	**2.375**
D_{85} (mm)	**12.599**
D_{90} (mm)	**16.818**
C_U	**NA**
C_C	**NA**

Soil Description:

Dark brown very sandy very clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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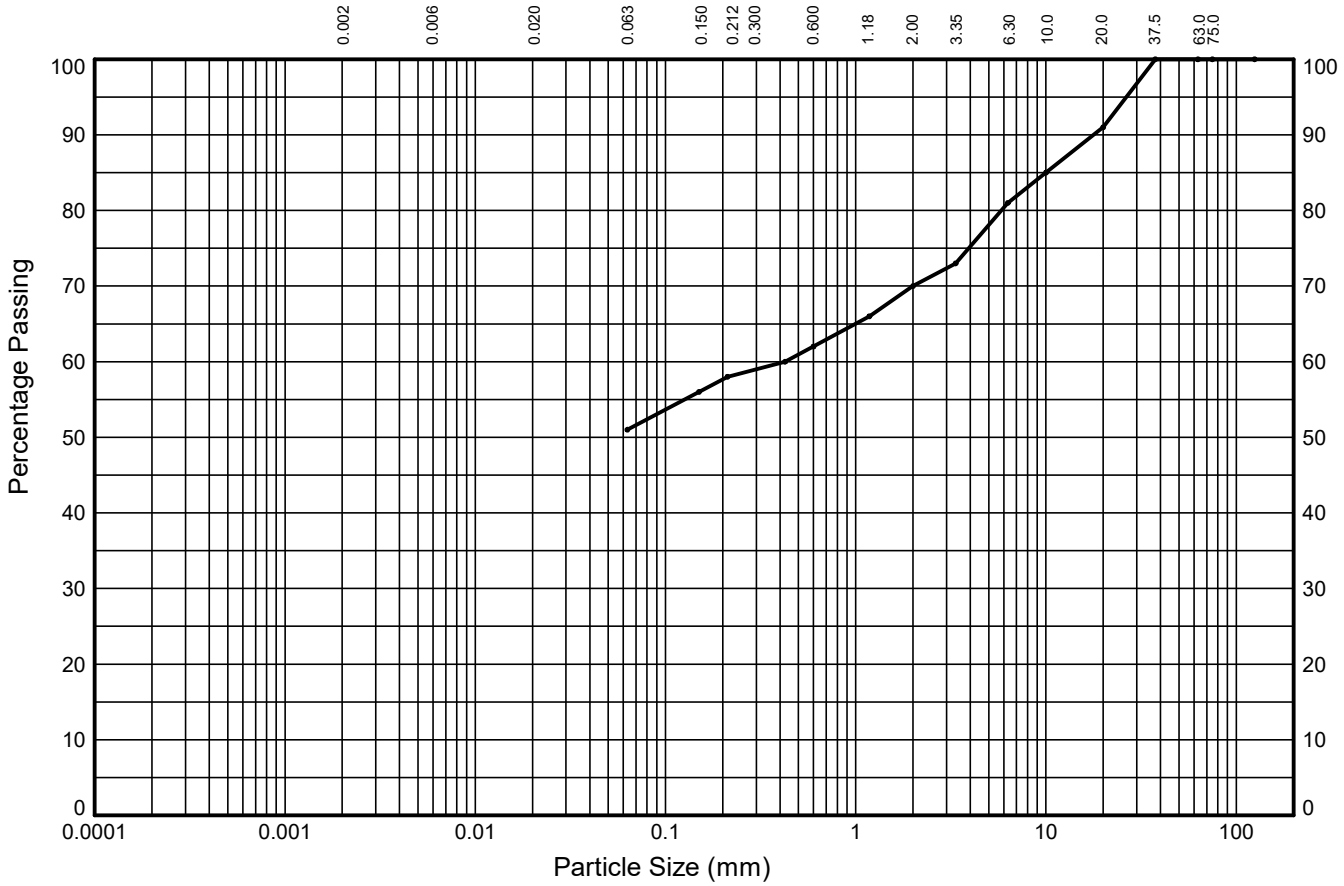
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH519** Sample Ref: **3** Sample Type: **D** Depth (m): **3.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	7%	5%	8%	11%	10%	9%	
	SILT			SAND			GRAVEL			
51%				19%			30%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**91**
10.0	**85**
6.30	**81**
3.35	**73**
2.00	**70**
1.18	**66**
0.600	**62**
0.425	**60**
0.212	**58**
0.150	**56**
0.063	**51**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**0.425**
D_{85} (mm)	**10.000**
D_{90} (mm)	**17.818**
C_U	**NA**
C_C	**NA**

Soil Description:
Light brown slightly gravelly slightly sandy CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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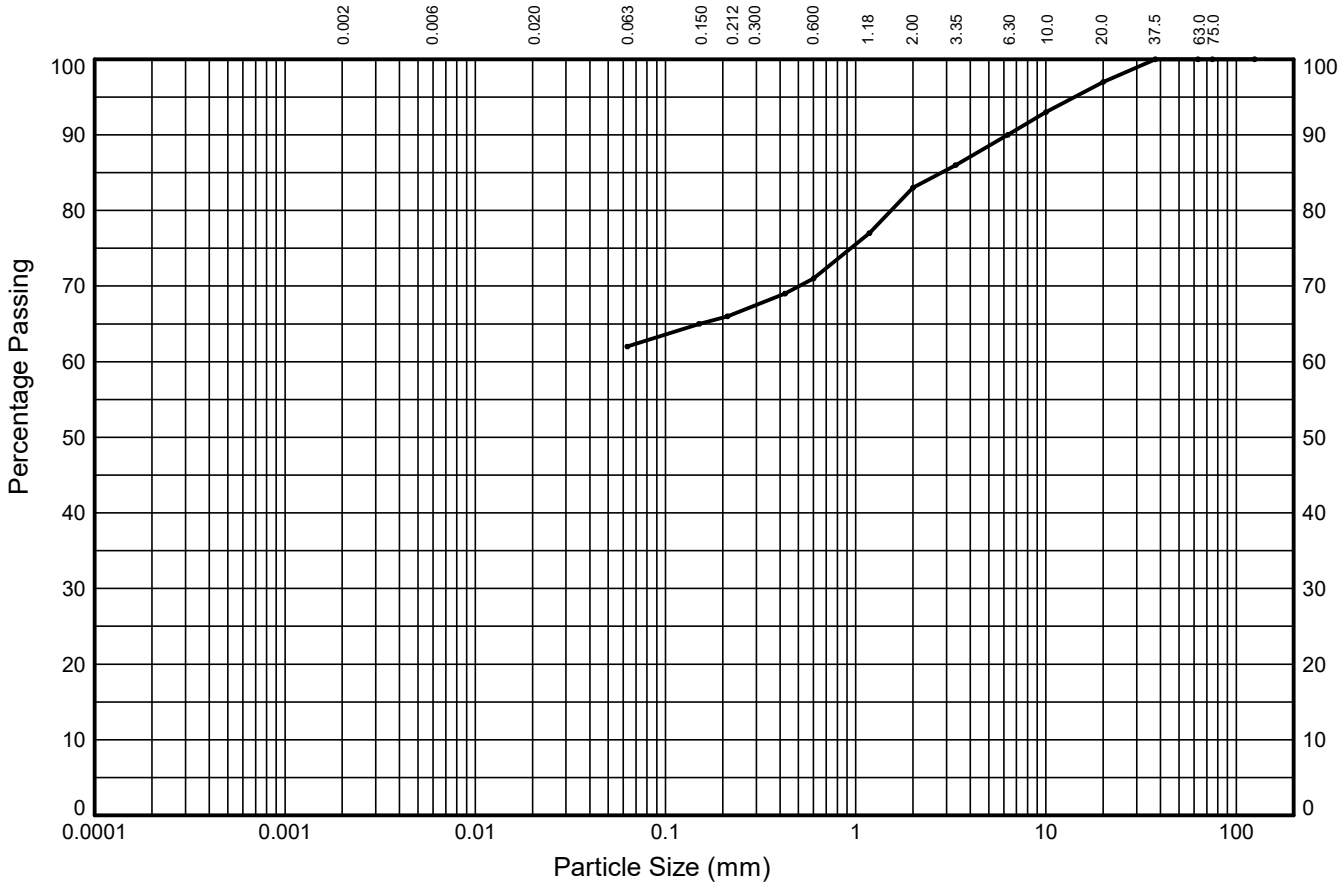
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH523** Sample Ref: **4** Sample Type: **B** Depth (m): **8.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	4%	6%	12%	7%	7%	3%	
	SILT			SAND			GRAVEL			
62%				21%			17%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**97**
10.0	**93**
6.30	**90**
3.35	**86**
2.00	**83**
1.18	**77**
0.600	**71**
0.425	**69**
0.212	**66**
0.150	**65**
0.063	**62**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**NA**
D_{85} (mm)	**2.821**
D_{90} (mm)	**6.300**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown grey gravelly sandy CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **24/01/2020 15:31:05**.

Testing reported after this date is not covered by this Verification Certificate.



Approved Signatory
Luke Fisher (Materials Laboratory Manager)

(Head Office)
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Unit 1A, Princess Street
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BS3 4AG

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Hemel Laboratory
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Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU

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SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425μm	Description of Sample
BH503	1	B	4.00	11	35	20	15	45	Black dark brown clayey very sandy GRAVEL

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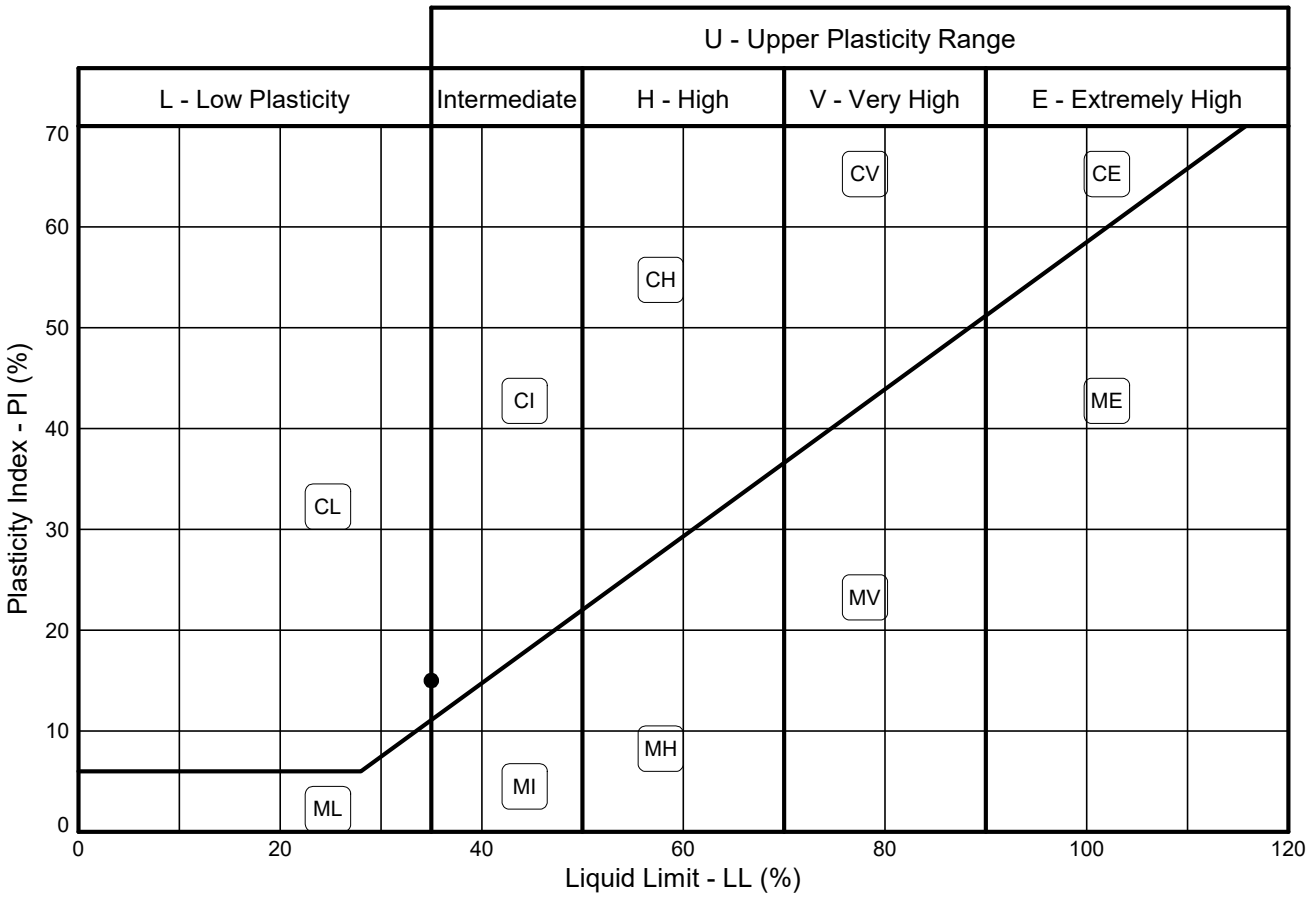
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Contract Ref: **784270**

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PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	BH503	1B	4.00	3.2/4.4/5.3/5.4	4.2.4	11	35	20	15	45	C	

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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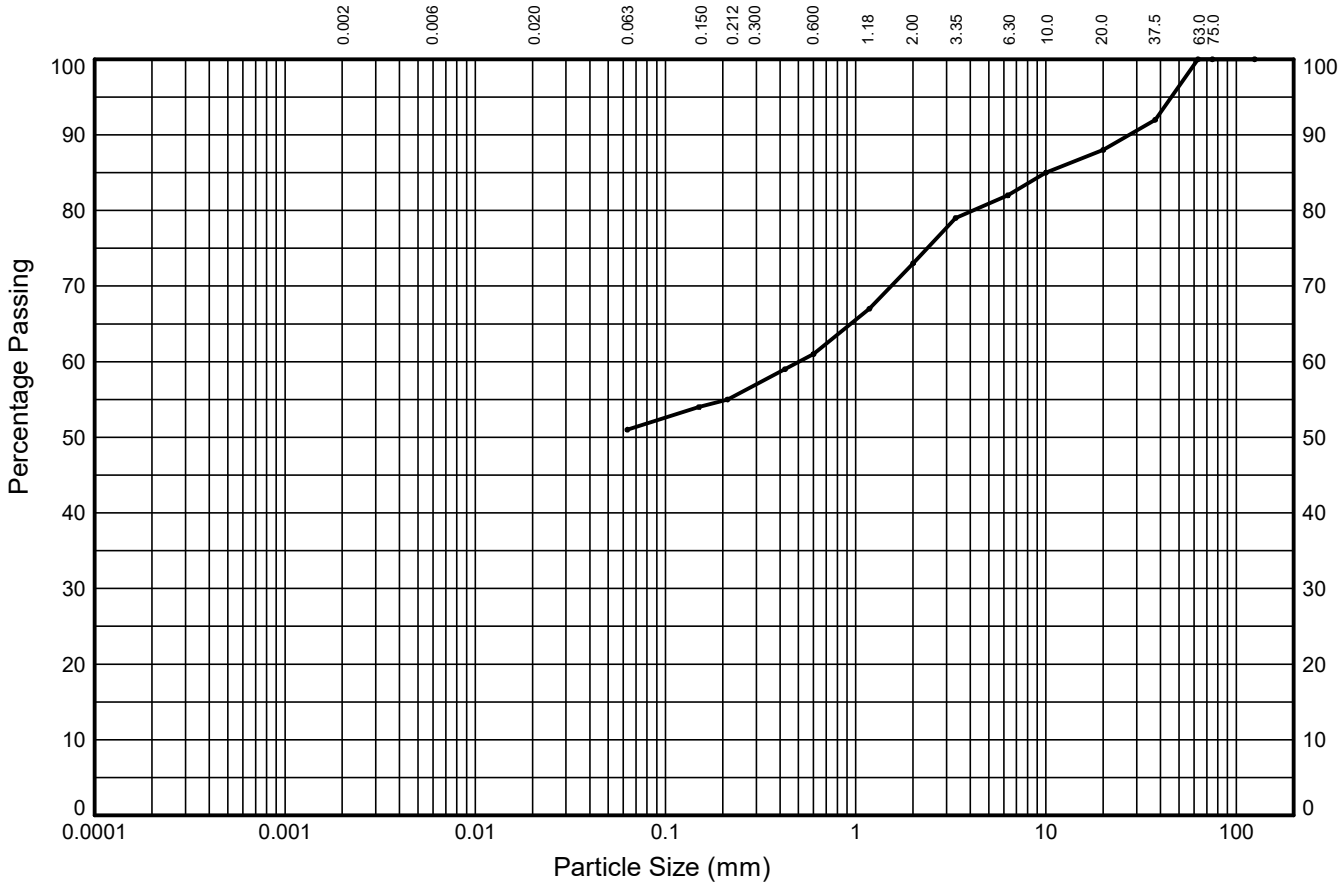
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH504** Sample Ref: **-** Sample Type: **B** Depth (m): **4.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	4%	7%	12%	9%	6%	12%	
	SILT			SAND			GRAVEL			
51%				22%			27%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**92**
20.0	**88**
10.0	**85**
6.30	**82**
3.35	**79**
2.00	**73**
1.18	**67**
0.600	**61**
0.425	**59**
0.212	**55**
0.150	**54**
0.063	**51**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**0.505**
D_{85} (mm)	**10.000**
D_{90} (mm)	**27.386**
C_U	**NA**
C_C	**NA**

Soil Description:
Grey gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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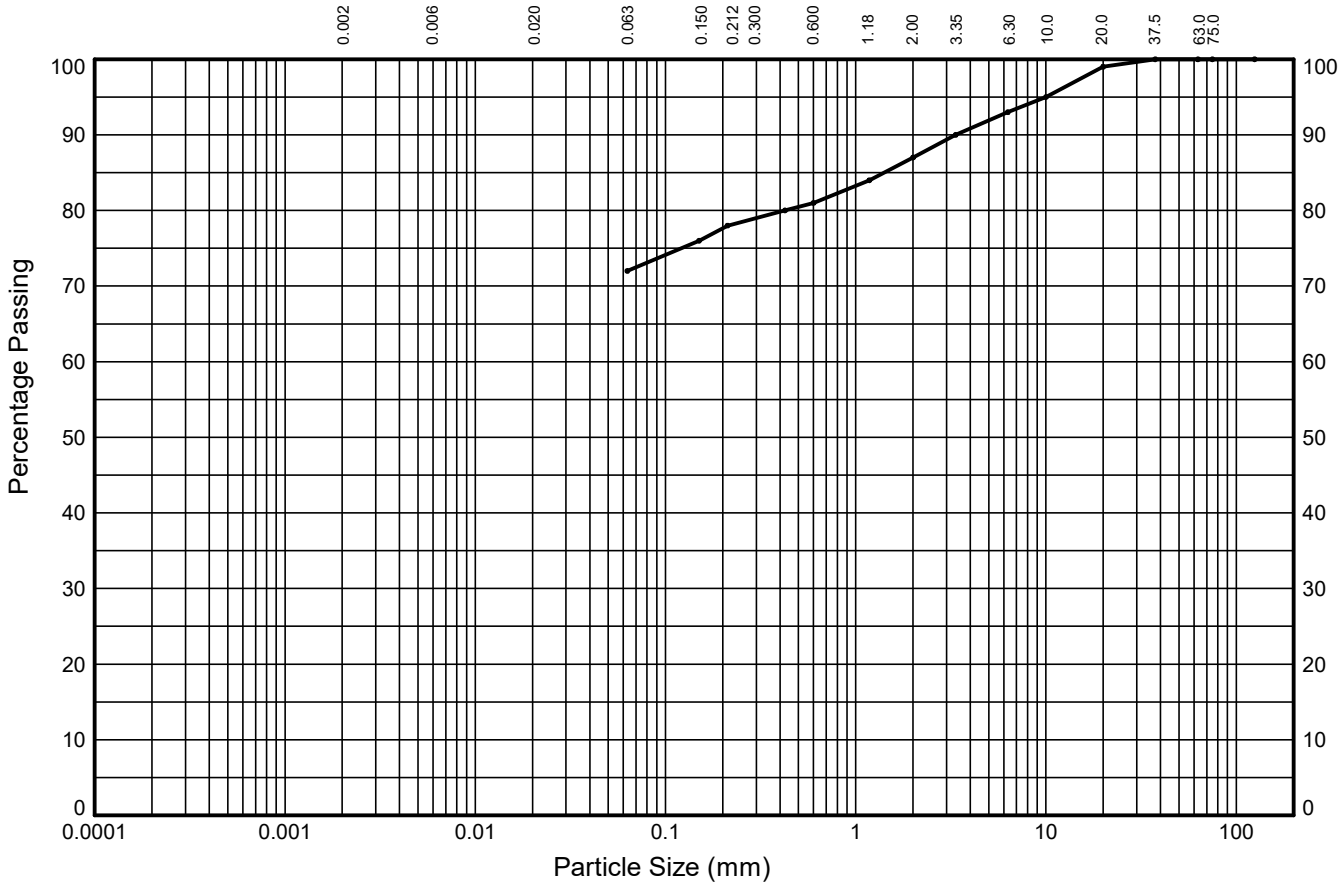
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH524** Sample Ref: **1** Sample Type: **B** Depth (m): **9.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	6%	4%	6%	6%	6%	1%	
	SILT			SAND			GRAVEL			
72%				15%			13%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**99**
10.0	**95**
6.30	**93**
3.35	**90**
2.00	**87**
1.18	**84**
0.600	**81**
0.425	**80**
0.212	**78**
0.150	**76**
0.063	**72**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**NA**
D_{85} (mm)	**1.407**
D_{90} (mm)	**3.350**
C_U	**NA**
C_C	**NA**

Soil Description:

Grey brown slightly sandy slightly gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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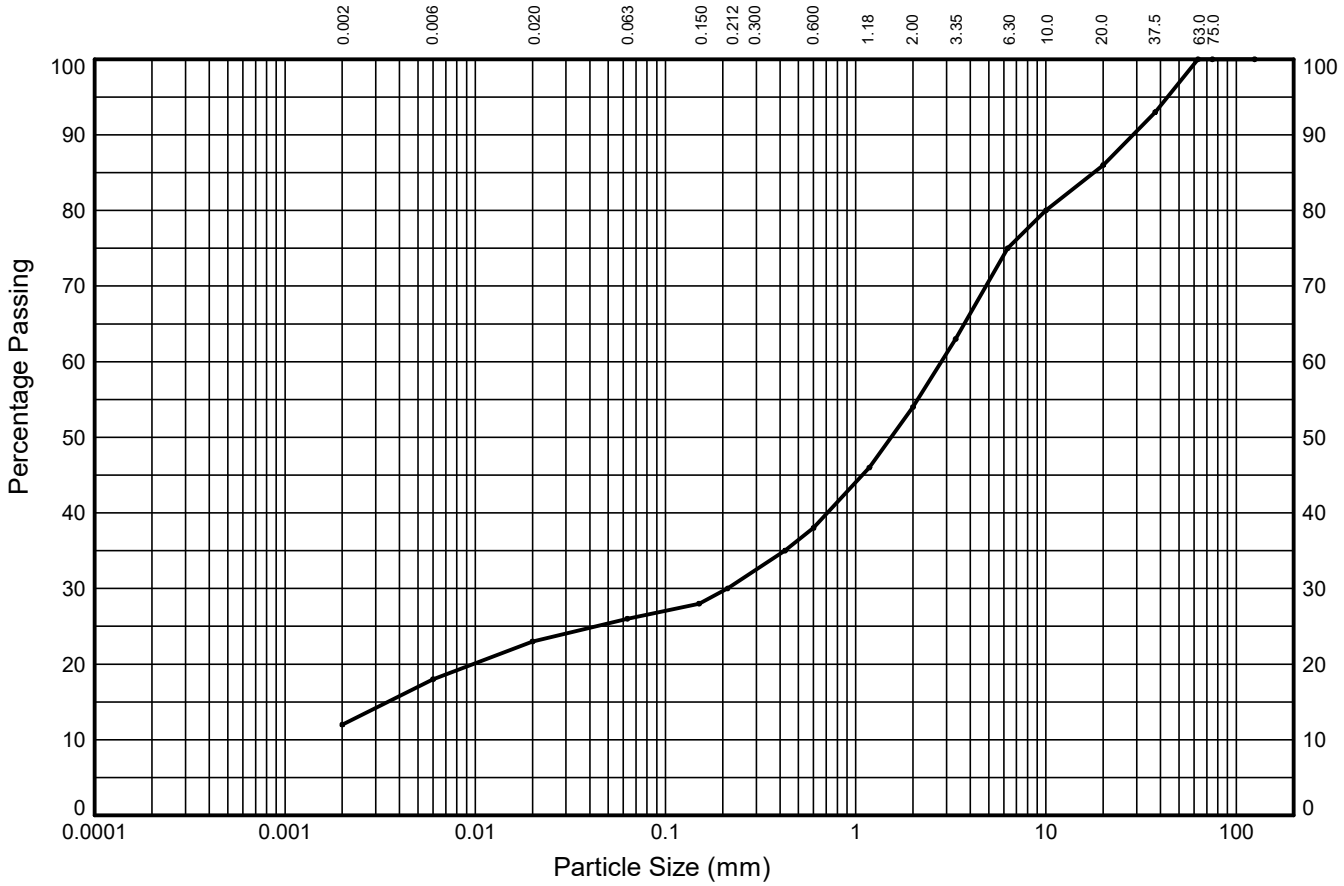
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP510** Sample Ref: **1** Sample Type: **B** Depth (m): **1.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	5%	3%	4%	9%	16%	21%	11%	14%	
	SILT			SAND			GRAVEL			
12%	14%			28%			46%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**93**
20.0	**86**
10.0	**80**
6.30	**75**
3.35	**63**
2.00	**54**
1.18	**46**
0.600	**38**
0.425	**35**
0.212	**30**
0.150	**28**
0.063	**26**

Particle Diameter (mm)	Percent Passing (%)
0.02	**23**
0.006	**18**
0.002	**12**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.212**
D_{50} (mm)	**1.536**
D_{60} (mm)	**2.821**
D_{85} (mm)	**17.818**
D_{90} (mm)	**28.644**
C_U	**NA**
C_C	**NA**

Soil Description:

Black grey very sandy very clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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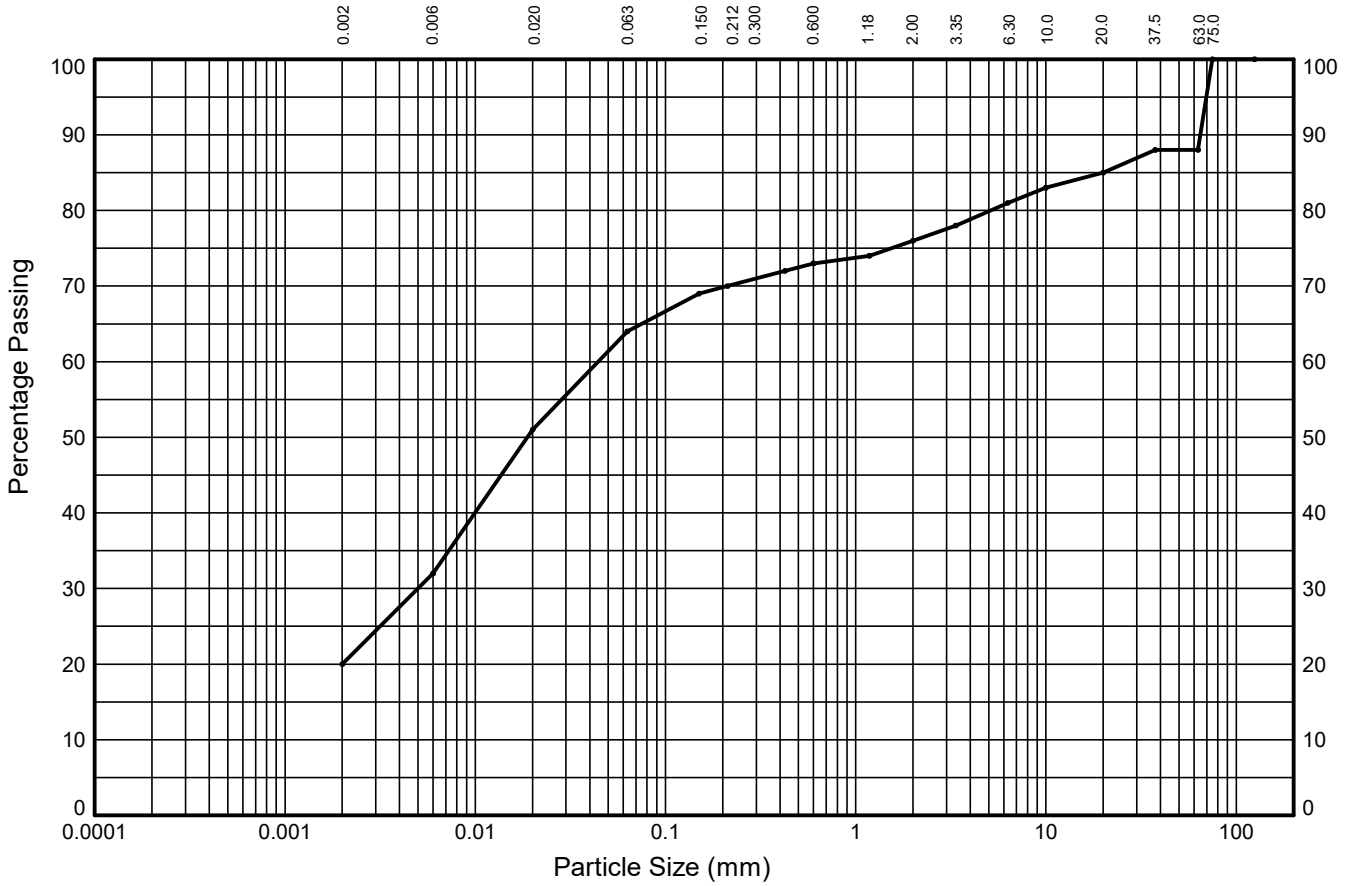
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990
NON-STANDARD TEST

Trial Pit: **TP514** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	12%	19%	13%	6%	3%	3%	5%	4%	3%	
	SILT			SAND			GRAVEL			
20%	44%			12%			12%			12%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**88**
37.5	**88**
20.0	**85**
10.0	**83**
6.30	**81**
3.35	**78**
2.00	**76**
1.18	**74**
0.600	**73**
0.425	**72**
0.212	**70**
0.150	**69**
0.063	**64**

Particle Diameter (mm)	Percent Passing (%)
0.02	**51**
0.006	**32**
0.002	**20**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.005**
D_{50} (mm)	**0.019**
D_{60} (mm)	**0.044**
D_{85} (mm)	**20.000**
D_{90} (mm)	**64.858**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly clayey slightly sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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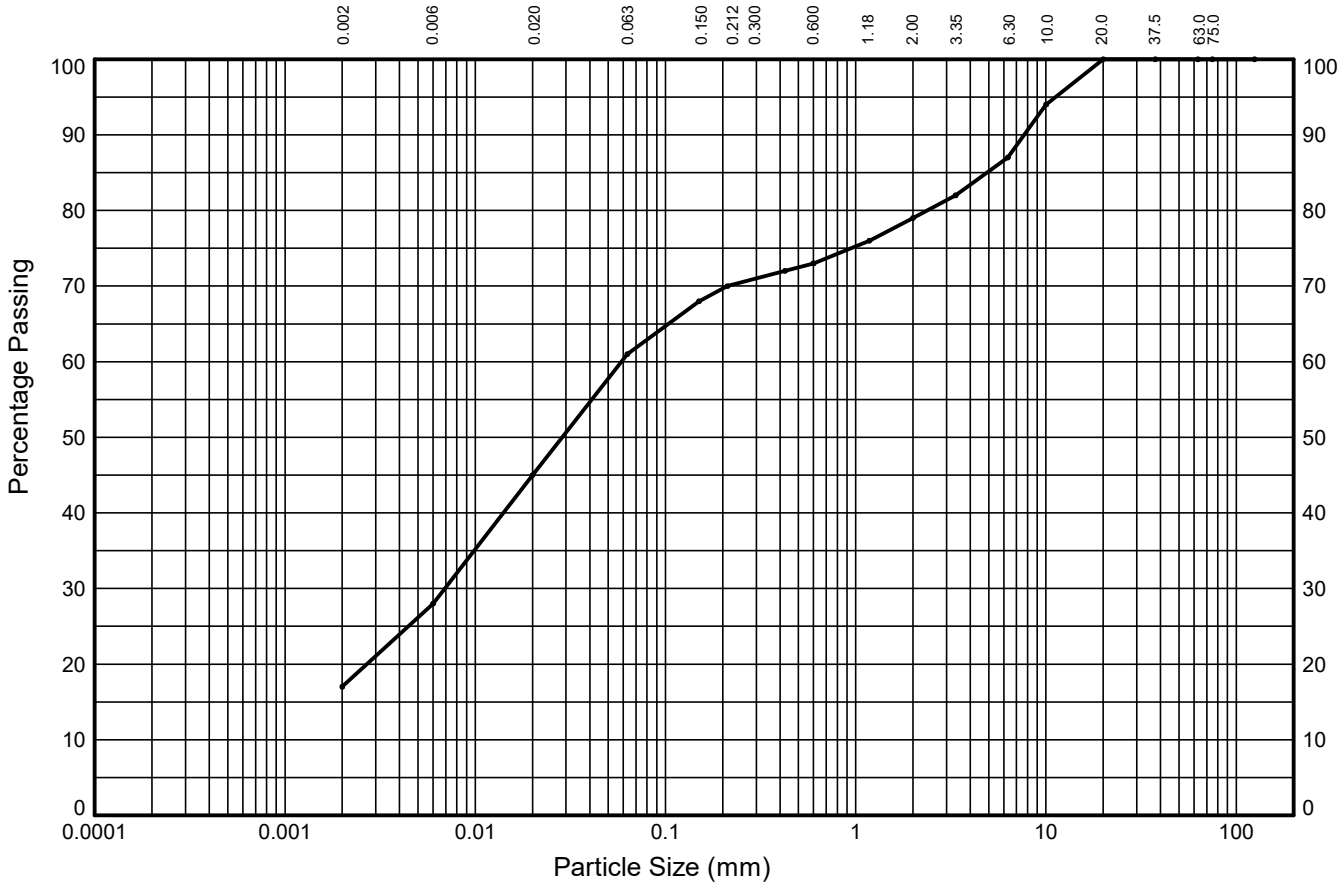
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP517** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	11%	17%	16%	9%	4%	6%	8%	13%	0%	
	SILT			SAND			GRAVEL			
17%	44%			18%			21%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**94**
6.30	**87**
3.35	**82**
2.00	**79**
1.18	**76**
0.600	**73**
0.425	**72**
0.212	**70**
0.150	**68**
0.063	**61**

Particle Diameter (mm)	Percent Passing (%)
0.02	**45**
0.006	**28**
0.002	**17**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.007**
D_{50} (mm)	**0.029**
D_{60} (mm)	**0.059**
D_{85} (mm)	**4.894**
D_{90} (mm)	**7.680**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey gravelly sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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TEST REPORT

Report No. 784270-3 R1

1774

Date 05-March-2020 Contract Rockingham

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire WA6 0AR

For the Attention of Patrick Norwood

Samples submitted by client	18/02/2020	Client Reference	322638
Testing Started	20/02/2020	Client Order No.	
Testing Completed	05/03/2020	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

Ukas Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded)**
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Particle Size Distribution sedimentation pipette method BS1377:Part 2:1990,clause 9.4
Dry density/moisture content relationship 4.5kg cbr method BS1377:Part 4:1990
clause 3.6

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail mark.athorne@soils.co.uk

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425μm	Description of Sample
BH503	1	B	4.00	11	35	20	15	45	Black dark brown clayey very sandy GRAVEL
BH504		D	4.00	5.2	35	18	17	58	Grey slightly gravelly CLAY
TP510	1	B	1.50	11	39	22	17	46	Black grey very sandy very clayey GRAVEL
TP514	1	B	0.60	23	41	21	20	87	Brown slightly gravelly slightly clayey slightly sandy SILT
TP517	1	B	1.00	17	42	23	19	88	Brown clayey gravelly sandy SILT

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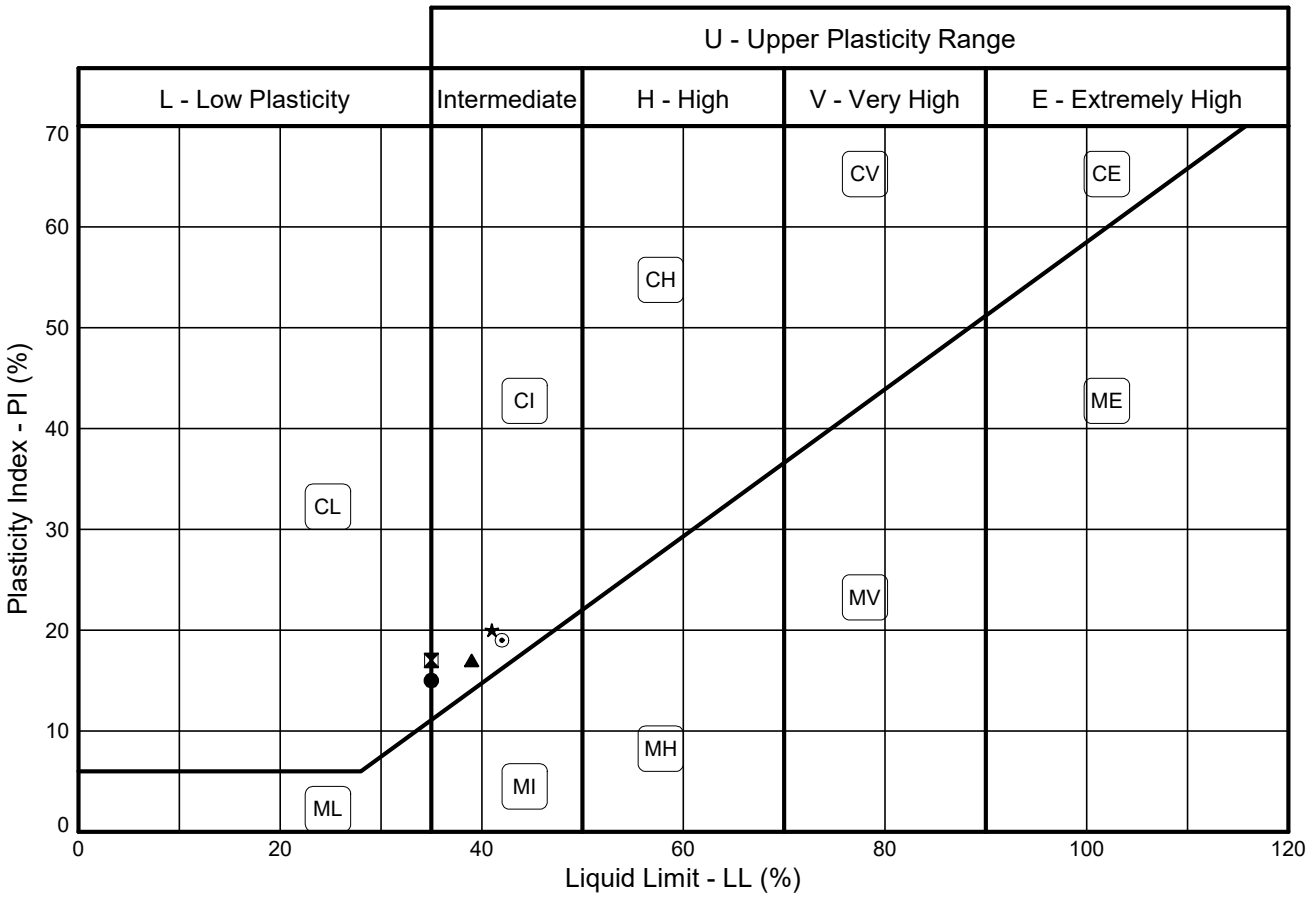
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PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
Exploratory Position ID		Sample	Depth (m)									
●	BH503	1B	4.00	3.2/4.4/5.3/5.4	4.2.4	11	35	20	15	45	C	
⊠	BH504	D	4.00	3.2/4.4/5.3/5.4	4.2.4	5.2	35	18	17	58	C	
▲	TP510	1B	1.50	3.2/4.4/5.3/5.4	4.2.4	11	39	22	17	46	C	
★	TP514	1B	0.60	3.2/4.4/5.3/5.4	4.2.4	23	41	21	20	87	C	
⊙	TP517	1B	1.00	3.2/4.4/5.3/5.4	4.2.3	17	42	23	19	88	C	

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

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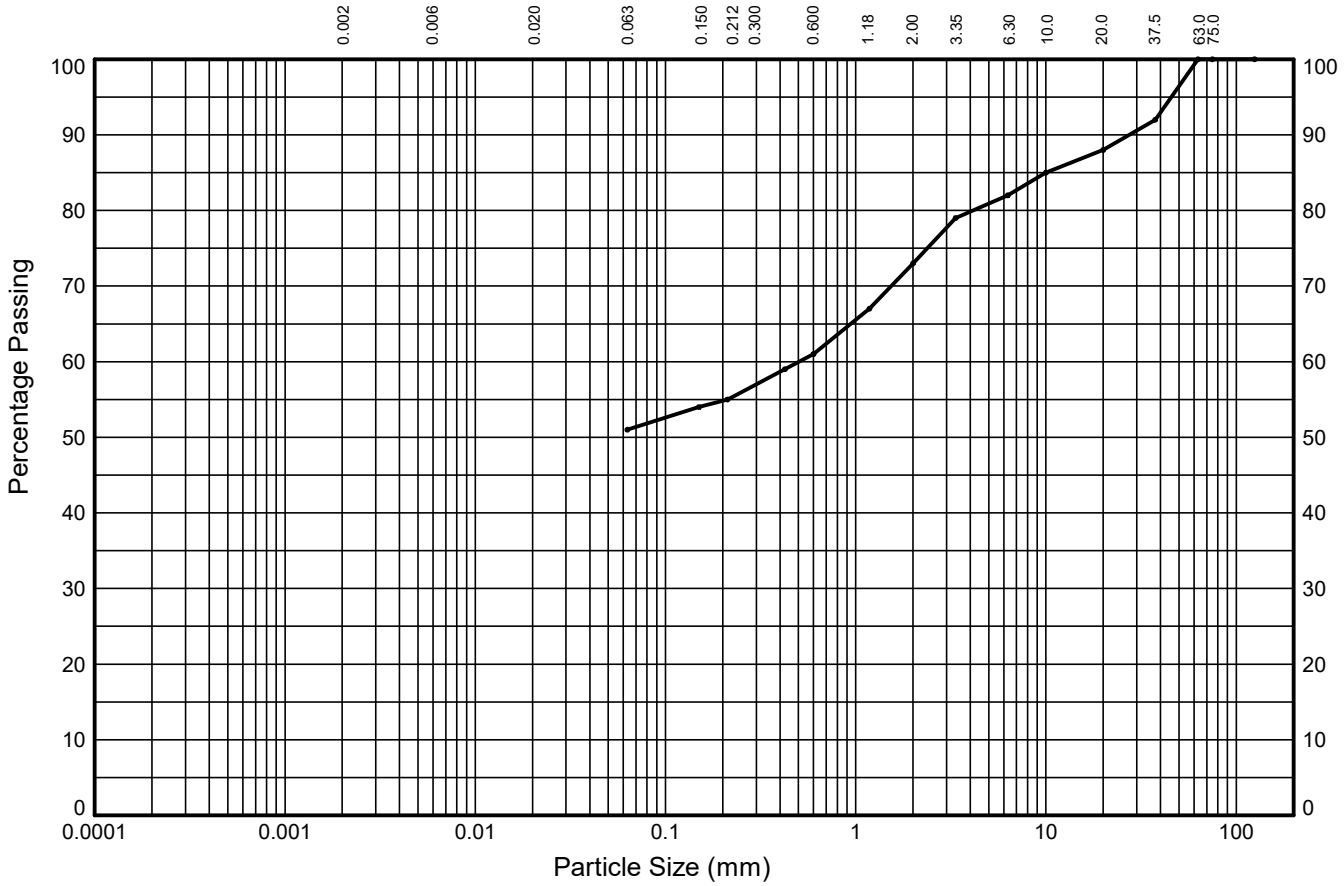
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH504** Sample Ref: **-** Sample Type: **B** Depth (m): **4.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	4%	7%	12%	9%	6%	12%	
	SILT			SAND			GRAVEL			
51%				22%			27%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**92**
20.0	**88**
10.0	**85**
6.30	**82**
3.35	**79**
2.00	**73**
1.18	**67**
0.600	**61**
0.425	**59**
0.212	**55**
0.150	**54**
0.063	**51**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**0.505**
D_{85} (mm)	**10.000**
D_{90} (mm)	**27.386**
C_U	**NA**
C_C	**NA**

Soil Description:
Grey gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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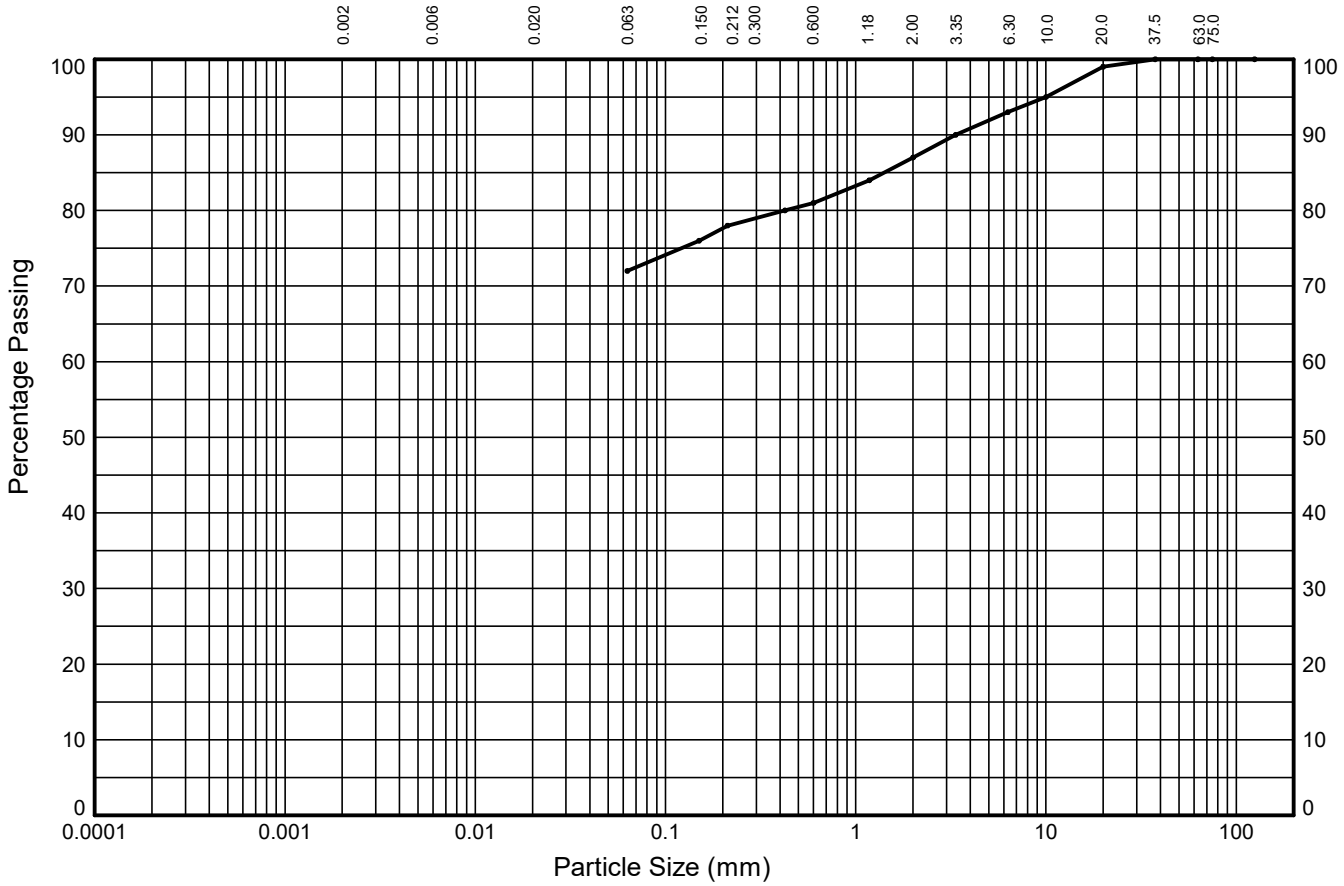
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990
NON-STANDARD TEST

Borehole: **BH524** Sample Ref: **1** Sample Type: **B** Depth (m): **9.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	6%	4%	6%	6%	6%	1%	
	SILT			SAND			GRAVEL			
72%				15%			13%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**99**
10.0	**95**
6.30	**93**
3.35	**90**
2.00	**87**
1.18	**84**
0.600	**81**
0.425	**80**
0.212	**78**
0.150	**76**
0.063	**72**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**NA**
D_{85} (mm)	**1.407**
D_{90} (mm)	**3.350**
C_U	**NA**
C_C	**NA**

Soil Description:

Grey brown slightly sandy slightly gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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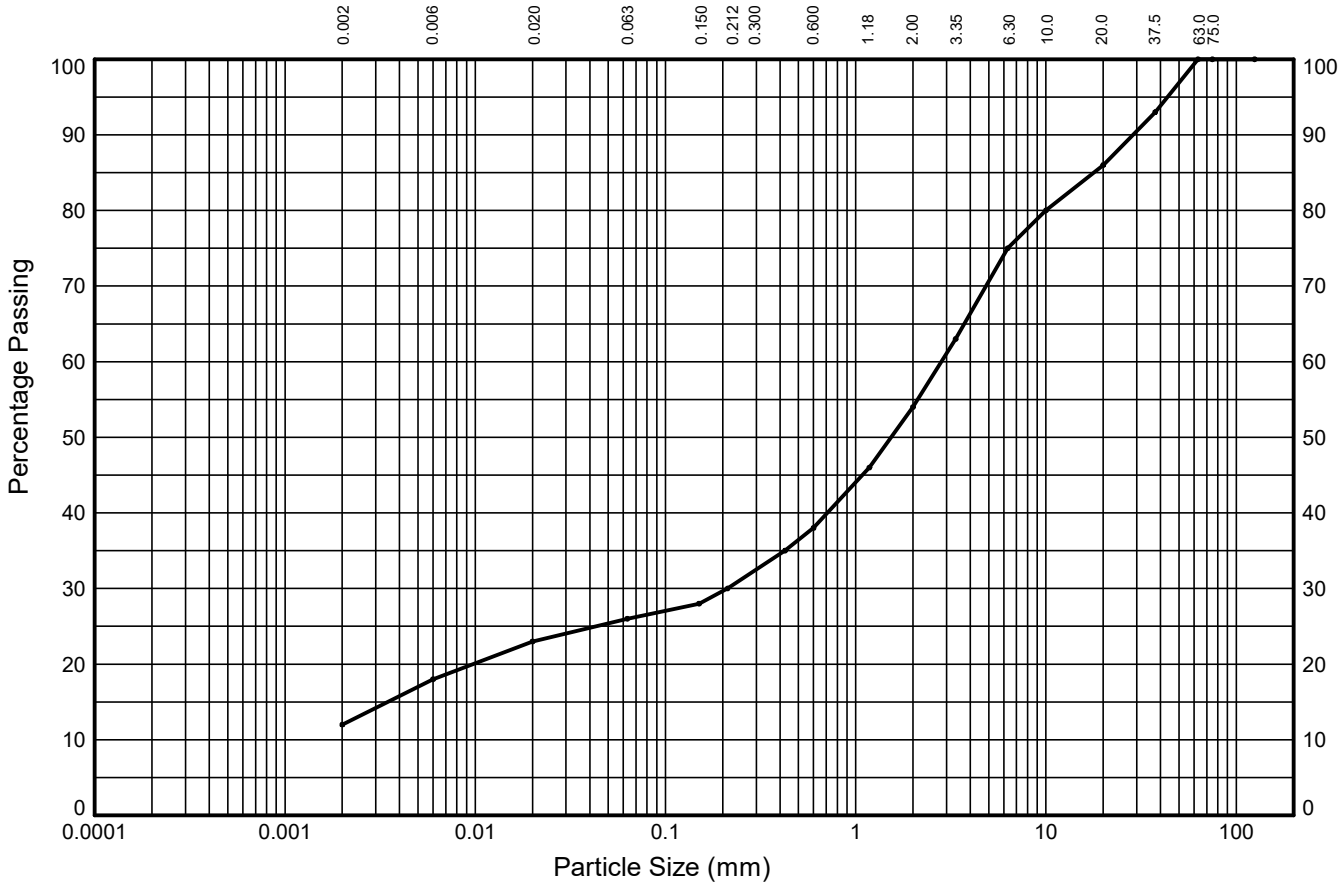
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP510** Sample Ref: **1** Sample Type: **B** Depth (m): **1.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	5%	3%	4%	9%	16%	21%	11%	14%	
	SILT			SAND			GRAVEL			
12%	14%			28%			46%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**93**
20.0	**86**
10.0	**80**
6.30	**75**
3.35	**63**
2.00	**54**
1.18	**46**
0.600	**38**
0.425	**35**
0.212	**30**
0.150	**28**
0.063	**26**

Particle Diameter (mm)	Percent Passing (%)
0.02	**23**
0.006	**18**
0.002	**12**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.212**
D_{50} (mm)	**1.536**
D_{60} (mm)	**2.821**
D_{85} (mm)	**17.818**
D_{90} (mm)	**28.644**
C_U	**NA**
C_C	**NA**

Soil Description:

Black grey very sandy very clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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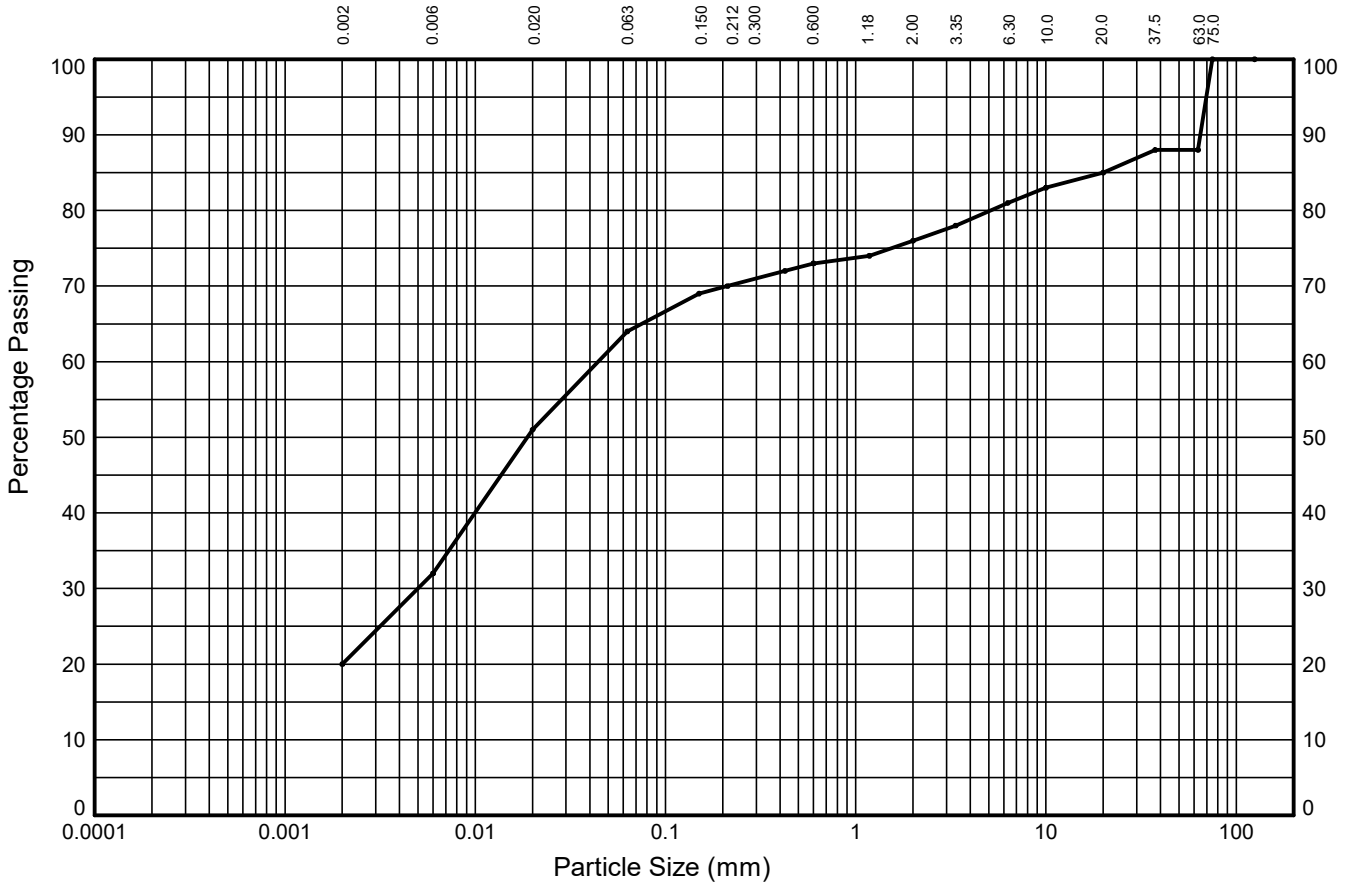
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP514** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	12%	19%	13%	6%	3%	3%	5%	4%	3%	
	SILT			SAND			GRAVEL			
20%	44%			12%			12%			12%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**88**
37.5	**88**
20.0	**85**
10.0	**83**
6.30	**81**
3.35	**78**
2.00	**76**
1.18	**74**
0.600	**73**
0.425	**72**
0.212	**70**
0.150	**69**
0.063	**64**

Particle Diameter (mm)	Percent Passing (%)
0.02	**51**
0.006	**32**
0.002	**20**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.005**
D_{50} (mm)	**0.019**
D_{60} (mm)	**0.044**
D_{85} (mm)	**20.000**
D_{90} (mm)	**64.858**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly clayey slightly sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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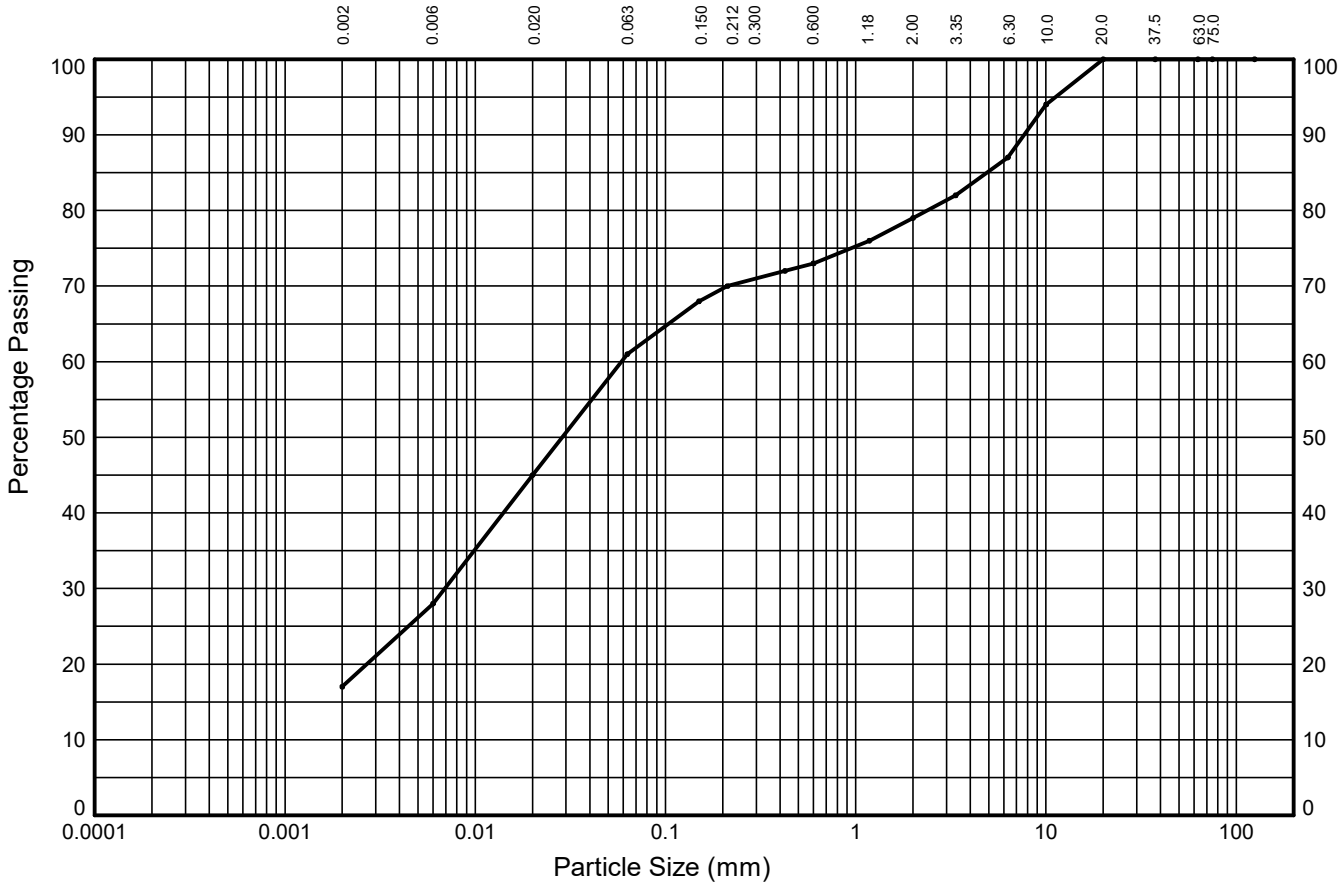
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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.4 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP517** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	11%	17%	16%	9%	4%	6%	8%	13%	0%	
	SILT			SAND			GRAVEL			
17%	44%			18%			21%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**94**
6.30	**87**
3.35	**82**
2.00	**79**
1.18	**76**
0.600	**73**
0.425	**72**
0.212	**70**
0.150	**68**
0.063	**61**

Particle Diameter (mm)	Percent Passing (%)
0.02	**45**
0.006	**28**
0.002	**17**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.007**
D_{50} (mm)	**0.029**
D_{60} (mm)	**0.059**
D_{85} (mm)	**4.894**
D_{90} (mm)	**7.680**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey gravelly sandy SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2

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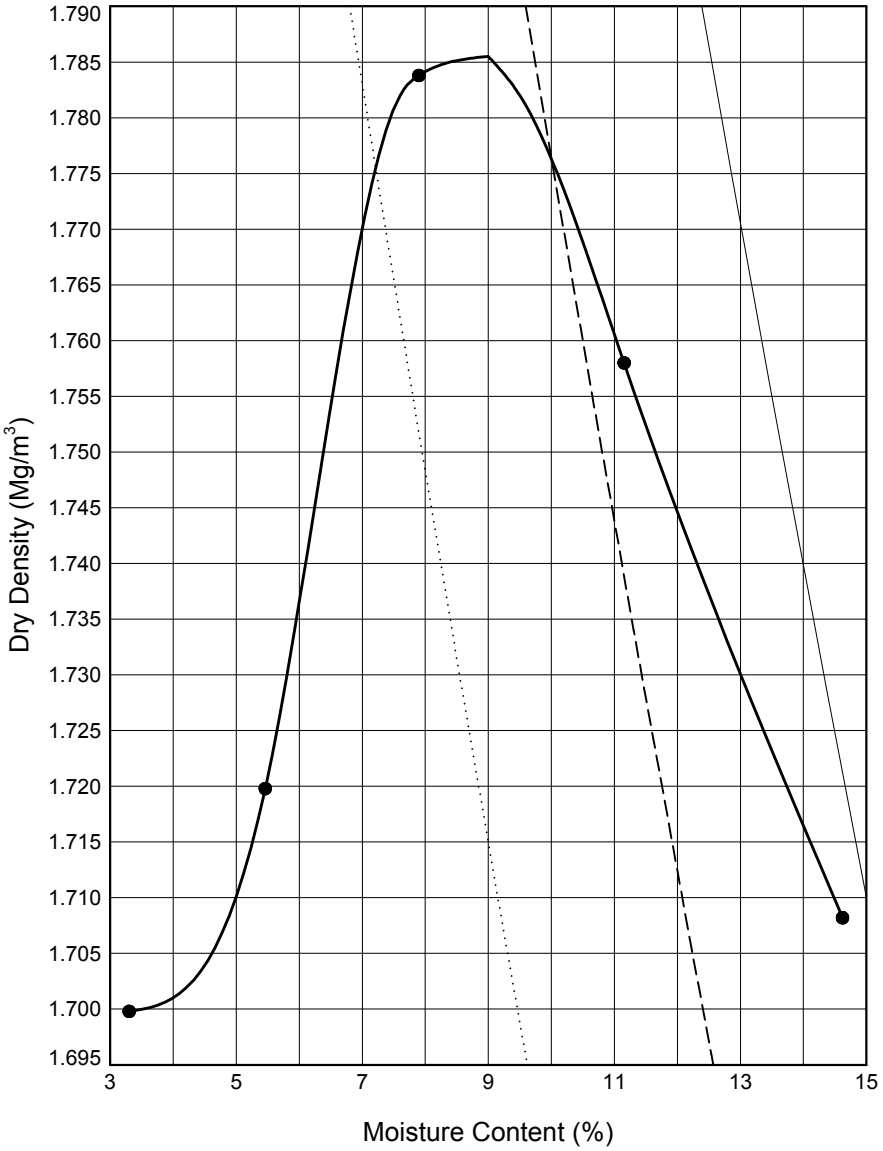
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Contract: **Rockingham**	Contract Ref: **784270**	

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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP510** Sample Ref: **1** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.78**
% Retained on 37.5mm BS Sieve	:	**3**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**7.9**
% Retained on 20.0mm BS Sieve	:	**6**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.30**				Remarks:		
Size of Soil Pieces	:	**<20MM**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Black grey very sandy very clayey GRAVEL	——— 0%	– – – – 5%	····· 10%

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W. Yorkshire WF10 1NJ

Compiled By		Date
	LUKE FISHER	**05/03/20**

Contract	Contract Ref:
Rockingham	**784270**

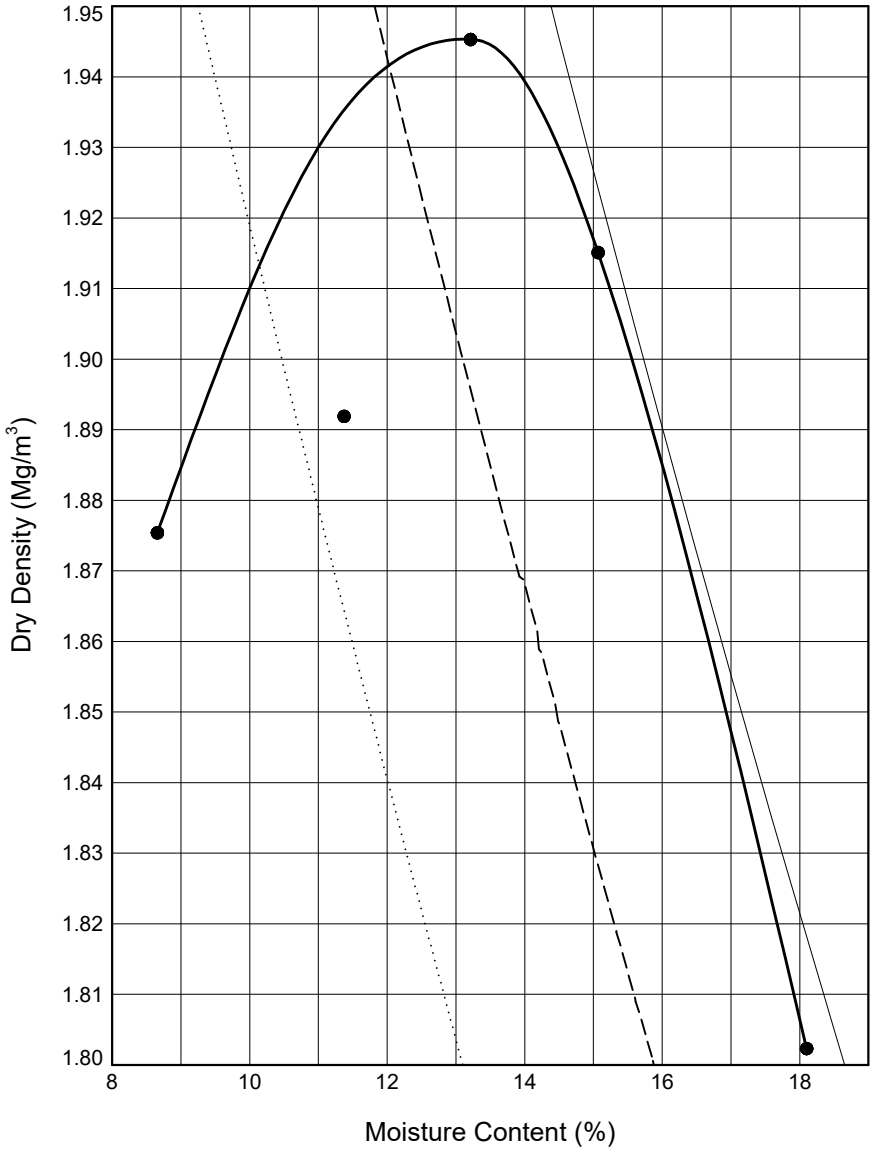
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP514** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions		Test Details	Test Results
Initial Moisture Content (%) : **18**		Compaction Type : **Heavy**	Maximum Dry Density (Mg/m^3) : **1.94**
% Retained on 37.5mm BS Sieve : **0**		Mass of Rammer (kg): **4.5**	Optimum Moisture Content (%) : **13**
% Retained on 20.0mm BS Sieve : **4**		Type of Mould : **1 LITRE**	Method Used: **Clause 3.5**
Particle Density - assumed (Mg/m^3) : **2.71**			Remarks:
Size of Soil Pieces : **<20mm**		Separate samples were used.	

Sample Description	Key to Air Voids Lines		
Brown slightly gravelly slightly clayey slightly sandy SILT	——— 0%	– – – – 5%	····· 10%

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	LUKE FISHER	**05/03/20**

Contract	Contract Ref:
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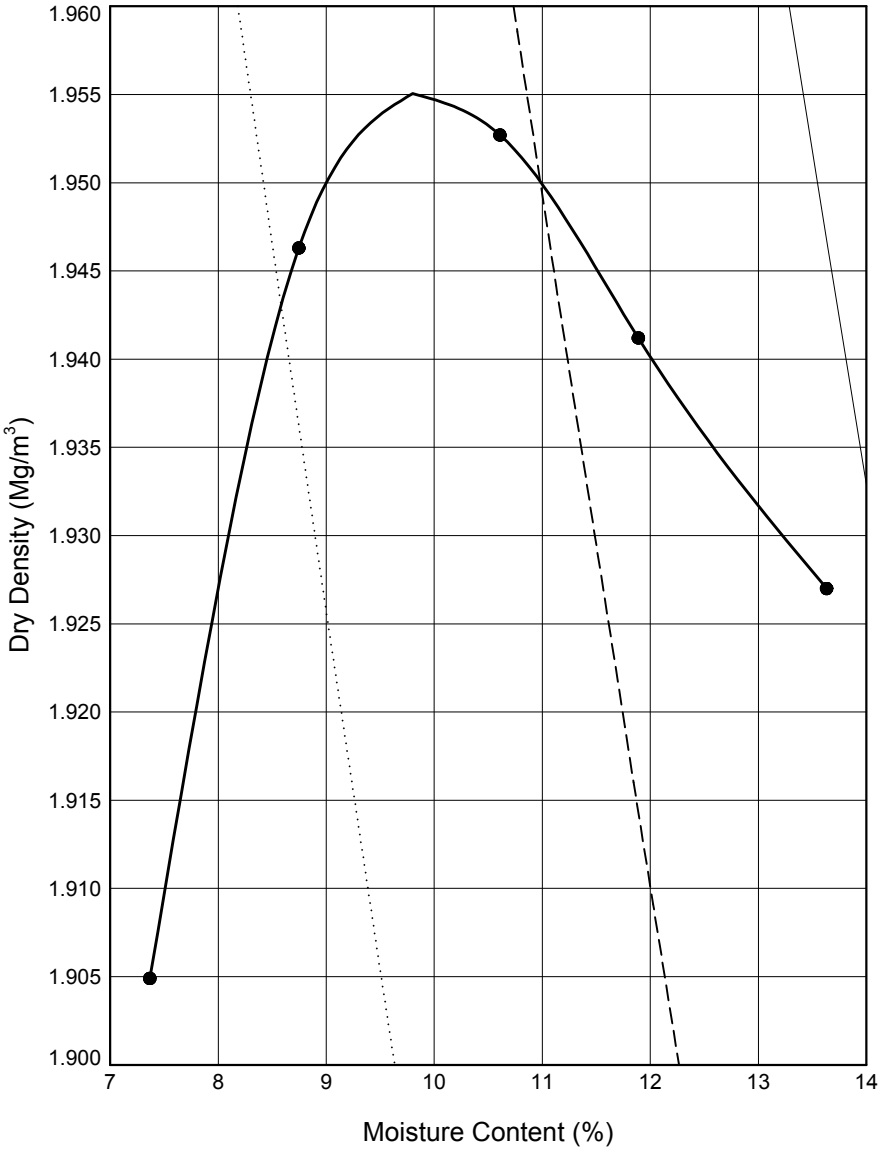
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP517** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details		Test Results		
Initial Moisture Content (%)	:	**14**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.95**
% Retained on 37.5mm BS Sieve	:	**3**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	:	**11**
% Retained on 20.0mm BS Sieve	:	**6**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**			Remarks:		
Size of Soil Pieces	:	**>20mm**	Separate samples were used.				

Sample Description	Key to Air Voids Lines		
Brown clayey gravelly sandy SILT	——— 0%	– – – – 5%	····· 10%

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	LUKE FISHER	**05/03/20**

Contract	Contract Ref:
Rockingham	**784270**

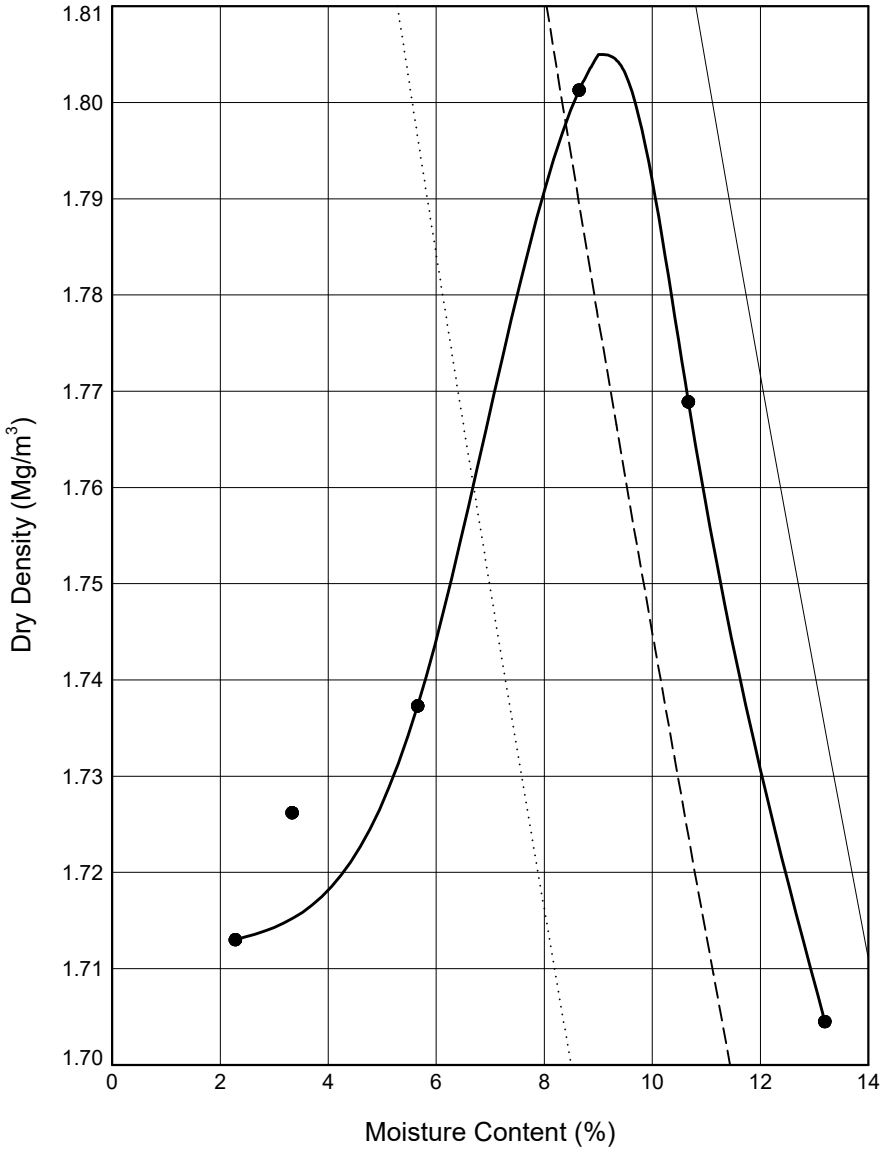
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP522** Sample Ref: **1** Sample Type: **B** Depth (m): **2.00**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.80**
% Retained on 37.5mm BS Sieve	:	**6**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**9**
% Retained on 20.0mm BS Sieve	:	**10**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.25**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Dark grey slightly sandy gravelly CLAY with high levels of mudstone	——— 0%	– – – – 5%	····· 10%

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Contract	Contract Ref:
Rockingham	**784270**

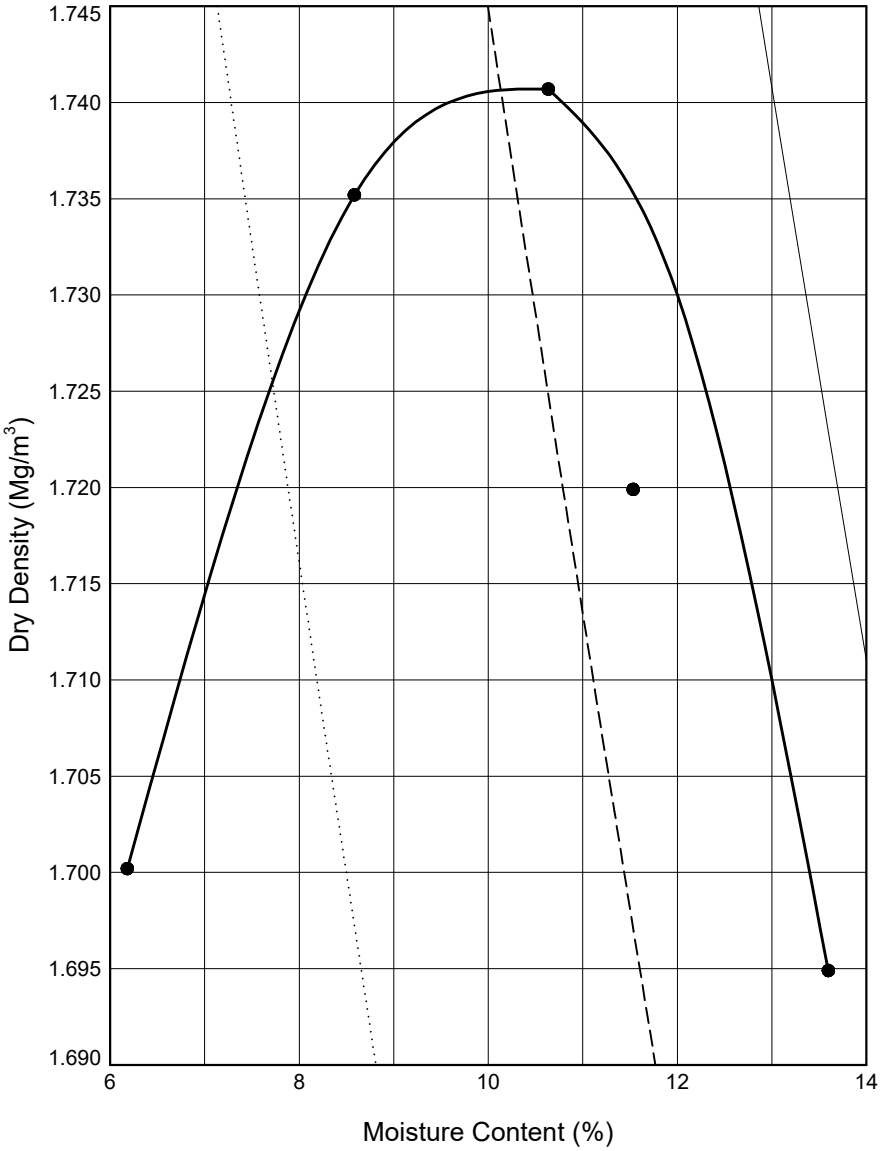
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP524** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.74**
% Retained on 37.5mm BS Sieve	:	**18**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**11**
% Retained on 20.0mm BS Sieve	:	**14**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.25**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Dark grey slightly sandy gravelly CLAY	——— 0%	– – – – 5%	····· 10%

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Compiled By		Date
D. Smith	**DANIEL SMITH**	**05/03/20**

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TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **05/03/2020 15:09:57**.

Testing reported after this date is not covered by this Verification Certificate.



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APPENDIX K
GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH

Generic assessment criteria for human health: commercial scenario

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009[1]. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009[2]. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014, the publication of Category 4 Screening Levels (C4SL)[3,4], as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)[5] used in the generation of SGVs.

C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010[3]). Where a C4SL has been published, the RSK GAC duplicates the C4SL published values using all input parameters within the SP1010 final project report[3] and associated appendices[6], and adopts them as GAC for these six substances.

For all other substances the only C4SL exposure modification relevant to a commercial end use are daily inhalation rates.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015[7] or by the USEPA[14], where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the Contaminated Land Exposure Assessment (CLEA) tool v1.071, supporting EA guidance[5,8,9] and revised exposure scenarios published for the C4SL[3]. The SAC are also termed GAC.

Pathway selection

In accordance with SR3[5] the commercial scenario considers risks to a female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery but may be appropriate for a sports centre or shopping centre where children are present. In accordance with Box 3.5, SR3[5] the pathways considered for production of the SAC in the commercial scenario are

- direct soil and dust ingestion
- dermal contact with soil both indoors and outdoors
- indoor air inhalation from soil and vapour and outdoor inhalation of soil and vapour.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase[9]. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached[9]. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required[9]:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook[9], this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook[9], which explains how to calculate an effective assessment criterion manually.

SR3[5] states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7[10], the EA TOX[1] reports, the C4SL SP1010 project report and associated appendices[3,6], the 2015 LQM/CIEH report[7] or the USEPA IRIS database[14]. Where a C4SL has been published, the RSK GAC have duplicated the C4SL published values using all input parameters within the SP1010 final project report[3] and associated appendices[6], and has

adopted them as GAC for these six substances. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene, barium and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report[11].

For TPH, aromatic hydrocarbons C_5–C_8 were not modelled, as this range comprises benzene (>EC5-EC7) and toluene (>EC7-EC8), which are modelled separately.

Physical parameters

For the commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3[5] notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3[5] have been used.

The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3[5]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

Summary of modifications to the default CLEA SR3[5] input parameters for a commercial land use

In summary, the RSK commercial GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3[5]. Modifications to the default SR3[5] exposure scenarios based on the C4SL exposure scenarios[3] are presented in Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 3 with the combined GAC in Table 4.

Figure 1: Conceptual model for CLEA commercial scenario

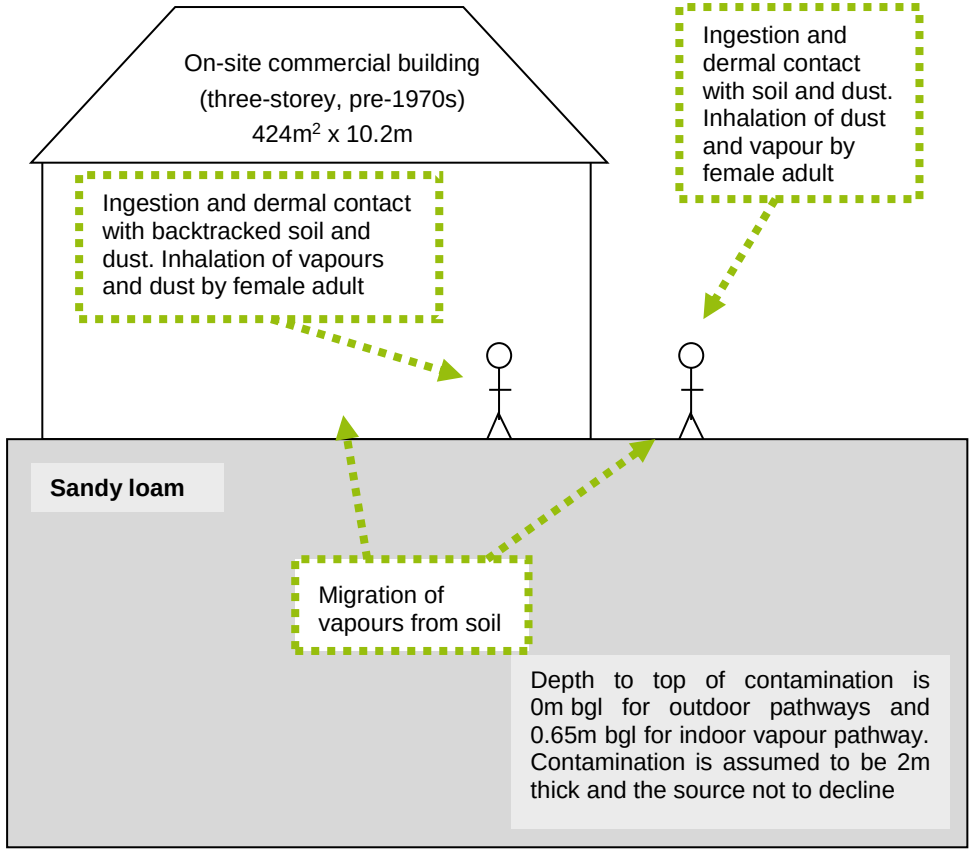


Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 16 to 65 years, Box 3.5, SR3[5]
Building	Office (pre-1970)	Key generic assumption given in Box 3.5, SR3[5]. Pre-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4.6, SR3[5])
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3[5])
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 16 to 65 years. Assumption given in Box 3.5, SR3[5]
End AC	17	
SOM (%)	6	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[13]
	1	To provide SAC for sites where SOM < 6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m^3 day^{-1}	15.7	Mean value USEPA, 2011[12]; Table 3.2, SP1010[3]

References

1. Environment Agency (2009), 'Science Reports SC050021 - SGV and TOX reports for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs'; 'Supplementary information for the derivation of SGV for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs', and 'Contaminants in soil: updated collation of toxicological data and intake values for humans: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs'. Available at: https://www.gov.uk/government/publications/contaminants-in-soil-updated-collation-of-toxicological-data-and-intake-values-for-humans and https://www.gov.uk/government/publications/land-contamination-soil-guideline-values-sgvs (accessed 4 February 2015)

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12. USEPA (2011), *Exposure factors handbook*, EPA/600/R-090/052F (Washington, DC: Office of Research and Development).

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14. USEPA (2010). Hydrogen cyanide and cyanide salts. Integrated Risk Information Systems (IRIS) Chemical Assessment Summary. September 2010. https://www.epa.gov/iris (accessed 9 December 2015)

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 3

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Barium	(b)	2.21E+04	NR	NR	NR	2.21E+04	NR	NR	NR	2.21E+04	NR	NR	NR
Beryllium		3.97E+03	1.17E+01	NR	NR	3.97E+03	1.17E+01	NR	NR	3.97E+03	1.17E+01	NR	NR
Boron		2.38E+05	2.82E+07	NR	NR	2.38E+05	2.82E+07	NR	NR	2.38E+05	2.82E+07	NR	NR
Cadmium	(a)	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR
Chromium (III) - trivalent	(c)	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR
Copper		1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg^0)	(d)	NR	1.54E+01	NR	4.31E+00	NR	3.26E+01	NR	1.07E+01	NR	5.80E+01	NR	2.58E+01
Inorganic Mercury (Hg^{2+})		1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR
Methyl Mercury (Hg^{4+})		3.38E+02	2.13E+03	2.92E+02	7.33E+01	3.38E+02	3.87E+03	3.11E+02	1.42E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Vanadium		2.15E+04	9.03E+03	NR	NR	2.15E+04	9.03E+03	NR	NR	2.15E+04	9.03E+03	NR	NR
Zinc	(b)	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide (free)		6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR
Volatile Organic Compounds													
Benzene	(a)	1.09E+03	2.79E+01	2.72E+01	1.22E+03	1.09E+03	5.19E+01	4.96E+01	2.26E+03	1.09E+03	1.08E+02	9.80E+01	4.71E+03
Toluene		4.24E+05	6.49E+04	5.63E+04	8.69E+02	4.24E+05	1.43E+05	1.07E+05	1.92E+03	4.24E+05	3.24E+05	1.84E+05	4.36E+03
Ethylbenzene		1.91E+05	5.89E+03	5.71E+03	5.18E+02	1.91E+05	1.38E+04	1.28E+04	1.22E+03	1.91E+05	3.21E+04	2.75E+04	2.84E+03
Xylene - m		3.43E+05	6.26E+03	6.15E+03	6.25E+02	3.43E+05	1.47E+04	1.41E+04	1.47E+03	3.43E+05	3.44E+04	3.12E+04	3.46E+03
Xylene - o		3.43E+05	6.73E+03	6.60E+03	4.78E+02	3.43E+05	1.57E+04	1.50E+04	1.12E+03	3.43E+05	3.65E+04	3.30E+04	2.62E+03
Xylene - p		3.43E+05	6.03E+03	5.92E+03	5.76E+02	3.43E+05	1.41E+04	1.36E+04	1.35E+03	3.43E+05	3.28E+04	3.00E+04	3.17E+03
Total xylene		3.43E+05	6.03E+03	5.92E+03	6.25E+02	3.43E+05	1.41E+04	1.36E+04	1.47E+03	3.43E+05	3.28E+04	3.00E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		5.72E+05	7.58E+03	7.48E+03	2.04E+04	5.72E+05	1.23E+04	1.21E+04	3.31E+04	5.72E+05	2.34E+04	2.24E+04	6.27E+04
1,1,1,2 Tetrachloroethane		1.10E+04	1.09E+02	1.08E+02	2.60E+03	1.10E+04	2.53E+02	2.47E+02	6.02E+03	1.10E+04	5.88E+02	5.59E+02	1.40E+04
1,1,2,2-Tetrachloroethane		1.10E+04	2.81E+02	2.74E+02	2.67E+03	1.10E+04	5.75E+02	5.46E+02	5.46E+03	1.10E+04	1.26E+03	1.13E+03	1.20E+04
1,1,1-Trichloroethane		1.14E+06	6.60E+02	6.60E+02	1.43E+03	1.14E+06	1.35E+03	1.35E+03	2.92E+03	1.14E+06	2.96E+03	2.95E+03	6.39E+03
1,1,2 Trichloroethane		7.62E+03	9.02E+01	8.91E+01	4.03E+03	7.62E+03	1.84E+02	1.80E+02	8.21E+03	7.62E+03	4.02E+02	3.82E+02	1.80E+04
1,1-Dichloroethene		8.76E+04	2.43E+01	2.43E+01	2.23E+03	8.76E+04	4.30E+01	4.30E+01	3.94E+03	8.76E+04	8.68E+01	8.67E+01	7.94E+03
1,2-Dichloroethane		2.29E+02	6.73E-01	6.71E-01	3.41E+03	2.29E+02	9.71E-01	9.67E-01	4.91E+03	2.29E+02	1.67E+00	1.65E+00	8.43E+03
1,2,4-Trimethylbenzene		NR	3.29E+02	NR	4.74E+02	NR	6.41E+02	NR	1.16E+03	NR	1.04E+03	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
1,2-Dichloropropane		2.57E+04	3.14E+00	3.13E+00	1.19E+03	2.57E+04	5.54E+00	5.54E+00	2.11E+03	2.57E+04	1.11E+01	1.11E+01	4.24E+03
Carbon Tetrachloride (tetrachloromethane)		7.62E+03	2.87E+00	2.87E+00	1.52E+03	7.62E+03	6.29E+00	6.28E+00	3.32E+03	7.62E+03	1.43E+01	1.42E+01	7.54E+03
Chloroethane		NR	9.01E+02	NR	2.61E+03	NR	1.22E+03	NR	3.54E+03	NR	1.97E+03	NR	5.71E+03
Chloromethane		NR	9.54E-01	NR	1.91E+03	NR	1.11E+00	NR	2.24E+03	NR	1.49E+00	NR	2.99E+03
Cis 1,2 Dichloroethene		1.36E+01	NR	NR	3.94E+03	2.29E+01	NR	NR	6.61E+03	4.44E+01	NR	NR	1.29E+04
Dichloromethane		9.04E+03	2.63E+02	2.57E+02	7.27E+03	9.04E+03	3.50E+02	3.39E+02	9.68E+03	9.04E+03	5.53E+02	5.26E+02	1.53E+04
Tetrachloroethene		1.12E+04	1.86E+01	1.86E+01	4.24E+02	1.12E+04	4.17E+01	4.16E+01	9.51E+02	1.12E+04	9.57E+01	9.49E+01	2.18E+03
Trans 1,2 Dichloroethene		3.23E+04	2.07E+01	NR	3.42E+03	3.23E+04	3.74E+01	NR	6.17E+03	3.23E+04	7.63E+01	NR	1.26E+04
Trichloroethene		9.53E+02	1.23E+00	1.23E+00	1.54E+03	9.53E+02	2.58E+00	2.57E+00	3.22E+03	9.53E+02	5.72E+00	5.69E+00	7.14E+03
Vinyl Chloride (chloroethene)		2.67E+01	5.95E-02	5.94E-02	1.36E+03	2.67E+01	7.70E-02	7.67E-02	1.76E+03	2.67E+01	1.18E-01	1.17E-01	2.69E+03
Semi-Volatile Organic Compounds													
2-Chloronaphthalene		1.53E+05	3.71E+02	3.70E+02	1.14E+02	1.53E+05	9.07E+02	9.02E+02	2.80E+02	1.53E+05	2.13E+03	2.10E+03	6.69E+02
Acenaphthene		1.10E+05	2.75E+06	1.06E+05	5.70E+01	1.10E+05	5.36E+06	1.08E+05	1.41E+02	1.10E+05	8.83E+06	1.08E+05	3.36E+02
Acenaphthylene		1.10E+05	2.68E+06	1.05E+05	8.61E+01	1.10E+05	5.23E+06	1.07E+05	2.12E+02	1.10E+05	8.65E+06	1.08E+05	5.06E+02
Anthracene		5.49E+05	1.13E+07	5.23E+05	1.17E+00	5.49E+05	2.35E+07	5.36E+05	2.91E+00	5.49E+05	4.13E+07	5.42E+05	6.96E+00
Benzo(a)anthracene		2.84E+02	4.08E+02	1.67E+02	1.71E+00	2.84E+02	4.47E+02	1.74E+02	4.28E+00	2.84E+02	4.67E+02	1.76E+02	1.03E+01
Benzo(a)pyrene	(a)	7.68E+01	2.04E+02	5.58E+01	9.11E-01	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.63E+01	5.46E+00

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 3

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Benzo(b)fluoranthene		7.13E+01	1.17E+02	4.43E+01	1.22E+00	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.21E+02	4.49E+01	7.29E+00
Benzo(g,h,i)perylene		6.29E+03	1.05E+04	3.93E+03	1.54E-02	6.29E+03	1.06E+04	3.95E+03	3.85E-02	6.29E+03	1.07E+04	3.96E+03	9.23E-02
Benzo(k)fluoranthene		1.88E+03	3.11E+03	1.17E+03	6.87E-01	1.88E+03	3.17E+03	1.18E+03	1.72E+00	1.88E+03	3.21E+03	1.19E+03	4.12E+00
Chrysene		5.67E+02	8.89E+02	3.46E+02	4.40E-01	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	9.47E+02	3.55E+02	2.64E+00
Dibenzo(a,h)anthracene		5.67E+00	9.32E+00	3.53E+00	3.93E-03	5.67E+00	9.52E+00	3.55E+00	9.82E-03	5.67E+00	9.64E+00	3.57E+00	2.36E-02
Fluoranthene		2.29E+04	1.89E+06	2.26E+04	1.89E+01	2.29E+04	2.72E+06	2.27E+04	4.73E+01	2.29E+04	3.32E+06	2.27E+04	1.13E+02
Fluorene		7.31E+04	4.55E+05	6.30E+04	3.09E+01	7.31E+04	1.06E+06	6.84E+04	7.65E+01	7.31E+04	2.24E+06	7.08E+04	1.83E+02
Hexachloroethane		2.09E+01	NR	NR	8.17E+00	4.98E+01	NR	NR	2.01E+01	1.11E+02	NR	NR	4.81E+01
Indeno(1,2,3-cd)pyrene		8.10E+02	1.31E+03	5.01E+02	6.13E-02	8.10E+02	1.35E+03	5.06E+02	1.53E-01	8.10E+02	1.37E+03	5.09E+02	3.68E-01
Naphthalene		3.64E+04	1.87E+03	1.78E+03	7.64E+01	3.64E+04	4.39E+03	3.92E+03	1.83E+02	3.64E+04	9.94E+03	7.81E+03	4.32E+02
Phenanthrene		2.28E+04	5.35E+05	2.19E+04	3.60E+01	2.28E+04	1.09E+06	2.24E+04	8.96E+01	2.28E+04	1.86E+06	2.25E+04	2.14E+02
Pyrene		5.49E+04	4.47E+06	5.42E+04	2.20E+00	5.49E+04	6.46E+06	5.44E+04	5.49E+00	5.49E+04	7.91E+06	5.45E+04	1.32E+01
Phenol		1.10E+06	2.65E+04	2.59E+04	2.42E+04	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04
Total petroleum hydrocarbons													
Aliphatic hydrocarbons EC5-EC6		4.77E+06	3.19E+03	3.19E+03	3.04E+02	4.77E+06	5.86E+03	5.86E+03	5.58E+02	4.77E+06	1.21E+04	1.21E+04	1.15E+03
Aliphatic hydrocarbons >EC6-EC8		4.77E+06	7.79E+03	7.78E+03	1.44E+02	4.77E+06	1.74E+04	1.74E+04	3.22E+02	4.77E+06	3.97E+04	3.96E+04	7.36E+02
Aliphatic hydrocarbons >EC8-EC10		9.53E+04	2.02E+03	2.00E+03	7.77E+01	9.53E+04	4.91E+03	4.85E+03	1.90E+02	9.53E+04	1.17E+04	1.13E+04	4.51E+02
Aliphatic hydrocarbons >EC10-EC12		9.53E+04	9.97E+03	9.69E+03	4.75E+01	9.53E+04	2.47E+04	2.29E+04	1.18E+02	9.53E+04	5.89E+04	4.73E+04	2.83E+02
Aliphatic hydrocarbons >EC12-EC16		9.53E+04	8.26E+04	5.88E+04	2.37E+01	9.53E+04	2.04E+05	8.17E+04	5.91E+01	9.53E+04	4.81E+05	9.02E+04	1.42E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC10		3.81E+04	3.55E+03	3.46E+03	6.13E+02	3.81E+04	8.66E+03	8.11E+03	1.50E+03	3.81E+04	2.05E+04	1.70E+04	3.58E+03
Aromatic hydrocarbons >EC10-EC12		3.81E+04	1.92E+04	1.62E+04	3.64E+02	3.81E+04	4.69E+04	2.79E+04	8.99E+02	3.81E+04	1.10E+05	3.42E+04	2.15E+03
Aromatic hydrocarbons >EC12-EC16		3.81E+04	2.02E+05	3.62E+04	1.69E+02	3.81E+04	4.76E+05	3.73E+04	4.19E+02	3.81E+04	1.03E+06	3.78E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	2.82E+04	NR	NR	5.37E+01	2.83E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. GrAC - groundwater screening value. SAC - soil screening value.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.

Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.

Calculated SAC does not exceed the soil saturation limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for barium and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	640	640	640
Barium	22,000	22,000	22,000
Beryllium	12	12	12
Boron	240,000	240,000	240,000
Cadmium	410	410	410
Chromium (III) - trivalent	8,600	8,600	8,600
Chromium (VI) - hexavalent	49	49	49
Copper	68,000	68,000	68,000
Lead	2,300	2,300	2,300
Elemental Mercury (Hg^0)	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg^{2+})	1,120	1,120	1,120
Methyl Mercury (Hg^{4+})	290 (73)	310 (142)	320
Nickel	980	980	980
Selenium	12,000	12,000	12,000
Vanadium	9,000	9,000	9,000
Zinc	740,000	740,000	740,000
Cyanide (free)	650	650	650
Volatile Organic Compounds			
Benzene	27	50	98
Toluene	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	7,500	12,100	22,400
1,1,1,2 Tetrachloroethane	110	250	560
1,1,2,2-Tetrachloroethane	270	550	1,130
1,1,1-Trichloroethane	700	1,300	3,000
1,1,2 Trichloroethane	89	180	382
1,1-Dichloroethene	24	43	87
1,2-Dichloroethane	0.67	0.97	1.65
1,2,4-Trimethylbenzene	330	640	1,040
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	3	6	11
Carbon Tetrachloride (tetrachloromethane)	2.9	6.3	14.2
Chloroethane	901	1,223	1,972
Chloromethane	1.0	1.1	1.5
Cis 1,2 Dichloroethene	14	23	44
Dichloromethane	257	339	526
Tetrachloroethene	20	40	90
Trichloroethene	1	3	6
Trans 1,2 Dichloroethene	21	37	76
Trichloroethene	1	3	6
Vinyl Chloride (chloroethene)	0.06	0.08	0.12
Semi-Volatile Organic Compounds			
2-Chloronaphthalene	370 (114)	902 (280)	2,098 (669)
Acenaphthene	110,000	110,000	110,000
Acenaphthylene	110,000	110,000	110,000
Anthracene	520,000	540,000	540,000
Benzo(a)anthracene	170	170	180
Benzo(a)pyrene	77	77	77
Benzo(b)fluoranthene	44	45	45
Benzo(g,h,i)perylene	3,900	3,900	4,000
Benzo(k)fluoranthene	1,200	1,200	1,200
Chrysene	350	350	350
Dibenzo(a,h)anthracene	3.5	3.6	3.6
Fluoranthene	23,000	23,000	23,000
Fluorene	63,000 (31)	68,000	71,000
Hexachloroethane	21 (8)	50 (20)	111 (48)
Indeno(1,2,3-cd)pyrene	500	510	510
Naphthalene	1,800 (76)	3,900 (183)	7,800 (432)
Phenanthrene	22,000	22,000	23,000
Pyrene	54,000	54,000	54,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC_5-EC_6	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-EC_8	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	59,000 (24)	82,000 (59)	90,000 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC_{35}-EC_{44}	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC_8-EC_{10}	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	36,000 (169)	37,000	38,000
Aromatic hydrocarbons >EC_{16}-EC_{21}	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{21}-EC_{35}	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{35}-EC_{44}	28,000	28,000	28,000
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC)[1]		

Notes:

'-' Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)

** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.
1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS)

RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

APPENDIX L
GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75 m below finished ground levels, sample results from depths between 0.5 m and 1.5 m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5 m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table Q1: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	**PE**	**PVC**
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5–C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}–C_{20}	10	Suitable
4	Mineral oil C_{21}–C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX M
GQRA DATA SCREENING TABLES – SOILS

Project name	J36 Rockingham Phase 2 and 3
Project code	322638
Client name	Harworth Estates
Address	
NGR	
Land use	Commercial Scenario
SOM	6%
GAC version	2019_00

Notes

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
Lab sample ID									19/10013/1	19/10013/2	19/10013/3	19/10013/6	19/10013/7	19/10013/4	19/10013/5	19/11030/11	19/11030/12	19/11030/13
Client sample ID									BH501	BH501	BH501	BH502	BH502	BH507	BH507	BH512	BH512	BH517
Depth to top									0.5	1.2	3.95	0.4	4.5	1.4	3.5	2.5	10	0.5
Depth to bottom																		
Date sampled									17/10/19	17/10/19	17/10/19	16/10/19	16/10/19	18/10/19	18/10/19	30/10/19	30/10/19	04/11/19
Metals and Inorganics																		
Arsenic	mg/kg	640		27	<1	18	17	1	12	27		11			<1			6
Cadmium	mg/kg	410		1.5	<0.5	18	13	5	0.6	0.6		0.7			<0.5			0.6
Chromium	mg/kg	8600	49	56	10	18	18	0	18	15		17			14			24
Copper	mg/kg	68000		37	12	18	18	0	33	36		25			23			25
Lead	mg/kg	2300		55	7	18	18	0	27	25		33			14			24
Mercury	mg/kg	1120	58		<0.17	18	0	18	<0.17	<0.17		<0.17			<0.17			<0.17
Nickel	mg/kg	980		43	17	18	18	0	26	23		21			33			29
Selenium	mg/kg	12000		3	<1	18	5	13	<1	<1		2			2			<1
Zinc	mg/kg	740000		92	34	18	18	0	76	54		69			61			72
Petroleum Hydrocarbons																		
Ali >C5-C6	mg/kg	12100	1150		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
Ali >C6-C8	mg/kg	39600	736		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
Ali >C8-C10	mg/kg	11300	451	8	<1	8	3	5		<1	8	1		2				
Ali >C10-C12	mg/kg	47300	283	4	<1	8	2	6		<1	4	<1		2				
Ali >C12-C16	mg/kg	90000	142	6	<1	8	2	6		<1	6	<1		2				
Ali >C16-C21	mg/kg			4	<1	8	3	5		<1	4	<1		1				
Ali >C21-C35	mg/kg			6	1	8	8	0		5	6	5		5				
Ali >C16-C35 calculated	mg/kg	1000000		10	1	8	8	0		5	10	5		6				
Total Aliphatics	mg/kg			29	1	8	8	0		5	29	6		13				
Aro >C5-C7	mg/kg				<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
Aro >C7-C8	mg/kg				<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
Aro >C8-C10	mg/kg	17000	3580	10	<1	8	4	4		2	10	2		2				
Aro >C10-C12	mg/kg	34000	2150	8	<1	8	3	5		<1	8	2		2				
Aro >C12-C16	mg/kg	38000		24	1	8	8	0		2	24	5		8				
Aro >C16-C21	mg/kg	28000		21	2	8	8	0		2	21	5		7				
Aro >C21-C35	mg/kg	28000		32	4	8	8	0		5	32	12		12				
Total Aromatics	mg/kg			96	8	8	8	0		12	96	27		30				
TPH (Ali & Aro)	mg/kg			125	10	8	8	0		16	125	33		43				
BTEX - Benzene	mg/kg	98			<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
BTEX - Toluene	mg/kg	184000	4357		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
BTEX - Ethyl Benzene	mg/kg	27000	2844		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
BTEX - o Xylene	mg/kg	33000	2618		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
BTEX - m & p Xylene	mg/kg	30000	3167		<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
MTBE	mg/kg	22400			<0.01	8	0	8		<0.05	<0.05	<0.05		<0.05				
Polycyclic aromatic hydrocarbons																		
Acenaphthene	mg/kg	110000			<0.01	4	0	4	<0.01	<0.01		<0.01			<0.01			
Acenaphthylene	mg/kg	110000			<0.01	4	0	4	<0.01	<0.01		<0.01			<0.01			
Anthracene	mg/kg	540000			<0.02	4	0	4	<0.02	<0.02		<0.02			<0.02			
Benzo(a)anthracene	mg/kg	180			<0.04	4	0	4	<0.04	<0.04		<0.04			<0.04			
Benzo(a)pyrene	mg/kg	77			<0.04	4	0	4	<0.04	<0.04		<0.04			<0.04			
Benzo(b)fluoranthene	mg/kg	45			<0.05	4	0	4	<0.05	<0.05		<0.05			<0.05			
Benzo(ghi)perylene	mg/kg	4000			<0.05	4	0	4	<0.05	<0.05		<0.05			<0.05			
Benzo(k)fluoranthene	mg/kg	1200			<0.07	4	0	4	<0.07	<0.07		<0.07			<0.07			

Project name	J36 Rockingham Phase 2 and 3
Project code	322638
Client name	Harworth Estates
Address	
NGR	
Land use	Commercial Scenario
SOM	6%
GAC version	2019_00

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete										
Lab sample ID									19/11030/3	19/11030/4	19/11030/6	19/11030/7	19/11030/10	19/12092/1	19/12092/2	19/12092/8	19/12092/14	19/12092/16
Client sample ID									TP502	TP503	TP505	TP505	TP507	TP508	TP509	TP517	TP524	TP525
Depth to top									1	0.5	0.1	1.1	1.4	2	2	1.5	3.5	2.5
Depth to bottom									1.1	0.6	0.2	1.2	1.5					
Date sampled									30/10/19	30/10/19	30/10/19	30/10/19	30/10/19	10/12/19	10/12/19	12/12/19	11/12/19	11/12/19
Metals and Inorganics																		
Arsenic	mg/kg	640		27	<1	18	17	1		4	3	11	13					
Cadmium	mg/kg	410		1.5	<0.5	18	13	5		<0.5	<0.5	<0.5	0.7					
Chromium	mg/kg	8600	49	56	10	18	18	0		15	23	17	22					
Copper	mg/kg	68000		37	12	18	18	0		12	17	20	25					
Lead	mg/kg	2300		55	7	18	18	0		7	10	11	13					
Mercury	mg/kg	1120	58		<0.17	18	0	18		<0.17	<0.17	<0.17	<0.17					
Nickel	mg/kg	980		43	17	18	18	0		19	28	23	43					
Selenium	mg/kg	12000		3	<1	18	5	13		<1	<1	<1	<1					
Zinc	mg/kg	740000		92	34	18	18	0		34	66	49	88					
Petroleum Hydrocarbons																		
Ali >C5-C6	mg/kg	12100	1150		<0.01	8	0	8										
Ali >C6-C8	mg/kg	39600	736		<0.01	8	0	8										
Ali >C8-C10	mg/kg	11300	451	8	<1	8	3	5										
Ali >C10-C12	mg/kg	47300	283	4	<1	8	2	6										
Ali >C12-C16	mg/kg	90000	142	6	<1	8	2	6										
Ali >C16-C21	mg/kg			4	<1	8	3	5										
Ali >C21-C35	mg/kg			6	1	8	8	0										
Ali >C16-C35 calculated	mg/kg	1000000		10	1	8	8	0										
Total Aliphatics	mg/kg			29	1	8	8	0										
Aro >C5-C7	mg/kg				<0.01	8	0	8										
Aro >C7-C8	mg/kg				<0.01	8	0	8										
Aro >C8-C10	mg/kg	17000	3580	10	<1	8	4	4										
Aro >C10-C12	mg/kg	34000	2150	8	<1	8	3	5										
Aro >C12-C16	mg/kg	38000		24	1	8	8	0										
Aro >C16-C21	mg/kg	28000		21	2	8	8	0										
Aro >C21-C35	mg/kg	28000		32	4	8	8	0										
Total Aromatics	mg/kg			96	8	8	8	0										
TPH (Ali & Aro)	mg/kg			125	10	8	8	0										
BTEX - Benzene	mg/kg	98			<0.01	8	0	8										
BTEX - Toluene	mg/kg	184000	4357		<0.01	8	0	8										
BTEX - Ethyl Benzene	mg/kg	27000	2844		<0.01	8	0	8										
BTEX - o Xylene	mg/kg	33000	2618		<0.01	8	0	8										
BTEX - m & p Xylene	mg/kg	30000	3167		<0.01	8	0	8										
MTBE	mg/kg	22400			<0.01	8	0	8										
Polycyclic aromatic hydrocarbons																		
Acenaphthene	mg/kg	110000			<0.01	4	0	4										
Acenaphthylene	mg/kg	110000			<0.01	4	0	4										
Anthracene	mg/kg	540000			<0.02	4	0	4										
Benzo(a)anthracene	mg/kg	180			<0.04	4	0	4										
Benzo(a)pyrene	mg/kg	77			<0.04	4	0	4										
Benzo(b)fluoranthene	mg/kg	45			<0.05	4	0	4										
Benzo(ghi)perylene	mg/kg	4000			<0.05	4	0	4										
Benzo(k)fluoranthene	mg/kg	1200			<0.07	4	0	4										

Project name	J36 Rockingham Phase 2 and 3
Project code	322638
Client name	Harworth Estates
Address	
NGR	
Land use	Commercial Scenario
SOM	6%
GAC version	2019_00

Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	19/11614/10	19/11614/12	19/11614/13
Lab sample ID									19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	19/11614/10	19/11614/12	19/11614/13
Client sample ID									WS101	WS103	WS104	WS104	WS105	WS105	WS106	WS106	WS107	WS108
Depth to top									0.4	0.4	0.2	1.2	0	1.3	0.3	0.7	0.5	0.2
Depth to bottom													0.4					
Date sampled									03/12/19	02/12/19	02/12/19	02/12/19	02/12/19	02/12/19	03/12/19	03/12/19	03/12/19	03/12/19
Metals and Inorganics																		
Arsenic	mg/kg	640		27	<1	18	17	1	4	8	8	15	9		10	4	3	5
Cadmium	mg/kg	410		1.5	<0.5	18	13	5	1.1	1.4	1.1	<0.5	1.5		1.5	0.9	1.2	1.1
Chromium	mg/kg	8600	49	56	10	18	18	0	18	56	18	10	21		23	17	15	19
Copper	mg/kg	68000		37	12	18	18	0	21	30	25	37	33		33	18	15	21
Lead	mg/kg	2300		55	7	18	18	0	15	20	32	17	53		55	14	15	30
Mercury	mg/kg	1120	58		<0.17	18	0	18	<0.17	<0.17	<0.17	<0.17	<0.17		<0.17	<0.17	<0.17	<0.17
Nickel	mg/kg	980		43	17	18	18	0	34	31	25	22	18		19	25	24	17
Selenium	mg/kg	12000		3	<1	18	5	13	<1	<1	2	<1	2		3	<1	<1	<1
Zinc	mg/kg	740000		92	34	18	18	0	77	75	69	35	88		92	55	60	77
Petroleum Hydrocarbons																		
Ali >C5-C6	mg/kg	12100	1150		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
Ali >C6-C8	mg/kg	39600	736		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
Ali >C8-C10	mg/kg	11300	451	8	<1	8	3	5	<1		<1					<1		<1
Ali >C10-C12	mg/kg	47300	283	4	<1	8	2	6	<1		<1					<1		<1
Ali >C12-C16	mg/kg	90000	142	6	<1	8	2	6	<1		<1					<1		<1
Ali >C16-C21	mg/kg			4	<1	8	3	5	<1		1					<1		<1
Ali >C21-C35	mg/kg			6	1	8	8	0	1		5					2		5
Ali >C16-C35 calculated	mg/kg	1000000		10	1	8	8	0	1		6					2		5
Total Aliphatics	mg/kg			29	1	8	8	0	1		7					2		5
Aro >C5-C7	mg/kg				<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
Aro >C7-C8	mg/kg				<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
Aro >C8-C10	mg/kg	17000	3580	10	<1	8	4	4	<1		<1					<1		<1
Aro >C10-C12	mg/kg	34000	2150	8	<1	8	3	5	<1		<1					<1		<1
Aro >C12-C16	mg/kg	38000		24	1	8	8	0	2		2					3		1
Aro >C16-C21	mg/kg	28000		21	2	8	8	0	2		4					2		4
Aro >C21-C35	mg/kg	28000		32	4	8	8	0	4		22					4		7
Total Aromatics	mg/kg			96	8	8	8	0	8		29					8		12
TPH (Ali & Aro)	mg/kg			125	10	8	8	0	11		37					10		16
BTEX - Benzene	mg/kg	98			<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
BTEX - Toluene	mg/kg	184000	4357		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
BTEX - Ethyl Benzene	mg/kg	27000	2844		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
BTEX - o Xylene	mg/kg	33000	2618		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
BTEX - m & p Xylene	mg/kg	30000	3167		<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
MTBE	mg/kg	22400			<0.01	8	0	8	<0.01		<0.01					<0.01		<0.01
Polycyclic aromatic hydrocarbons																		
Acenaphthene	mg/kg	110000			<0.01	4	0	4										
Acenaphthylene	mg/kg	110000			<0.01	4	0	4										
Anthracene	mg/kg	540000			<0.02	4	0	4										
Benzo(a)anthracene	mg/kg	180			<0.04	4	0	4										
Benzo(a)pyrene	mg/kg	77			<0.04	4	0	4										
Benzo(b)fluoranthene	mg/kg	45			<0.05	4	0	4										
Benzo(ghi)perylene	mg/kg	4000			<0.05	4	0	4										
Benzo(k)fluoranthene	mg/kg	1200			<0.07	4	0	4										

								Lab sample ID	19/10013/1	19/10013/2	19/10013/3	19/10013/6	19/10013/7	19/10013/4	19/10013/5	19/11030/11	19/11030/12	19/11030/13
								Client sample ID	BH501	BH501	BH501	BH502	BH502	BH507	BH507	BH512	BH512	BH517
								Depth to top	0.5	1.2	3.95	0.4	4.5	1.4	3.5	2.5	10	0.5
								Depth to bottom										
								Date sampled	17/10/19	17/10/19	17/10/19	16/10/19	16/10/19	18/10/19	18/10/19	30/10/19	30/10/19	04/11/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects										
Chrysene	mg/kg	350			<0.06	4	0	4	<0.06	<0.06		<0.06			<0.06			
Dibenzo(ah)anthracene	mg/kg	3.6			<0.04	4	0	4	<0.04	<0.04		<0.04			<0.04			
Fluoranthene	mg/kg	23000			<0.08	4	0	4	<0.08	<0.08		<0.08			<0.08			
Fluorene	mg/kg	71000		0.02	<0.01	4	1	3	<0.01	<0.01		<0.01			0.02			
Indeno(123-cd)pyrene	mg/kg	510			<0.03	4	0	4	<0.03	<0.03		<0.03			<0.03			
Naphthalene	mg/kg	7800	432	0.08	<0.03	4	2	2	<0.03	<0.03		0.05			0.08			
Phenanthrene	mg/kg	23000		0.06	<0.03	4	2	2	<0.03	<0.03		0.06			0.05			
Pyrene	mg/kg	54000			<0.07	4	0	4	<0.07	<0.07		<0.07			<0.07			
Total PAH-16MS	mg/kg			0.15	<0.08	4	2	2	<0.08	<0.08		0.11			0.15			
Polycyclic aromatic hydrocarbons (SVOC)																		
Acenaphthene	mg/kg	110000			<0.1	7	0	7										
Acenaphthylene	mg/kg	110000			<0.1	7	0	7										
Anthracene	mg/kg	540000		0.145	<0.1	7	2	5										
Benzo(a)anthracene	mg/kg	180		0.811	<0.1	7	2	5										
Benzo(a)pyrene	mg/kg	77		0.913	<0.1	7	2	5										
Benzo(b)fluoranthene	mg/kg	45		1.23	<0.1	7	3	4										
Benzo(ghi)perylene	mg/kg	4000		0.504	<0.1	7	2	5										
Benzo(k)fluoranthene	mg/kg	1200		0.252	<0.1	7	2	5										
Chrysene	mg/kg	350		0.754	<0.1	7	3	4										
Dibenzo(ah)anthracene	mg/kg	3.6		0.145	<0.1	7	1	6										
Fluoranthene	mg/kg	23000		1.57	<0.1	7	6	1										
Fluorene	mg/kg	71000			<0.1	7	0	7										
Hexachlorobutadiene	mg/kg				<0.1	7	0	7										
Indeno(1,2,3-cd)pyrene	mg/kg	510		0.52	<0.1	7	2	5										
Naphthalene	mg/kg	7800	432	0.642	<0.1	7	2	5										
Phenanthrene	mg/kg	23000		0.649	<0.1	7	4	3										
Pyrene	mg/kg	54000		1.37	<0.1	7	6	1										
Volatile Organic Compounds (VOC)																		
1,2,4-Trichlorobenzene	mg/kg				<0.1	7	0	7										
1,2-Dichlorobenzene	mg/kg				<0.1	7	0	7										
1,3-Dichlorobenzene	mg/kg				<0.1	7	0	7										
1,4-Dichlorobenzene	mg/kg				<0.1	7	0	7										
Semi-Volatile Organic Compounds (SVOC)																		
2,4,5-Trichlorophenol	mg/kg				<0.1	7	0	7										
2,4,6-Trichlorophenol	mg/kg				<0.1	7	0	7										
2,4-Dichlorophenol	mg/kg				<0.1	7	0	7										
2,4-Dimethylphenol	mg/kg				<0.1	7	0	7										
2,4-Dinitrotoluene	mg/kg				<0.1	7	0	7										
2,6-Dinitrotoluene	mg/kg				<0.1	7	0	7										
2-Chloronaphthalene	mg/kg	2098	669		<0.1	7	0	7										
2-Chlorophenol	mg/kg				<0.1	7	0	7										
2-Methylnaphthalene	mg/kg			1.09	<0.1	7	3	4										
2-Methylphenol	mg/kg				<0.1	7	0	7										
2-Nitrophenol	mg/kg				<0.1	7	0	7										
4-Chloro-3-methylphenol	mg/kg				<0.1	7	0	7										
4-Methylphenol	mg/kg				<0.1	7	0	7										
4-Nitrophenol	mg/kg				<1	7	0	7										
Bis(2-chloroethoxy)methane	mg/kg				<0.1	7	0	7										
Bis(2-chloroethyl)ether	mg/kg				<0.1	7	0	7										
Bis(2-chloroisopropyl)ether	mg/kg				<0.1	7	0	7										
Bis(2-ethylhexyl)phthalate	mg/kg				<0.5	7	0	7										
Butylbenzyl phthalate	mg/kg				<0.1	7	0	7										
Carbazole	mg/kg				<0.1	7	0	7										
Dibenzofuran	mg/kg			0.34	<0.1	7	2	5										
Diethyl phthalate	mg/kg				<0.1	7	0	7										
Dimethyl phthalate	mg/kg				<0.1	7	0	7										

								Lab sample ID	19/11030/3	19/11030/4	19/11030/6	19/11030/7	19/11030/10	19/12092/1	19/12092/2	19/12092/8	19/12092/14	19/12092/16
								Client sample ID	TP502	TP503	TP505	TP505	TP507	TP508	TP509	TP517	TP524	TP525
								Depth to top	1	0.5	0.1	1.1	1.4	2	2	1.5	3.5	2.5
								Depth to bottom	1.1	0.6	0.2	1.2	1.5					
								Date sampled	30/10/19	30/10/19	30/10/19	30/10/19	30/10/19	10/12/19	10/12/19	12/12/19	11/12/19	11/12/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete										
Chrysene	mg/kg	350			<0.06	4	0	4										
Dibenzo(ah)anthracene	mg/kg	3.6			<0.04	4	0	4										
Fluoranthene	mg/kg	23000			<0.08	4	0	4										
Fluorene	mg/kg	71000		0.02	<0.01	4	1	3										
Indeno(123-cd)pyrene	mg/kg	510			<0.03	4	0	4										
Naphthalene	mg/kg	7800	432	0.08	<0.03	4	2	2										
Phenanthrene	mg/kg	23000		0.06	<0.03	4	2	2										
Pyrene	mg/kg	54000			<0.07	4	0	4										
Total PAH-16MS	mg/kg			0.15	<0.08	4	2	2										
Polycyclic aromatic hydrocarbons (SVOC)																		
Acenaphthene	mg/kg	110000			<0.1	7	0	7										
Acenaphthylene	mg/kg	110000			<0.1	7	0	7										
Anthracene	mg/kg	540000		0.145	<0.1	7	2	5										
Benzo(a)anthracene	mg/kg	180		0.811	<0.1	7	2	5										
Benzo(a)pyrene	mg/kg	77		0.913	<0.1	7	2	5										
Benzo(b)fluoranthene	mg/kg	45		1.23	<0.1	7	3	4										
Benzo(ghi)perylene	mg/kg	4000		0.504	<0.1	7	2	5										
Benzo(k)fluoranthene	mg/kg	1200		0.252	<0.1	7	2	5										
Chrysene	mg/kg	350		0.754	<0.1	7	3	4										
Dibenzo(ah)anthracene	mg/kg	3.6		0.145	<0.1	7	1	6										
Fluoranthene	mg/kg	23000		1.57	<0.1	7	6	1										
Fluorene	mg/kg	71000			<0.1	7	0	7										
Hexachlorobutadiene	mg/kg				<0.1	7	0	7										
Indeno(1,2,3-cd)pyrene	mg/kg	510		0.52	<0.1	7	2	5										
Naphthalene	mg/kg	7800	432	0.642	<0.1	7	2	5										
Phenanthrene	mg/kg	23000		0.649	<0.1	7	4	3										
Pyrene	mg/kg	54000		1.37	<0.1	7	6	1										
Volatile Organic Compounds (VOC)																		
1,2,4-Trichlorobenzene	mg/kg				<0.1	7	0	7										
1,2-Dichlorobenzene	mg/kg				<0.1	7	0	7										
1,3-Dichlorobenzene	mg/kg				<0.1	7	0	7										
1,4-Dichlorobenzene	mg/kg				<0.1	7	0	7										
Semi-Volatile Organic Compounds (SVOC)																		
2,4,5-Trichlorophenol	mg/kg				<0.1	7	0	7										
2,4,6-Trichlorophenol	mg/kg				<0.1	7	0	7										
2,4-Dichlorophenol	mg/kg				<0.1	7	0	7										
2,4-Dimethylphenol	mg/kg				<0.1	7	0	7										
2,4-Dinitrotoluene	mg/kg				<0.1	7	0	7										
2,6-Dinitrotoluene	mg/kg				<0.1	7	0	7										
2-Chloronaphthalene	mg/kg	2098	669		<0.1	7	0	7										
2-Chlorophenol	mg/kg				<0.1	7	0	7										
2-Methylnaphthalene	mg/kg			1.09	<0.1	7	3	4										
2-Methylphenol	mg/kg				<0.1	7	0	7										
2-Nitrophenol	mg/kg				<0.1	7	0	7										
4-Chloro-3-methylphenol	mg/kg				<0.1	7	0	7										
4-Methylphenol	mg/kg				<0.1	7	0	7										
4-Nitrophenol	mg/kg				<1	7	0	7										
Bis(2-chloroethoxy)methane	mg/kg				<0.1	7	0	7										
Bis(2-chloroethyl)ether	mg/kg				<0.1	7	0	7										
Bis(2-chloroisopropyl)ether	mg/kg				<0.1	7	0	7										
Bis(2-ethylhexyl)phthalate	mg/kg				<0.5	7	0	7										
Butylbenzyl phthalate	mg/kg				<0.1	7	0	7										
Carbazole	mg/kg				<0.1	7	0	7										
Dibenzofuran	mg/kg			0.34	<0.1	7	2	5										
Diethyl phthalate	mg/kg				<0.1	7	0	7										
Dimethyl phthalate	mg/kg				<0.1	7	0	7										

								Lab sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	19/11614/10	19/11614/12	19/11614/13
								Client sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106	WS106	WS107	WS108
								Depth to top	0.4	0.4	0.2	1.2	0	1.3	0.3	0.7	0.5	0.2
								Depth to bottom					0.4					
								Date sampled	03/12/19	02/12/19	02/12/19	02/12/19	02/12/19	02/12/19	03/12/19	03/12/19	03/12/19	03/12/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete										
Chrysene	mg/kg	350			<0.06	4	0	4										
Dibenzo(ah)anthracene	mg/kg	3.6			<0.04	4	0	4										
Fluoranthene	mg/kg	23000			<0.08	4	0	4										
Fluorene	mg/kg	71000		0.02	<0.01	4	1	3										
Indeno(123-cd)pyrene	mg/kg	510			<0.03	4	0	4										
Naphthalene	mg/kg	7800	432	0.08	<0.03	4	2	2										
Phenanthrene	mg/kg	23000		0.06	<0.03	4	2	2										
Pyrene	mg/kg	54000			<0.07	4	0	4										
Total PAH-16MS	mg/kg			0.15	<0.08	4	2	2										
Polycyclic aromatic hydrocarbons (SVOC)																		
Acenaphthene	mg/kg	110000			<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	110000			<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Anthracene	mg/kg	540000		0.145	<0.1	7	2	5	<0.1	0.145		<0.1	0.136			<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	180		0.811	<0.1	7	2	5	<0.1	0.811		<0.1	0.743			<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	77		0.913	<0.1	7	2	5	<0.1	0.913		<0.1	0.677			<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	45		1.23	<0.1	7	3	4	<0.1	1.23		<0.1	1.04			<0.1	<0.1	0.136
Benzo(ghi)perylene	mg/kg	4000		0.504	<0.1	7	2	5	<0.1	0.504		<0.1	0.291			<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	1200		0.252	<0.1	7	2	5	<0.1	0.252		<0.1	0.212			<0.1	<0.1	<0.1
Chrysene	mg/kg	350		0.754	<0.1	7	3	4	<0.1	0.754		0.104	0.743			<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	3.6		0.145	<0.1	7	1	6	<0.1	0.145		<0.1	<0.1			<0.1	<0.1	<0.1
Fluoranthene	mg/kg	23000		1.57	<0.1	7	6	1	<0.1	1.35		0.107	1.57			0.127	0.125	0.157
Fluorene	mg/kg	71000			<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Hexachlorobutadiene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	510		0.52	<0.1	7	2	5	<0.1	0.52		<0.1	0.316			<0.1	<0.1	<0.1
Naphthalene	mg/kg	7800	432	0.642	<0.1	7	2	5	<0.1	0.131		0.642	<0.1			<0.1	<0.1	<0.1
Phenanthrene	mg/kg	23000		0.649	<0.1	7	4	3	<0.1	0.524		0.529	0.649			0.129	<0.1	<0.1
Pyrene	mg/kg	54000		1.37	<0.1	7	6	1	<0.1	1.26		0.112	1.37			0.116	0.111	0.141
Volatile Organic Compounds (VOC)																		
1,2,4-Trichlorobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
1,2-Dichlorobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
1,3-Dichlorobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
1,4-Dichlorobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Semi-Volatile Organic Compounds (SVOC)																		
2,4,5-Trichlorophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2,4-Dinitrotoluene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2,6-Dinitrotoluene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2-Chloronaphthalene	mg/kg	2098	669		<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2-Chlorophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg			1.09	<0.1	7	3	4	<0.1	0.192		1.09	<0.1			0.123	<0.1	<0.1
2-Methylphenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
4-Methylphenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg				<1	7	0	7	<1	<1		<1	<1			<1	<1	<1
Bis(2-chloroethoxy)methane	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Bis(2-chloroisopropyl)ether	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Bis(2-ethylhexyl)phthalate	mg/kg				<0.5	7	0	7	<0.5	<0.5		<0.5	<0.5			<0.5	<0.5	<0.5
Butylbenzyl phthalate	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Carbazole	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Dibenzofuran	mg/kg			0.34	<0.1	7	2	5	<0.1	0.106		0.34	<0.1			<0.1	<0.1	<0.1
Diethyl phthalate	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Dimethyl phthalate	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1

									Lab sample ID	19/10013/1	19/10013/2	19/10013/3	19/10013/6	19/10013/7	19/10013/4	19/10013/5	19/11030/11	19/11030/12	19/11030/13
									Client sample ID	BH501	BH501	BH501	BH502	BH502	BH507	BH507	BH512	BH512	BH517
									Depth to top	0.5	1.2	3.95	0.4	4.5	1.4	3.5	2.5	10	0.5
									Depth to bottom										
									Date sampled	17/10/19	17/10/19	17/10/19	16/10/19	16/10/19	18/10/19	18/10/19	30/10/19	30/10/19	04/11/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects												
Hexachlorobenzene	mg/kg				<0.1	7	0	7												
Hexachlorocyclopentadiene	mg/kg				<0.1	7	0	7												
Hexachloroethane	mg/kg	111	48		<0.1	7	0	7												
Isophorone	mg/kg				<0.1	7	0	7												
n-Dibutylphthalate	mg/kg				<0.1	7	0	7												
n-Dioctylphthalate	mg/kg				<0.5	7	0	7												
Nitrobenzene	mg/kg				<0.1	7	0	7												
n-Nitroso-n-dipropylamine	mg/kg				<0.1	7	0	7												
Pentachlorophenol	mg/kg				<0.1	7	0	7												
Perylene	mg/kg			0.256	<0.1	7	2	5												
Phenols																				
Phenol	mg/kg	1300			<0.1	7	0	7												
Other analytes																				
% Stones >10mm	% w/w			31.3	1.5	30	30	0		4.1	5.3	7.6	3.6	2	1.7	20.3	3.8	13.5	8
Calorific Value	MJ/kg			3.4	0.4	3	3	0										3.4	
pH	pH			8.63	5.23	20	20	0		6.59	5.23		7.33			8.63	7.74	7.77	7.54
pH BRE	pH			8.51	6.19	12	12	0				8.21		8.39	8.51		7.74	7.77	
Sulphate (acid soluble)	mg/kg			5900	770	2	2	0			5900		770						
Sulphate (water sol 2:1)	g/l			0.16	0.07	2	2	0			0.16		0.07						
Sulphate BRE (acid sol)	% w/w			0.79	0.04	12	12	0				0.79		0.26	0.04		0.17	0.1	
Sulphur BRE (total)	% w/w			0.67	0.02	12	12	0				0.67		0.55	0.04		0.3	0.22	
Total Organic Carbon	% w/w			7.57	0.66	10	10	0		4.16	7.54				1.67			7.57	
Converted to SOM (x / 0.58)	% w/w			13.05172	1.137931	10	10	0		7.17241379	13				2.87931034			13.0517241	

								Lab sample ID	19/11030/3	19/11030/4	19/11030/6	19/11030/7	19/11030/10	19/12092/1	19/12092/2	19/12092/8	19/12092/14	19/12092/16
								Client sample ID	TP502	TP503	TP505	TP505	TP507	TP508	TP509	TP517	TP524	TP525
								Depth to top	1	0.5	0.1	1.1	1.4	2	2	1.5	3.5	2.5
								Depth to bottom	1.1	0.6	0.2	1.2	1.5					
								Date sampled	30/10/19	30/10/19	30/10/19	30/10/19	30/10/19	10/12/19	10/12/19	12/12/19	11/12/19	11/12/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete										
Hexachlorobenzene	mg/kg				<0.1	7	0	7										
Hexachlorocyclopentadiene	mg/kg				<0.1	7	0	7										
Hexachloroethane	mg/kg	111	48		<0.1	7	0	7										
Isophorone	mg/kg				<0.1	7	0	7										
n-Dibutylphthalate	mg/kg				<0.1	7	0	7										
n-Dioctylphthalate	mg/kg				<0.5	7	0	7										
Nitrobenzene	mg/kg				<0.1	7	0	7										
n-Nitroso-n-dipropylamine	mg/kg				<0.1	7	0	7										
Pentachlorophenol	mg/kg				<0.1	7	0	7										
Perylene	mg/kg			0.256	<0.1	7	2	5										
Phenols																		
Phenol	mg/kg	1300			<0.1	7	0	7										
Other analytes																		
% Stones >10mm	% w/w			31.3	1.5	30	30	0	4	27.1	8.8	13.9	6.8	3.2	30.4	6	5.2	31.3
Calorific Value	MJ/kg			3.4	0.4	3	3	0	1.3			0.4						
pH	pH			8.63	5.23	20	20	0		7.08	6.28	7.02	7.77					
pH BRE	pH			8.51	6.19	12	12	0				7.02	7.77	7.26	7.27	6.19	8.06	7.05
Sulphate (acid soluble)	mg/kg			5900	770	2	2	0										
Sulphate (water sol 2:1)	g/l			0.16	0.07	2	2	0										
Sulphate BRE (acid sol)	% w/w			0.79	0.04	12	12	0				0.04	0.06	0.13	0.24	0.06	0.09	0.05
Sulphur BRE (total)	% w/w			0.67	0.02	12	12	0				0.02	0.28	0.1	0.26	0.04	0.37	0.02
Total Organic Carbon	% w/w			7.57	0.66	10	10	0	1.38		0.66	0.67						
Converted to SOM (x / 0.58)	% w/w			13.05172	1.137931	10	10	0	2.37931034		1.13793103	1.15517241						

								Lab sample ID	19/11614/2	19/11614/4	19/11614/5	19/11614/6	19/11614/7	19/11614/8	19/11614/9	19/11614/10	19/11614/12	19/11614/13
								Client sample ID	WS101	WS103	WS104	WS104	WS105	WS105	WS106	WS106	WS107	WS108
								Depth to top	0.4	0.4	0.2	1.2	0	1.3	0.3	0.7	0.5	0.2
								Depth to bottom					0.4					
								Date sampled	03/12/19	02/12/19	02/12/19	02/12/19	02/12/19	02/12/19	03/12/19	03/12/19	03/12/19	03/12/19
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete										
Hexachlorobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Hexachloroethane	mg/kg	111	48		<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Isophorone	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
n-Dibutylphthalate	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
n-Dioctylphthalate	mg/kg				<0.5	7	0	7	<0.5	<0.5		<0.5	<0.5			<0.5	<0.5	<0.5
Nitrobenzene	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
n-Nitroso-n-dipropylamine	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Pentachlorophenol	mg/kg				<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Perylene	mg/kg			0.256	<0.1	7	2	5	<0.1	0.256		<0.1	0.17			<0.1	<0.1	<0.1
Phenols																		
Phenol	mg/kg	1300			<0.1	7	0	7	<0.1	<0.1		<0.1	<0.1			<0.1	<0.1	<0.1
Other analytes																		
% Stones >10mm	% w/w			31.3	1.5	30	30	0	7.6	10.2	12.1	24.1	8.4	14	3.2	20.3	26.4	1.5
Calorific Value	MJ/kg			3.4	0.4	3	3	0										
pH	pH			8.63	5.23	20	20	0	7.43	7.75	7.53	7.82	6.88		7.49	7.35	7.46	7.67
pH BRE	pH			8.51	6.19	12	12	0										
Sulphate (acid soluble)	mg/kg			5900	770	2	2	0										
Sulphate (water sol 2:1)	g/l			0.16	0.07	2	2	0										
Sulphate BRE (acid sol)	% w/w			0.79	0.04	12	12	0										
Sulphur BRE (total)	% w/w			0.67	0.02	12	12	0										
Total Organic Carbon	% w/w			7.57	0.66	10	10	0						4.5		5.26		4.17
Converted to SOM (x / 0.58)	% w/w			13.05172	1.137931	10	10	0						7.75862069		9.06896552		7.18965517

APPENDIX N
GQRA DATA SCREENING TABLES – GAS

Job Number:
Client:
Site:

Revised Wilson and Card Classification Ground Gas Risk Assessment

Job No.:	322638
Client:	Harworth Estates Investments Limited
Site:	J36 Phase 2 and Phase 3 Rockingham

For low-rise residential developments without a clear ventilated sub-floor void, flats and commercial / industrial sites

Characteristic Situation	Risk	GSV
1	Very Low	0.07
2	Low	0.7
3	Moderate	3.5
4	Moderate to High	15
5	High	70
6	Very High	>70

From CIRIA Report 659 (2006) "Assessing Risks Posed By Hazardous Ground Gases To Buildings", Wilson et al.

KEY:
GSV Gas Screening Value

GSV cannot be calculated on a site-specific basis

GSV indicates very low risk
GSV indicates low to moderate risk
GSV indicates moderate or greater risk; Concentrations of CH4 ≥20%V/V; CO2 ≥30%V/V
Oxygen concentration ≤10%v/v
Total ground gas concentrations >100%v/v

BH NO.	DATE	CH4 I %v/v	CH4 SS %v/v	CO2 I %v/v	CO2 SS %v/v	O2 I %v/v	O2 SS %v/v	Flow l/hr	Baro mbar	BH Press mbar	I SUM %v/v	SS SUM %v/v	GSV CH4	GSV CO2	CS No.	H2S peak (ppm)	CO peak (ppm)
BH204	15/01/2020	<0.1	<0.1	0.1	2.1	20.9	12.3	0	983	-0.03	21.0	14.4	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.1	4.1	21.0	9.1	0.1	973	0.03	21.1	13.2	0.00	0.00	CS1	0	0
	11/02/2020	<0.1		0.2		20.7			983		20.9	0.0	0.00	0.00	CS1	0	0
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
BH208	15/01/2020	<0.1	<0.1	0.1	1.8	20.9	17.3	0	982	0.02	21.0	19.1	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.4	20.6	20.3	0	972	0.07	20.8	20.7	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	1.0	2.8	19.7	9.9	0.3	980	7.4	20.8	12.8	0.00	0.01	CS1	0	0
	27/02/2020	<0.1	<0.1	0.1	1.7	20.6	11.6	0.1	981	-0.38	20.7	13.3	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.1	2.8	20.9	18.1	0.2	1004	0	21.0	20.9	0.00	0.01	CS1	0	0
											0.0	0.0	0.00	0.00	CS1		
BH302	13/01/2020	<0.1	<0.1	0.3	6.6	20.9	1.8	1.8	979	4.41	21.2	8.4	0.00	0.12	CS2	0	0
	27/01/2020	<0.1	<0.1	0.3	6.1	20.6	0.7	0.7	981	0.77	20.9	6.8	0.00	0.04	CS1	0	1
	10/02/2020	<0.1	<0.1	0.1	3.3	21.1	8.6	0	978	-0.12	21.2	11.9	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	1.6	21.0	17.5	0	991	-0.6	21.3	19.1	0.00	0.00	CS1	0	0
	16/03/2020	<0.1	<0.1	0.2	1.0	21.2	18.6	0	1007	0	21.4	19.6	0.00	0.00	CS1	0	1
	29/04/2020	<0.1	<0.1	0.1	3.2	21.1	7.8	0	982	0	21.2	11.0	0.00	0.00	CS1	0	0
BH402	15/01/2020	<0.1	<0.1	0.1	5.2	20.9	15.8	0	984	0.02	21.0	21.0	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.4	20.6	20.3	0	974	0.02	20.8	20.7	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	0.2	6.3	20.2	14.8	0.4	982	-0.65	20.5	21.2	0.00	0.03	CS1	0	0
	27/02/2020	<0.1	<0.1	0.1	0.1	20.6	20.6	0.1	982	-0.45	20.7	20.7	0.00	0.00	CS1	0	2
	17/03/2020	<0.1	<0.1	0.7	0.2	20.5	21.1	0.1	1007	0	21.2	21.3	0.00	0.00	CS1	0	0
	28/04/2020	<0.1	<0.1	4.4	3.6	21.6	19.7	0	984	0.31	26.0	23.3	0.00	0.00	CS1	0	0
BH501D	13/01/2020	<0.1	<0.1	0.3	16.4	20.9	2.3	0.4	992	1.19	21.2	18.7	0.00	0.07	CS1	0	0
	27/01/2020	<0.1	<0.1	0.2	23.0	20.7	<0.1	0.4	981	0.72	20.9	23.0	0.00	0.09	CS2	0	0
	10/02/2020	<0.1	<0.1	0.1	0.1	20.9	21.0	0	978	-0.27	21.0	21.1	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	7.4	21.0	12.4	0.3	992	-0.6	21.3	19.8	0.00	0.02	CS1	0	0
	16/03/2020	<0.1	<0.1	0.1	0.3	21.0	21.0	0.2	1006	0	21.1	21.3	0.00	0.00	CS1	0	1
	29/04/2020	<0.1	<0.1	17.0	16.4	20.8	2.7	0.3	982	0.15	37.8	19.1	0.00	0.05	CS1	0	0
BH501S	13/01/2020	<0.1	<0.1	0.3	14.8	20.9	4.8	0.6	992	0.99	21.2	19.6	0.00	0.09	CS2	0	0
	27/01/2020	<0.1	<0.1	0.2	15.9	20.8	3.3	0.5	981	0.6	21.0	19.2	0.00	0.08	CS2	0	1
	10/02/2020	<0.1	<0.1	0.2	0.1	21.8	22.1	0	977	-0.15	22.0	22.2	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	3.7	21.0	20.0	0.2	992	-0.56	21.3	23.7	0.00	0.01	CS1	0	0
	16/03/2020	<0.1	<0.1	1.5	3.8	20.9	18.9	0.2	1007	0	22.4	22.7	0.00	0.01	CS1	0	0
	29/04/2020	<0.1	<0.1	0.2	14.8	21.0	4.8	0.5	982	0.25	21.2	19.6	0.00	0.07	CS2	0	0
BH502	13/01/2020	<0.1	<0.1	0.3	13.9	20.9	2.7	0.6	993	1.08	21.2	16.6	0.00	0.08	CS2	0	0
	27/01/2020	<0.1	<0.1	0.3	16.6	20.7	1.7	0.5	980	0.77	21.0	18.3	0.00	0.08	CS2	0	7
	10/02/2020	<0.1	<0.1	0.1	0.1	20.9	20.9	0.2	977	-0.29	21.0	21.0	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	9.5	21.0	2.8	0.1	990	-0.67	21.3	12.3	0.00	0.01	CS1	0	0
	16/03/2020	0.1	<0.1	0.1	0.2	20.9	20.8	0.4	1004	0	21.1	21.0	0.00	0.00	CS1	0	0
	29/04/2020	<0.1	<0.1	0.1	14.0	20.9	2.7	0.4	982	0.38	21.0	16.7	0.00	0.06	CS1	0	0
BH503	13/01/2020	<0.1	<0.1	0.3	12.8	20.9	0.4	0.5	992	1.12	21.2	13.2	0.00	0.06	CS1	0	0
	27/01/2020	<0.1	<0.1	0.3	23.6	20.7	0.9	0.6	979	0.97	21.0	24.5	0.00	0.14	CS2	0	0
	10/02/2020	<0.1	<0.1	0.1	0.1	20.8	20.8	0.2	977	-0.27	20.9	20.9	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	1.3	0.3	21.0	21.7	0	990	-1.04	22.3	22.0	0.00	0.00	CS1	0	0
	16/03/2020	<0.1	<0.1	0.1	0.1	20.7	20.7	0.3	1005	0	20.8	20.8	0.00	0.00	CS1	0	1
	29/04/2020	<0.1	<0.1	0.2	0.1	21.0	21.0	0.1	982	0	21.2	21.1	0.00	0.00	CS1	0	0
BH507	10/02/2020	<0.1	<0.1	0.1	0.6	20.5	20.2	0.6	976	0.34	20.6	20.8	0.00	0.00	CS1	0	0
	16/03/2020	<0.1	<0.1	0.1	0.1	21.4	21.4	0.2	1007	0.5	21.5	21.5	0.00	0.00	CS1	0	0
	29/04/2020	<0.1	<0.1	0.1	18.7	21.0	2.5	0.1	982	0.1	21.1	21.2	0.00	0.02	CS1	0	1
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
BH506	13/01/2020	<0.1	<0.1	0.2	18.6	20.9	2.5	0.2	992	0.75	21.1	21.1	0.00	0.04	CS1	0	0
	27/01/2020	<0.1	<0.1	0.3	24.6	20.8	0.7	0.1	979	0.36	21.1	25.3	0.00	0.02	CS1	0	1
	10/02/2020	<0.1	<0.1	0.1	0.1	20.6	20.6	0.4	975	0.29	20.7	20.7	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	10.2	20.6	10.4	0.1	989	-0.67	20.9	20.6	0.00	0.01	CS1	0	0
	16/03/2020	<0.1	<0.1	0.1	0.2	21.1	21.4	0.1	1008	0	21.2	21.6	0.00	0.00	CS1	0	1
											0.0	0.0	0.00	0.00	CS1		
BH508	15/01/2020	<0.1	<0.1	0.2	0.6	20.9	20.3	0	983	-0.05	21.1	20.9	0.00	0.00	CS1	0	1
	28/01/2020	<0.1	<0.1	0.3	4.3	20.6	13.9	0.1	973	-0.26	20.9	18.2	0.00	0.00	CS1	0	0
	11/02/2020	0.2	<0.1	0.3	4.0	21.5	17.1	0.2	982	0.07	22.0	21.1	0.00	0.01	CS1	0	2
	27/02/2020	<0.1	<0.1	0.2	0.1	21.0	21.9	0.1	982	-0.48	21.2	22.0	0.00	0.00	CS1	0	2
	17/03/2020	0.1	0.1	1.5	0.2	19.5	20.9	0.1	1006	0	21.1	21.2	0.00	0.00	CS1	0	2
	28/04/2020	<0.1	<0.1	0.1	7.5	21.4	3.5	0	985	0.19	21.5	11.0	0.00	0.00	CS1	0	0
BH511	15/01/2020	<0.1	0.1	0.3	4.5	20.9	2.9	0.1	985	-0.51	21.2	7.5	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.3	7.6	20.6	5.4	0	974	-0.07	20.9	13.0	0.00	0.00	CS1	0	0
	11/02/2020										0.0	0.0	0.00	0.00	CS1		
	27/02/2020	<0.1	0.1	0.2	9.0	21.0	<0.1	0.3	980	-0.48	21.2	9.1	0.00	0.03	CS1	0	1
	17/03/2020	<0.1	0.1	0.1	8.9	21.0	<0.1	0.5	1007	0	21.1	9.0	0.00	0.04	CS1	0	2
	28/04/2020	<0.1	0.1	0.1	12.4	20.8	<0.1	0.2	984	0.18	20.9	12.5	0.00	0.02	CS1	0	0
BH516	15/01/2020	<0.1	1.2	0.1	4.8	20.9	1.2	0.2	983	-0.21	21.0	7.2	0.00	0.01	CS1	0	1
	28/01/2020	<0.1	1.7	0.3	7.4	20.9	<0.1	0	974	-0.03	21.2	9.1	0.00	0.00	CS1	0	0
	11/02/2020	<0.1	1.3	0.1	8.7	20.9	<0.1	0.1	982	-0.14	21.0	10.0	0.00	0.01	CS1	0	1
	27/02/2020	<0.1	0.9	0.1	9.0	20.9	<0.1	0.2	982	-0.58	21.0	9.9	0.00	0.02	CS1	0	0
	17/03/2020	<0.1	1.3	0.1	9.0	21.0	<0.1	2.4	1007	0	21.1	10.3	0.00	0.22	CS2	0	2
	28/04/2020	<0.1	1.9	0.1	10.8	21.2	<0.1	0	985	0.17	21.3	12.7	0.00	0.00	CS1	0	0
BH519	15/01/2020	<0.1	<0.1	0.3	3.7	20.9	17.1	0.1	983	-0.44	21.2	20.8	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.3	0.2	20.7	20.9	0.1	974	-0.31	21.0	21.1	0.00	0.00	CS1	0	0
	11/02/2020	0.1	<0.1	0.6	3.8	20.4	17.1	0.1	982	-0.41	21.1	20.9	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.6	0.1	20.6	20.8	0	982	-1.03	21.2	20.9	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.1	0.1	21.0	21.0	0.2	1007	0	21.1	21.1	0.00	0.00	CS1	0	0
	28/04/2020	<0.1	<0.1	0.1	5.0	21.4	17.2	0	985	0.18	21.5	22.2	0.00	0.00	CS1	0	0
BH520	15/01/2020	<0.1		0.1		20.9			984	0.05	21.0	0.0	0.00	0.00	CS1	0	0
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		

Job Number:
Client:
Site:

Characteristic Situation	Risk	GSV
1	Very Low	0.07
2	Low	0.7
3	Moderate	3.5
4	Moderate to High	15
5	High	70
6	Very High	>70

From CIRIA Report 659 (2006) "Assessing Risks Posed By Hazardous Ground Gases To Buildings", Wilson et al.

KEY:
GSV Gas Screening Value

GSV cannot be calculated on a site-specific basis

GSV indicates very low risk
GSV indicates low to moderate risk
GSV indicates moderate or greater risk; Concentrations of CH4 ≥20%V/V; CO2 ≥30%V/V
Oxygen concentration ≤10%v/v
Total ground gas concentrations >100%v/v

BH NO.	DATE	CH4 I %v/v	CH4 SS %v/v	CO2 I %v/v	CO2 SS %v/v	O2 I %v/v	O2 SS %v/v	Flow l/hr	Baro mbar	BH Press mbar	I SUM %v/v	SS SUM %v/v	GSV CH4	GSV CO2	CS No.	H2S peak (ppm)	CO peak (ppm)
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
BH521	15/01/2020	<0.1	<0.1	0.3	0.1	20.9	21.0	0.2	984	-0.61	21.2	21.1	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	10.5	20.9	9.7	0.1	974	-0.15	21.1	20.2	0.00	0.01	CS1	0	1
	11/02/2020	<0.1	<0.1	0.3	0.2	20.7	20.7	0.1	982	-0.92	21.0	20.9	0.00	0.00	CS1	0	1
	27/02/2020	<0.1	<0.1	0.1	2.4	20.7	18.1	0.3	981	-0.6	20.8	20.5	0.00	0.01	CS1	0	1
	17/03/2020	<0.1	<0.1	9.0	6.6	11.1	13.7	0.2	1007	0	20.1	20.3	0.00	0.01	CS1	0	1
	28/04/2020	<0.1	<0.1	0.1	11.7	21.3	10.2	0	985	0.2	21.4	21.9	0.00	0.00	CS1	0	0
BH522	15/01/2020	<0.1	<0.1	0.1	<0.1	20.9	20.9	0.1	984	-0.52	21.0	20.9	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.1	20.9	20.7	0.1	974	-0.19	21.1	20.8	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	0.1	7.5	20.9	7.0	0.2	982	-0.87	21.1	14.6	0.00	0.02	CS1	0	3
	27/02/2020	<0.1	<0.1	0.5	0.1	20.6	20.2	0	982	0.22	21.1	20.3	0.00	0.00	CS1	0	1
	17/03/2020	<0.1	<0.1	0.1	16.7	21.2	3.1	0.1	1007	0	21.3	19.8	0.00	0.02	CS1	0	2
	28/04/2020	<0.1	<0.1	0.1	22.5	21.0	0.2	0	985	0.17	21.1	22.7	0.00	0.00	CS1	0	0
BH523	15/01/2020	<0.1	<0.1	0.1	0.1	20.9	20.9	0.2	984	-0.66	21.0	21.0	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.1	20.8	20.8	0.2	974	-0.49	21.0	20.9	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	0.2	0.1	20.5	20.4	0.3	982	-0.72	20.8	20.6	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.3	0.1	19.2	20.2	0.2	982	-0.36	19.5	20.3	0.00	0.00	CS1	0	0
	17/03/2020	<0.1		0.2	17.4	20.9	<0.1	0.1	1007	0	21.1	17.4	0.00	0.02	CS1	0	2
	28/04/2020	<0.1	<0.1	0.1	15.0	21.2	0.1	0	984	0.25	21.3	15.1	0.00	0.00	CS1	0	0
BH524	15/01/2020	<0.1	<0.1	0.1	<0.1	20.9	20.7	0.2	984	-0.49	21.0	20.7	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.1	20.6	20.6	0.1	975	-0.34	20.8	20.7	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	0.1	0.1	20.3	20.2	0.4	982	-0.92	20.5	20.4	0.00	0.00	CS1	0	3
	27/02/2020	<0.1	<0.1	0.1	3.5	20.6	18.8	0	982	-0.5	20.7	22.3	0.00	0.00	CS1	0	2
	17/03/2020	<0.1	<0.1	0.3	17.2	20.8	0.2	0.1	1007	0	21.1	17.4	0.00	0.02	CS1	0	3
	28/04/2020	<0.1	<0.1	0.1	20.7	21.2	<0.1	0	984	0.27	21.3	20.7	0.00	0.00	CS1	0	0
BH535A	11/02/2020	<0.1	<0.1	0.1	0.1	19.6	19.5	0.3	980	-0.45	19.7	19.6	0.00	0.00	CS1	0	2
	17/03/2020	<0.1	<0.1	0.1	1.2	20.8	17.8	0.2	1005	0.5	20.9	19.0	0.00	0.00	CS1	0	1
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		
RBH209	15/01/2020	<0.1	<0.1	0.1	12.5	20.9	0.9	0	984	3.45	21.0	13.4	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	9.5	20.7	5.0	0.1	973	-0.1	20.9	14.5	0.00	0.01	CS1	0	0
	11/02/2020	<0.1	<0.1	0.3	0.1	19.6	19.9	0.3	981	0.12	19.9	20.0	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.3	8.2	20.8	7.4	0	981	-0.46	21.1	15.6	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.2	11.5	20.6	1.7	0.2	1005	0.5	20.8	13.2	0.00	0.02	CS1	0	3
	28/04/2020	<0.1	<0.1	0.1	13.6	21.8	1.9	0	983	0.26	21.9	15.5	0.00	0.00	CS1	0	0
RBH210	15/01/2020	<0.1	<0.1	0.1	0.6	20.9	20.7	0	983	-0.07	21.0	21.3	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.2	0.5	20.7	20.4	0.1	972	-0.2	20.9	20.9	0.00	0.00	CS1	0	0
	11/02/2020	<0.1	<0.1	0.2	3.4	19.5	15.4	0.3	980	-0.65	19.7	18.8	0.00	0.01	CS1	1	1
	27/02/2020	<0.1	<0.1	0.1	4.8	20.8	16.4	0.1	981	-0.5	20.9	21.2	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.1	13.8	20.8	1.2	0.4	1005	0.5	20.9	15.0	0.00	0.06	CS1	0	6
	28/04/2020	<0.1	<0.1	0.1	16.9	21.8	3.7	0	983	0.23	21.9	20.6	0.00	0.00	CS1	0	0
RBH211	15/01/2020	<0.1	<0.1	0.1	<0.1	20.9	21.0	0	983	-0.07	21.0	21.0	0.00	0.00	CS1	0	0
	28/01/2020	<0.1	<0.1	0.3	0.1	20.7	20.8	0.1	972	-0.02	21.0	20.9	0.00	0.00	CS1	0	0
	11/02/2020	<0.1	<0.1	0.2	0.1	19.8	19.7	0.4	980	-0.94	20.0	19.8	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.2	0.1	20.6	20.6	0.1	981	-0.53	20.8	20.7	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.4	5.4	20.5	12.3	0.1	1004	0	20.9	17.7	0.00	0.01	CS1	0	0
	28/04/2020	<0.1	<0.1	0.1	0.1	21.1	21.8	0	982	0.18	21.2	21.9	0.00	0.00	CS1	0	0
RBH305	13/01/2020	<0.1	<0.1	0.1	19.2	20.9	1.0	0.5	979	1.17	21.0	20.2	0.00	0.10	CS2	0	0
	27/01/2020	<0.1	<0.1	0.9	24.1	19.9	0.3	0.5	979	0.72	20.8	24.4	0.00	0.12	CS2	0	1
	10/02/2020	<0.1	<0.1	0.1	0.6	20.8	20.7	0.2	977	-0.34	20.9	21.3	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	17.9	21.0	1.3	0	990	-0.53	21.3	19.2	0.00	0.00	CS1	0	0
	29/04/2020	<0.1	<0.1	0.1	19.1	20.7	1.0	0.6	982	0.48	20.8	20.1	0.00	0.11	CS2	0	0
											0.0	0.0	0.00	0.00	CS1		
RBH306	13/01/2020	<0.1	<0.1	0.1	7.1	20.9	11.4	0	994	0	21.0	18.5	0.00	0.00	CS1	0	0
	27/01/2020	<0.1	<0.1	0.2	19.8	20.6	6.8	0.4	982	0.63	20.8	26.6	0.00	0.08	CS2	0	1
	10/02/2020	<0.1	<0.1	0.1	0.2	20.9	20.9	0.2	978	-0.26	21.0	21.1	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	<0.1	0.3	14.1	21.0	8.0	0.2	992	-0.14	21.3	22.1	0.00	0.03	CS1	0	0
	16/03/2020	<0.1	<0.1	0.9	0.4	21.0	20.7	0.3	1007	0	21.9	21.1	0.00	0.00	CS1	0	0
	29/04/2020	<0.1	<0.1	0.1	7.1	21.1	11.6	0	982	0	21.2	18.7	0.00	0.00	CS1	0	0
RBH307	13/01/2020	<0.1	<0.1	0.3	15.8	20.9	0.5	0.4	992	0.89	21.2	16.3	0.00	0.06	CS1	0	0
	27/01/2020	<0.1	<0.1	0.2	21.5	20.6	<0.1	0.2	982	0.39	20.8	21.5	0.00	0.04	CS1	0	1
	10/02/2020	<0.1	<0.1	0.1	0.7	21.0	20.4	0.2	978	-0.22	21.1	21.1	0.00	0.00	CS1	0	0
	28/02/2020	<0.1	0.1	0.2	9.1	20.9	12.8	0.1	993	0.09	21.1	22.0	0.00	0.01	CS1	0	0
	16/03/2020	<0.1	<0.1	0.1	3.5	21.1	19.5	0.3	1007	0	21.2	23.0	0.00	0.01	CS1	0	1
	29/04/2020	<0.1	<0.1	0.1	16.1	21.1	0.6	0.3	982	0.25	21.2	16.7	0.00	0.05	CS1	0	0
RBH405	14/01/2020	<0.1	<0.1	0.2	6.0	20.9	12.5	0.9	964	1.66	21.1	18.5	0.00	0.05	CS1	0	0
	28/01/2020	<0.1	<0.1	0.1	5.8	20.9	9.8	0	973	0.17	21.0	15.6	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.3	0.8	20.6	19.1	0.1	982	-0.62	20.9	19.9	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.1	9.9	20.9	1.5	0.1	1005	0.5	21.0	11.4	0.00	0.01	CS1	0	1
	28/04/2020	<0.1	<0.1	0.1	1.4	21.5	20.6	0.1	983	0.26	21.6	22.0	0.00	0.00	CS1	0	0
											0.0	0.0	0.00	0.00	CS1		
RBH503	14/01/2020	<0.1	<0.1	0.1	15.3	20.9	5.4	1.3	966	2.28	21.0	20.7	0.00	0.20	CS2	0	0
	28/01/2020	<0.1	<0.1	0.2	0.1	20.7	20.7	0.2	974	-0.22	20.9	20.8	0.00	0.00	CS1	0	0
	11/02/2020	0.1	0.1	0.9	0.1	20.1	20.6	0.3	982	-0.67	21.1	20.8	0.00	0.00	CS1	0	0
	27/02/2020	<0.1	<0.1	0.1	0.5	20.6	20.0	0.2	982	-0.8	20.7	20.5	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.2	0.1	21.1	21.2	0.1	1007	0	21.3	21.3	0.00	0.00	CS1	0	0
	28/04/2020	<0.1	<0.1	0.1	0.6	21.2	20.6	0.1	984	0.24	21.3	21.2	0.00	0.00	CS1	0	0
RBH504	11/02/2020	<0.1	<0.1	0.2	0.6	19.8	19.0	0.3	983	-0.89	20.0	19.6	0.00	0.00	CS1	0	1
	27/02/2020	<0.1	<0.1	0.3	0.2	20.9	21.7	0	981	0	21.2	21.9	0.00	0.00	CS1	0	0
	17/03/2020	<0.1	<0.1	0.2	0.1	20.7	20.9	0.2	1007	0	20.9	21.0	0.00	0.00	CS1	0	0
	28/04/2020	<0.1	<0.1	0.1	1.0	21.1	20.0	0.2	985	0.19	21.2	21.0	0.00	0.00	CS1	0	0
											0.0	0.0	0.00	0.00	CS1		
											0.0	0.0	0.00	0.00	CS1		

Job Number:
Client:
Site:

Characteristic Situation	Risk	GSV
1	Very Low	0.07
2	Low	0.7
3	Moderate	3.5
4	Moderate to High	15
5	High	70
6	Very High	>70

From CIRIA Report 659 (2006) "Assessing Risks Posed By Hazardous Ground Gases To Buildings", Wilson et al.

KEY:
GSV Gas Screening Value

GSV cannot be calculated on a site-specific basis

GSV indicates very low risk
GSV indicates low to moderate risk
GSV indicates moderate or greater risk; Concentrations of CH4 ≥20%V/V; CO2 ≥30%V/V
Oxygen concentration ≤10%v/v
Total ground gas concentrations >100%v/v

BH NO.	DATE	CH4 I %v/v	CH4 SS %v/v	CO2 I %v/v	CO2 SS %v/v	O2 I %v/v	O2 SS %v/v	Flow l/hr	Baro mbar	BH Press mbar	I SUM %v/v	SS SUM %v/v	GSV CH4	GSV CO2	CS No.	H2S peak (ppm)	CO peak (ppm)

WORST-CASE VALUES PER BOREHOLE

		Maximum CH4		Maximum CO2		Minimum O2		Max Flow	Not Applicable		Maximum Total		Maximum GSVs		CS No
BH204		<0.1	<0.1	0.2	4.1	20.7	9.1	0.1			20.9	13.2	0.00	0.00	CS1
BH208		0.1	0.1	1.0	2.8	19.7	9.9	0.3			20.8	12.8	0.00	0.01	CS1
BH302		<0.1	<0.1	0.3	6.6	20.6	0.7	1.8			20.9	7.3	0.00	0.12	CS2
BH402		0.1	0.1	4.4	6.3	20.2	14.8	0.4			24.7	21.2	0.00	0.03	CS1
BH501D		<0.1	<0.1	17.0	23.0	20.7	<0.1	0.4			37.7	23.0	0.00	0.09	CS2
BH501S		<0.1	<0.1	1.5	15.9	20.8	3.3	0.6			22.3	19.2	0.00	0.10	CS2
BH502		0.1	<0.1	0.3	16.6	20.7	1.7	0.6			21.1	18.3	0.00	0.10	CS2
BH503		<0.1	<0.1	1.3	23.6	20.7	0.4	0.6			22.0	24.0	0.00	0.14	CS2
BH506		<0.1	<0.1	0.3	24.6	20.6	0.7	0.4			20.9	25.3	0.00	0.10	CS2
BH507		<0.1	<0.1	0.1	18.7	20.5	2.5	0.6			20.6	21.2	0.00	0.11	CS2
BH508		0.2	0.1	1.5	7.5	19.5	3.5	0.2			21.2	11.1	0.00	0.02	CS1
BH511		<0.1	0.1	0.3	12.4	20.6	<0.1	0.5			20.9	12.5	0.00	0.06	CS1
BH516		<0.1	1.9	0.3	10.8	20.9	<0.1	2.4			21.2	12.7	0.00	0.26	CS2
BH519		0.1	<0.1	0.6	5.0	20.4	17.1	0.2			21.1	22.1	0.00	0.01	CS1
BH520		<0.1	<0.1	0.1	<0.1	20.9	<0.1	<0.1			21.0	0.0	0.00	0.00	CS1
BH521		<0.1	<0.1	9.0	11.7	11.1	9.7	0.3			20.1	21.4	0.00	0.04	CS1
BH522		0.1	0.1	0.5	22.5	20.6	0.2	0.2			21.2	22.8	0.00	0.05	CS1
BH523		0.1	0.1	0.3	17.4	19.2	<0.1	0.3			19.6	17.5	0.00	0.05	CS1
BH524		0.1	0.1	0.3	20.7	20.3	<0.1	0.4			20.7	20.8	0.00	0.08	CS2
BH535		<0.1	<0.1	0.1	1.2	19.6	17.8	0.3			19.7	19.0	0.00	0.00	CS1
RBH209		<0.1	<0.1	0.3	13.6	19.6	0.9	0.3			19.9	14.5	0.00	0.04	CS1
RBH210		<0.1	<0.1	0.2	16.9	19.5	1.2	0.4			19.7	18.1	0.00	0.07	CS1
RBH211		<0.1	<0.1	0.4	5.4	19.8	12.3	0.4			20.2	17.7	0.00	0.02	CS1
RBH305		<0.1	<0.1	0.9	24.1	19.9	0.3	0.6			20.8	24.4	0.00	0.14	CS2
RBH306		<0.1	<0.1	0.9	19.8	20.6	6.8	0.4			21.5	26.6	0.00	0.08	CS2
RBH307		<0.1	0.1	0.3	21.5	20.6	<0.1	0.4			20.9	21.6	0.00	0.09	CS2
RBH405		<0.1	<0.1	0.3	9.9	20.6	1.5	0.9			20.9	11.4	0.00	0.09	CS2
RBH503		0.1	0.1	0.9	15.3	20.1	5.4	1.3			21.1	20.8	0.00	0.20	CS2
RBH504		<0.1	<0.1	0.3	1.0	19.8	19.0	0.3			20.1	20.0	0.00	0.00	CS1

APPENDIX O
GEOTECHNICAL MODELING SUMMARY

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Our Ref: 372079-L01 (00)

30 March 2020

Harworth Estates Limited
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S60 5TR

For the attention of Mr Robert Cole / Ms Joanne Neville

Dear Sir/Madam,

RE: GROUND SETTLEMENT ASSESMENT: ROCKINGHAM 2 AND 3

1. INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Harworth Estates Limited to carry out a geo-environmental assessment of the land at the Rockingham 2 and 3 sites in South Yorkshire. This site forms part of the larger Rockingham former opencast coal mining site and is anticipated to be redeveloped with a number of commercial/industrial units. An area to the northwest, Rockingham 1 has already been developed.

Limitations

The comments given in this report and the opinions expressed are based on the ground conditions indicated by previous investigation carried out by RSK. However, there may be conditions pertaining to the site that have not been disclosed by these investigations and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due or the thickness and quality of made ground including groundwater levels may at variance to that reported.

The settlement calculations undertaken in this work assumes that the un-engineered made ground placed within the former open cast mine has ceased settling and so does not account for further self-weight settlement of the backfill material.

This report is subject to the RSK service constraints given in **Appendix A**.

2. OBJECTIVE

The objective of this investigation is to assess ground conditions, predict the settlement of the opencast backfill by using data obtained from settlement monitoring. The results of the assessment will be used to determine whether ground improvement is required, and if required, suggest options and if applicable estimate the surcharge loading and duration of surcharging required to achieve adequate settlement prior to construction works.

3. SCOPE

The scope of the current works is based on several methods of assessment, as summarised below:

- Assessment of the existing borehole data (ground conditions and SPTs)
- Assessment of the settlement behaviour of the made ground backfill from a load test conducted on site, and establishing a stiffness profile of the backfill through back calculations
- Use the above information to predict the settlement for individual units in Rockingham 2 and 3, and propose ground treatment options if required.

4. SITE INFORMATION

4.1 Site Location

The site that is the subject of this report is referred to as Rockingham 2 and 3 and is part of the wider Rockingham development site. Rockingham 2 and 3 lies to the eastern end of the larger site area; Rockingham 2 is to the south of Dearne Valley Parkway, opposite Shortwood Business Park and Rockingham 3 is to the north of Dearne Valley Parkway (opposite to Rockingham 2).

Figure 1 shows the site location and Figure 2 provides information relating to the site setting. The approximate centre of the site is located at Ordnance Survey National Grid reference SE 35875 01123. The site lies between the residential areas of Birdwell and Hoyland in South Yorkshire.

4.2 Site Description

Historically, the site was subject to deep underground mining (Rockingham Colliery from pre-1893 to 1980) and was used for opencast coal mining (1991 to 1995). Subsequent backfilling and restoration was completed by approximately 1998. On completion of the opencast mining work it is understood that the Rockingham 2 and 3 site was backfilled, primarily with overburden materials, however this processes was not controlled (i.e. the backfill was not compacted to an engineering specification as it was deposited by end-tipping).

4.3 Proposed Site Use

It is understood that the site is being considered for redevelopment for commercial purposes.

Preliminary details of the proposed development within the Rockingham 2 and 3 area are shown on RSK drawing Figure 5 (Rev 1, February 2020) (see Appendix B). The proposed development is to include cut and fill exercise to provide level development platforms, details of which can be found in Appendix B. The following loadings from the commercial units have been considered in the settlement modelling:

i. Floor slab loading of 35 kPa acting at the ground level; and

ii. Colum pad (1m x 1m) loading of 100kPa acting at 1.0mbgl.

5. GROUND CONDITIONS

The preliminary results of the geo-environmental and geotechnical intrusive investigation are detailed below. This report summarises the site data collected in 2019 and 2020 and presents them in the context of the findings to date.

The exploratory holes revealed that the site is underlain by a variable thickness of made ground (backfill of the former opencast pit) directly overlying an interbedded series of mudstones, siltstones, sandstones and coal seams of the Pennine Middle Coal Measures Formation. This confirms the stratigraphical succession described within the CSM with no superficial deposits evident across the site. The Elsecar Fault is shown to influence bedrock geology in the proposed development area, trending through Rockingham 2 and 3 in an approximately north-west to south-easterly direction, downthrown by between 60m and 70m on the north eastern side. The bedrock has also been disturbed by the open cast mining across the site resulting in significant variations in depth.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in Table 1 with the strata discussed in subsequent subsections.

Table 1 General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Made Ground	All exploratory holes	0.00	1.50 – 54.00
Pennine Middle Coal Measures	BH502, BH509, BH514 to BH519, BH534, RBH501, RBH503, RBH504, RBH507, RBH509 to RBH512, RBH514 to RBH518	1.50 – 54.00	N/A

5.1 Made ground

The made ground generally comprised a cohesive soil with a significant proportion of granular material (gravel, cobbles and boulders) within the matrix. A surface layer of made ground ranging from 0.10m to 0.55m in thickness was encountered in all exploratory locations acting as a growing media for the grassed fields. This layer exhibited properties resembling that of topsoil in terms of appearance and structure and should be considered as a soft compressible layer across the site surface. The made ground ranged in thickness from 0.80m to 54.0m, with the latter extent found in RBH503, located in an area of deep opencast extraction. The deepest deposits of opencast backfilled identified at the site to date was 69.0m in RBH405. From the available historic records, in-situ testing and load test results it is evident that the opencast backfill material has not been placed as an engineered fill, however some material placed under engineering control may extend beneath parts of the site adjacent to the Dearne Valley Parkway.

The made ground largely comprised reworked natural materials including mudstone, sandstone, siltstone with occasional coal fragments as would be expected from the backfill of the opencast pit with excavated material. Other materials encountered included rare brick fragments and burnt shale, which are consistent with the former site use as a colliery with spoil materials.

Significant local variation in soil composition and strength has been encountered in the made ground during the site investigation, although it would be generally be the case that strength and relative density increased with depth.

SPT N value of the made ground ranged between 4 and 50. Where high SPT N values (>50) were recorded at shallow depths these are likely to represent obstructions on coarser fractions (boulders and cobbles) within the soil.

The presence of coarser soil fractions (cobbles and boulders) are likely to be underrepresented in the site logging of boreholes and window samples as a result of limited sample volumes.

5.2 Bedrock: Pennine Middle Coal Measures Formation

This stratum comprised an interbedded series of dark brown to dark grey mudstones, siltstones and sandstones with coal seams (usually weathered at the upper surface) and was encountered at a depth of between 1.50m and 54.0m below ground level.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in Table 2.

Table 2 Summary of in-situ test results for Pennine Middle Coal Measures Formation

Soil parameters	Min. Value	Max. Value
SPT 'N' values	53	333
Undrained shear strength inferred from SPT 'N' values (kN/m^2) (s_u = 5xN kN/m^2)	265	1665
Strength term from rock logging	Extremely weak	Medium strong

6. SETTLEMENT ASSESSMENT

6.1 Load Test

Some years ago, during an earlier phase of investigation works, RSK carried out a surcharge load test on the western part of the eastern site area (within Rockingham 3). This comprised the construction of a surcharge soil mound of approximately 40.0m by 55.0m in plan (plus sloping sides) and 5.0m in height. This was designed to apply a load of approximately $100kN/m^2$ across a broad ground surface, which would apply stress to the full depth of opencast backfill. The test was designed to mimic the area and load expected to be exerted by a typical light industrial or commercial building.

To facilitate settlement monitoring two hydrostatic profile gauge (HPG) access pipes were installed in trenches excavated approximately 300mm below the site surface before the surcharge mound was constructed. These passed across the plan footprint of the surcharge mound in two directions and were identified as L1 and L2. The HPG monitoring equipment consists of a probe which traverses a length of the access tubes, and readings are taken at regular intervals. Each round of monitoring is referenced to a datum, and subsequent settlement monitoring readings are reduced to an elevation height (m AOD). The datum is surveyed at

regular intervals during the monitoring period and therefore any potential change in level of the datum is taken into account. HPG monitoring measures settlement in a horizontal plane immediately beneath the surcharge mound, and does not monitor settlement through a vertical profile.

In addition, a borehole extensometer was installed close to the proposed mound's centre, and this was extended upwards through the mound as it was built up with soil. This system uses magnets installed at various depths within the borehole which can move vertically to record settlement at different depths as the surcharge mound is constructed and during subsequent monitoring. The extensometer was installed with five spider magnets at approximate 2.0m intervals between 2.40m and 10.40m bgl (prior to mound construction), and three magnets installed between 13.40m and 20.20m bgl. The datum magnet was installed in advance of the load test within bedrock at around 30.0mbgl.

Monitoring of the induced settlement began with baseline monitoring (prior to mound construction) taking place at the end of February 2016. Monitoring continued whilst the mound was being constructed throughout March, with the last of the material added by mid-April. Following construction of the mound settlement was monitored for a period of approximately nine months. A subsequent reading was taken in February 2020

A graphical representation of the recorded settlement at each of the installed extensometer magnets is provided in Figure 4. The maximum recorded settlements are interpreted to be 75mm occurring between 3 March 2016 to 14 June 2016 with settlement at its maximum to 4.3m below ground level. By 14 February 2020 an additional 15mm of settlement had been recorded brining the total maximum settlement for the load test to 90mm.

The positions of the surcharge mound, the two HPG access pipes and the borehole extensometer are indicated in Figures 2 and 3

6.2 Stiffness Back Calculation

This assessment adopts the software package developed by ARUP; OASYS PDISP 20.0.0.2 to back calculate the stiffness of the backfill at different depths. The displacement outputs from PDISP have been calculated using the Boussinesq method of elastic analysis for vertical movements.

Wherever applicable, the SPT data from the boreholes near the load test mound (BH301, BH301A, BH302, BH501 and BH503) have been used to verify the ground conditions.

The following methodology is adopted in the stiffness back calculation:

1. An upper bound and lower bound settlement at different depths of the backfill have been derived from the extensometer and HPG loop monitoring readings (Figures 3 to 5 Appendix B).
2. As a next step, a ground model has been developed in PDISP simulating the load test. The made ground fill has been divided into several sub-layers. The stiffness of sub-layers has been adjusted manually in PDISP in such a way that the settlement output from PDISP matches with the measured settlements (i.e. extensometer and HPG loops).

In this process, the stiffness and associated settlements have been established through 'bottom-up' method (i.e. from the bedrock upwards), in order not to affect the settlement of any sub-layers beneath it.

This approach has been used for both upper bound and lower bound settlements, and corresponding stiffness profiles have been established. As a realistic approach, an average of these two stiffness profiles is then calculated and assumed to represent the ground conditions at Rockingham 2 and 3.

3. Upon completion of stage 2 as above, the average stiffness profile is then used to predict the settlement at each proposed unit locations across Rockingham 2 and 3 sites.
4. PDISP output displacement profiles were then used to calculate differential settlement across each of the units

The output sheets from the PDISP analyses are presented in Appendix E.

7. RESULTS AND DISCUSSIONS

Table 3 summarises the PDISP modelling input stiffnesses and the output settlement. The actual measured settlement during the Load Test is also shown in Table 3. It should be noted that the measured settlement of 210-216mm directly beneath the Load Test surcharge mound was measured by the HPG loops. In order to accommodate this settlement in PDISP, the MG1 sub-layer must be assigned a stiffness value of 1300-1500 kN/m^2. To verify this, further in situ testing around the Load Test surcharge mound was conducted and it was reported that the undrained shear strength (c_u) of top 0.15m of the made ground ranged between 30 and 90kN/m^2 and increasing with depth. Considering an E_u/c_u ratio of 350, this results in the lowest undrained stiffness of 10500 kN/m^2. Factoring the E_u by 0.8 (i.e. E' = 0.8 E_u), the lowest drained stiffness E' equates to 8400 kN/m^2. This is significantly higher than the stiffness back calculated from PDISP. Therefore, owing to the uncertainty to the HPG loop settlement measurements, a realistic E' value of 5000 kN/m^2 has been assigned to the top layer of the made ground backfill (MG1).

Table 3 PDISP Model input stiffness and output settlement for the Load Test

Strata	BH Extensometer Magnet Level (Top of Strata)	Depth	Measured settlement Lower Bound	Measured settlement Upper Bound	PDISP back calculated Lower Bound Stiffness	PDISP back calculated Upper Bound Stiffnes	Average Stiffness	PDISP Settlement output for Average Stiffness profile
	(mAOD)	(mBGL)	(mm)	(mm)	(kN/m^2)	(kN/m^2)	(kN/m^2)	(mm)
MG1	130.0	0	200	216*	5000	5000	5000	139
MG2	127.6	2.4	90	110	5000	7500	6250	104
MG3	125.7	4.3	70	95	6500	8500	7500	80
MG4	123.7	6.3	50	70	14000	15000	14500	58
MG5	121.2	8.8	36	55	16000	21000	18500	44
MG6	119.6	10.4	28	48	20000	30000	25000	37
MG7	116.6	13.4	20	35	25000	42000	33500	27
MG8	113.6	16.4	15	27	28000	52000	40000	20
MG9	109.8	20.2	12	18	33500	62000	47750	13
BR	100.3	29.7	0	0	50000	100000	75000	0

Significant areas of the proposed Rockingham 2 and 3 development require engineered fill to be placed in order to achieve the final development platform levels. The fill is to be placed under strict engineered control following a detailed specification, which will be supervised, tested and validated. For this reason, a higher effective stiffness of 20000 kN/m^2 has been assumed for the fill material.

It should be noted that the fill material has been considered as a separate competent stratum and the analyses does not account for any self-weight settlement within the fill. The settlement calculations presented in this report are based on assumed building loads only and make no allowance for an ongoing long-term settlement or creep.

The average stiffness profile was then used to estimate maximum settlement (S_{max}) under different surcharge treatments (i.e. different surcharge heights). As a conservative approach, a rebound of 50% of S_{max} has been assumed. Therefore, the estimated net settlement would be 0.5 x S_{max}. Table 4 summarises the estimated maximum and net settlement for a number of surcharge treatment heights.

Table 4 PDISP Model input stiffness and output settlement for the Load Test

Surcharge height (m)	Surcharge (kPa)	Max. Settlement S_{max} (mm)	0.5 x S_{max} (mm)
2.0	40	56	28
2.5	50	70	35
3.0	60	84	42
4.0	80	112	56
5.0	100	140	70

Table 5 below summarises the maximum expected settlement under each proposed unit (SU_{max}) when there was no surcharging prior to constructing the building. At the time of this assessment, it has been assumed that the requirement is to limit the maximum settlement under each unit to 25mm. However, from Table 5 it is evident that all the units result in settlements greater than 25mm, indicating the need for ground improvement.

Therefore, in order to achieve a final settlement of less than 25mm after surcharge treatment, we would require a surcharge height that would satisfy the following criteria:

$SU_{max} - 0.5S_{max} \leq 25$ mm

Table 6 summarises the required surcharge height for different SU_{max} based on the above criteria.

Table 5 Units and calculated settlements under estimated building loads

Phase	Unit	Max settlement of units without treatment SU_{max} (mm)
3	1	57
2	1 & 2	45
3	2	65
2	3	64
2	4	70 to 40
2	4 / Option B	40
2	5	70
2	6	70
2	7	73
2	8	42
2	9	60

The range of settlement across Unit 4 in Table 5 above is high due to its possible position spanning the highwall of the former opencast pit. Option B represents switching the position of Units 3 and 4 so that neither building spans the high wall and each overlies a more consistent thickness of opencast backfill material. This alteration to the layout is **strongly recommended** to avoid an individual building spanning the Elsecar fault and highwall, where significant variations in opencast backfill thickness could potentially result in differential settlement failures.

The max settlement calculation for Unit 3 in Table 5 above assumes that this switch is adopted (i.e. moving this unit to the deeper backfill area). If Unit 3 were to remain in its proposed location maximum settlements of approximately 40mm could be expected.

Table 6 Proposed surcharge height and duration; calculated based on the difference between SU_{max} and $0.5S_{max}$ being less than 25mm (i.e. SU_{max} - $0.5S_{max}$ =< 25mm) [worst-case scenario]

SU_{max} (mm)	Proposed Surcharge Height (m)	Proposed Surcharging period (months)
less than 55	3.0	4 to 6
55 and above	5.0	6 to 8

From the Load Test settlement monitoring data, it is estimated that majority of the settlement would take place within approximately 3 months of construction. Therefore, conservatively a surcharging period of 4 to 6 months is recommended to most of the units. However, where the depth of the made ground is significantly deep (i.e. >35m) a surcharging period of 6 to 8 months is recommended. If timescales for development required shorter surcharge periods this would

only be possible if increased thicknesses of surcharge were used to induce more settlement within shorter timescales. A practical minimum timescale, even if additional surcharging was to be adopted, would likely be of the order of 3 months and this would require additional modelling to be completed.

The modelling has also included calculation of maximum differential movement of foundations at each. The results are presented in Table 7.

Table 7 Units and corresponding surcharge and surcharging periods

Phase	Unit	Max settlement of units without treatment SU_{max} (mm)	Proposed Surcharge Height (m)	Surcharging period (months)	Maximum foundation differential movement	Remarks
3	1	57	5	4 to 6	1 in 604	
2	1 & 2	45	3	4 to 6	1 in 705	
3	2	65	5	6 to 8	1 in 701	
2	3	64	5	6 to 8	1 in 567	
2	4*	70 to 40	5	6 to 8	1 in 512	Highwall
2	4 / Option B	40	3	4 to 6	1 in 963	
2	5	70	5	6 to 8	1 in 511	
2	6	70	5	6 to 8	1 in 510	
2	7	73	5	6 to 8	1 in 552	
2	8	42	5	4 to 6	1 in 1121	
2	9	60	5	6 to 8	1 in 606	

* Unit on top of highwall; one side of the Unit is on approximately 45 m thick made ground, centre of the Unit is on 5 to 7 m thickness of made ground; the other end of the Unit is on a 3m thickness of made ground.

8. CONCLUSIONS AND RECOMMENDATIONS

The settlement calculations presented make the assumption that the self-weight settlement of the made ground is already complete due to its placement over a relatively long period of time (approximately 25 years). However, there is ongoing surface monitoring to provide further information on this potential settlement mechanism, which will be carried out over approximately the next 6 months. If significant self-weight settlement is indicated, this would have to be considered in future settlement modelling.

It should be noted that where new fill is to be placed the material has been considered as a separate competent stratum and the analyses does not account for any self-weight settlement within the fill. The settlement calculations presented in this report are based on assumed building loads only and make no allowance for any ongoing long-term settlement or creep.

The modelling presented above indicates that surcharge treatment will be required for all the proposed Units on Rockingham 2 and 3. Information is also provided on the height of surcharge required and the likely duration of the treatment.

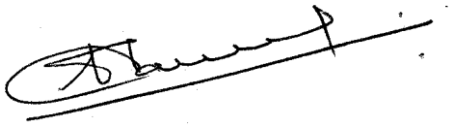
As previously stated, the made ground present on site is opencast backfill and understood to be un-engineered and hence variation in ground conditions highly likely. Therefore, it will be necessary that each of the surcharging operations should be fitted with reliable settlement monitoring instrumentation and be monitored on a regular basis to make sure that the expected settlements are induced within the expected timescales. This monitoring will be critical in determining when sufficient settlement has been induced and the surcharge can be removed.

We trust our services and report are satisfactory and meet with your expectations, if however you have any comments or require additional assistance then please do not hesitate to contact the undersigned.

Yours faithfully

For **RSK Environmental Ltd**





Dr G Sinnathamby

Geotechnical Engineer

Dr T Navaneethan

Associate Technical Director

Enc.

Appendices

Appendix A	Service constraints
Appendix B	Figures and Drawings
Appendix C	Borehole logs
Appendix D	SPT N, Settlement, Stiffness vs Depth Plots
Appendix E	PDISP Output and Foundation Differential Movement Plots

APPENDIX A
SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Harworth Estates Ltd (the "client") in accordance with the terms of a contract between RSK and the "client". The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

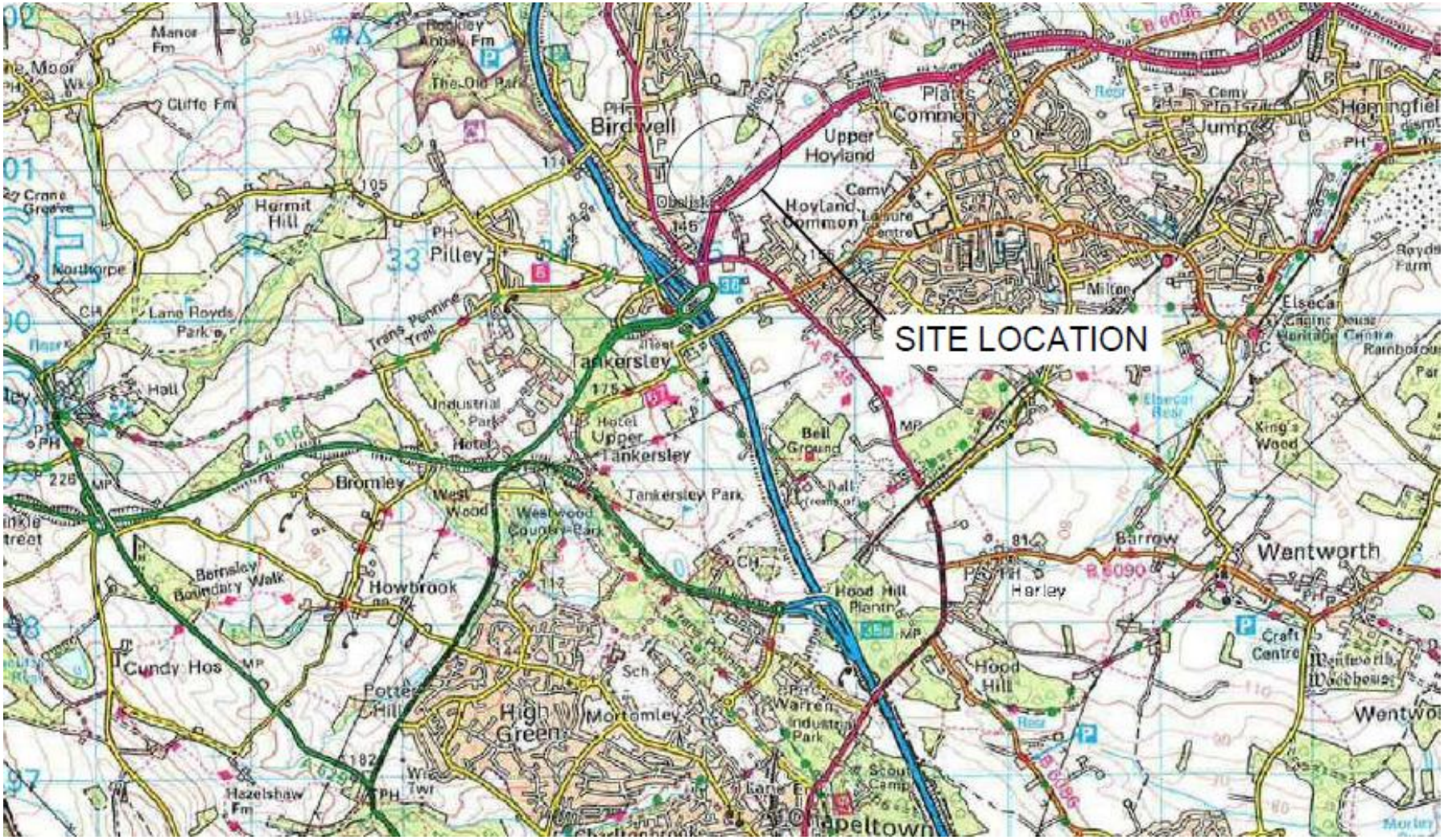
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

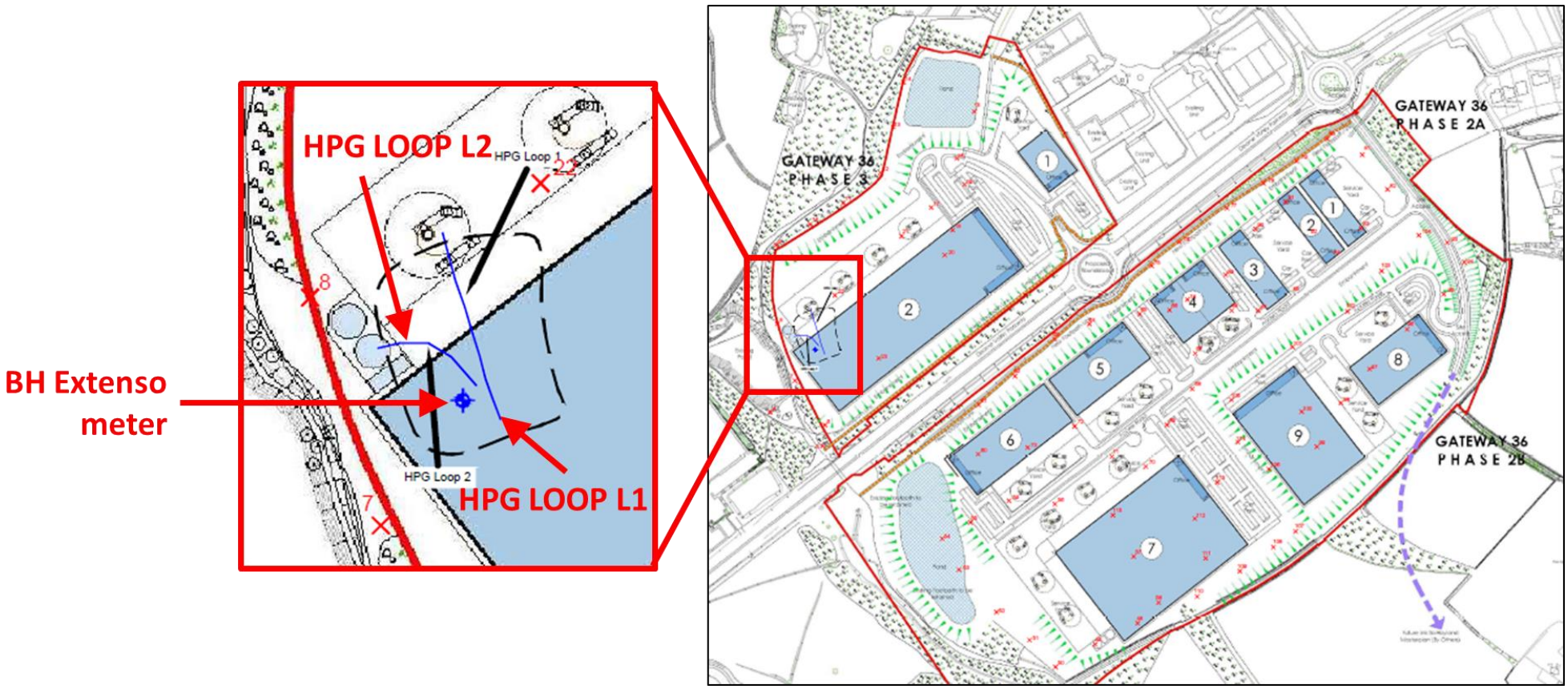
8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information], and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

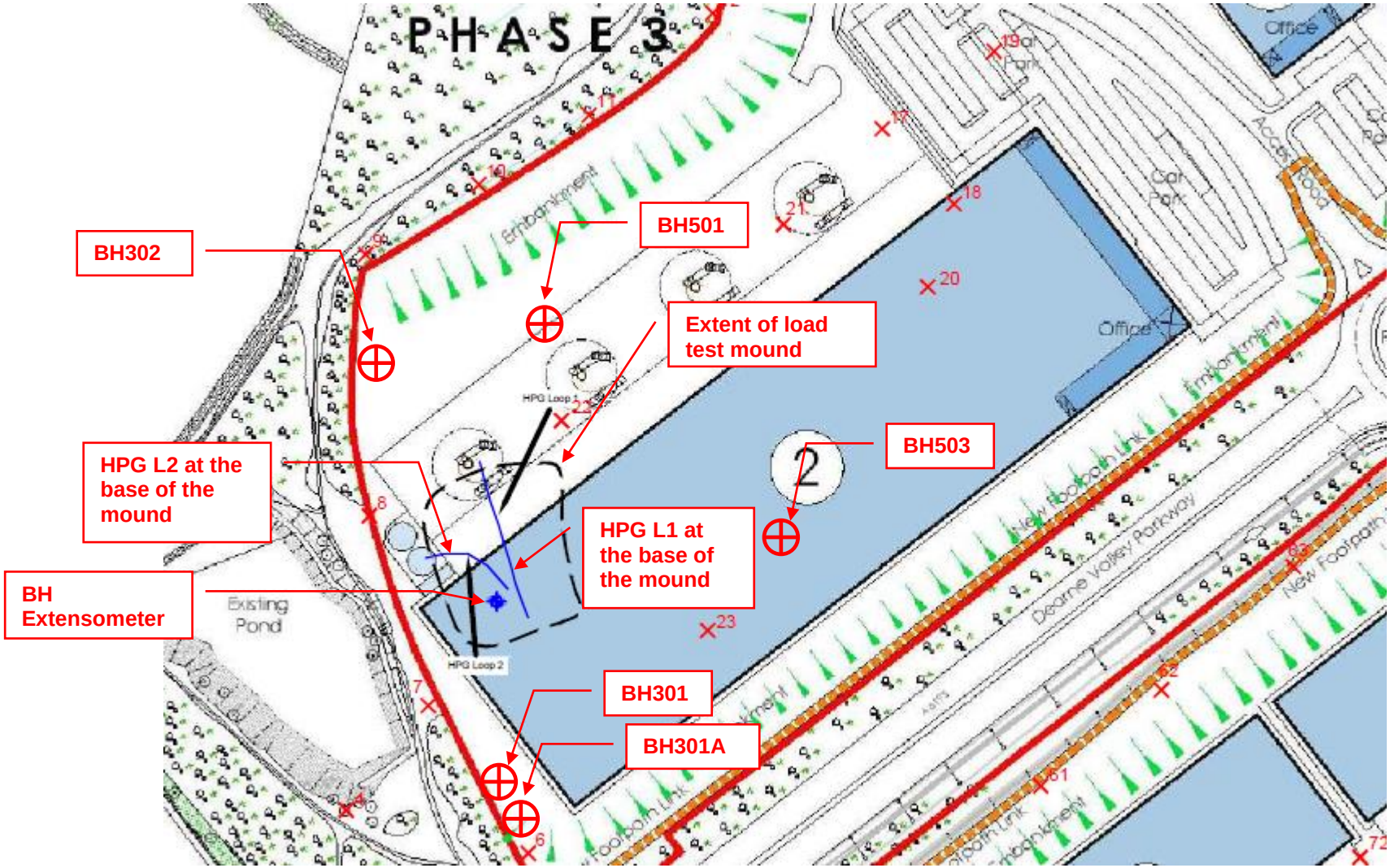
APPENDIX B
FIGURES AND DRAWINGS



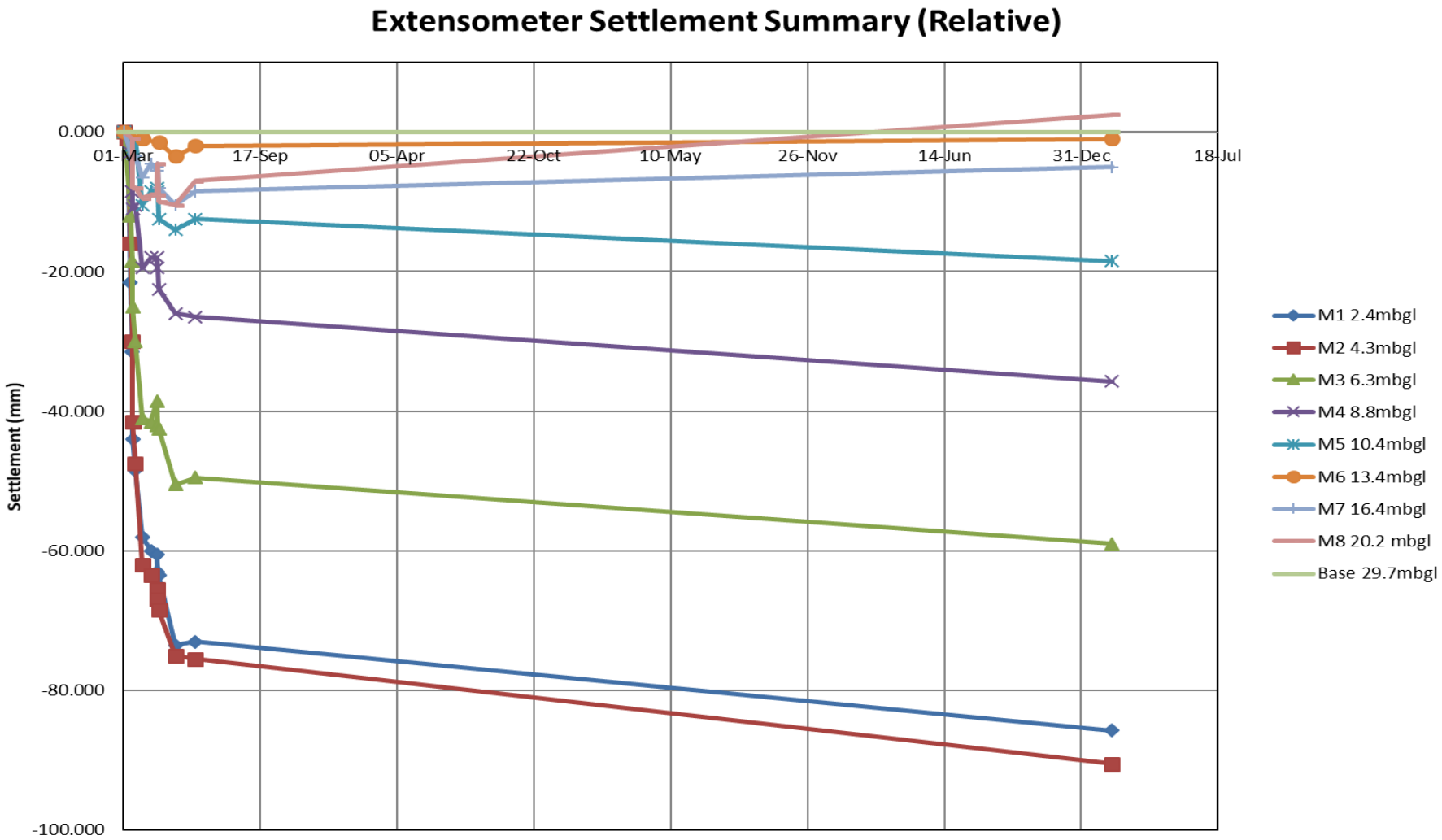
RSK	**LOAD TEST LOCATION AND EXTENSOMETER - HPG LOOP ARRANGEMENT**	**Client:**	Harworth Estates	**Figure No:**	**1**
		Site:	Rockingham 2-3	**Job No:**	**372079**
		Scale:	NTS	**Source:**	



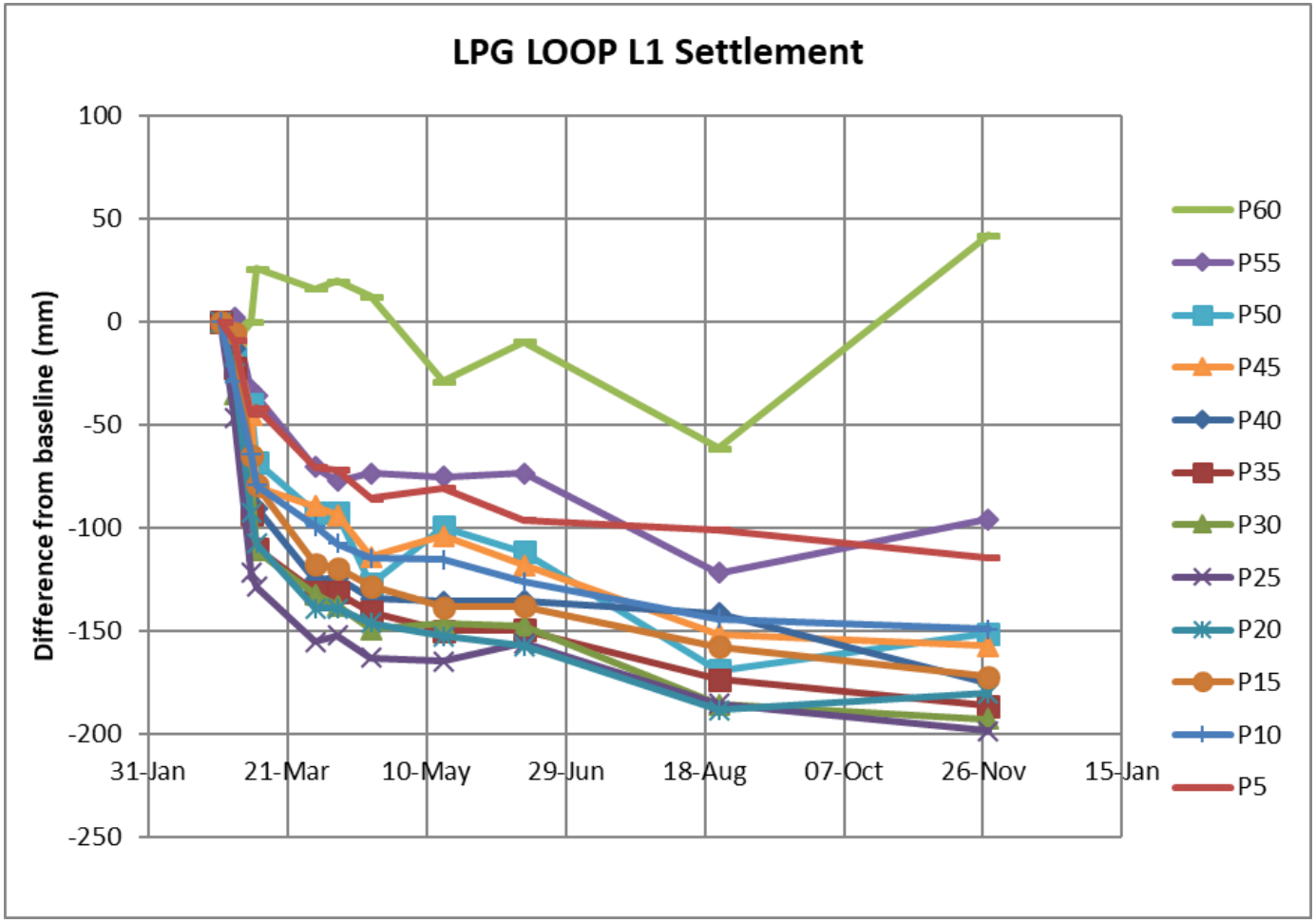
RSK	**LOAD TEST LOCATION AND EXTENSOMETER - HPG LOOP ARRANGEMENT**	**Client:**	Harworth Estates	**Figure No:**	**2**
		Site:	Rockingham 2-3	**Job No:**	**372079**
		Scale:	NTS	**Source:**	



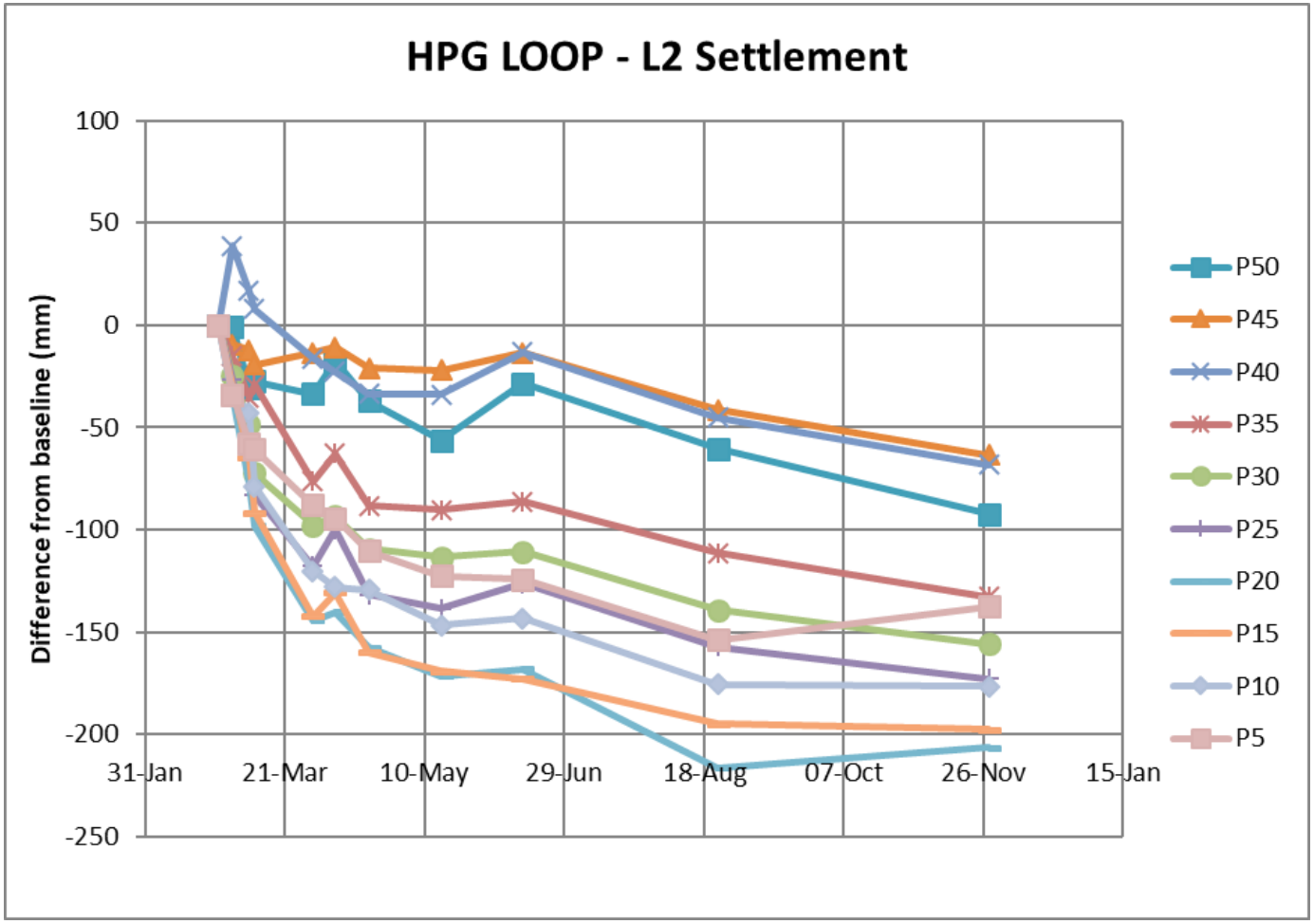
RSK	**LOAD TEST AND NEARBY BORE HOLE LOCATIONS (RSK DWNG. 322638 FIG.5)**	**Client:** Harworth Estates	**Figure No:** 3
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:**



RSK	**BOREHOLE EXTENSOMETER SETTLEMENT SUMMARY**	**Client:** Harworth Estates	**Figure No:** 4
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:**



RSK	**HPG LOOP L1 SETTLEMENT SUMMARY**	**Client:** Harworth Estates	**Figure No:** 5
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:**



RSK	**HPG LOOP L2 SETTLEMENT SUMMARY**	**Client:** Harworth Estates	**Figure No:** 6
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:**

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NOTES

Cut/Fill Depth By Colour Banding			
Number	Minimum Elevation	Maximum Elevation	Colour
1	-12.00	-10.00	
2	-10.00	-8.00	
3	-8.00	-6.00	
4	-6.00	-4.00	
5	-4.00	-2.00	
6	-2.00	0.00	
7	0.00	2.00	
8	2.00	4.00	
9	4.00	6.00	
10	6.00	8.00	
11	8.00	10.00	
12	10.00	12.00	

Site Specific
Maximum Cut Depth: -4.93m
Maximum Fill Build-Up: 7.49m

PROPOSED LEVELS

Cut/Fill In Brief
Cut: 112546.29 Cu. M.
Fill: 109425.07 Cu. M.
Net Surplus: 3121.22 Cu. M.

Site Perimeter Has Battered To Existing Levels At 1:3.

This Is A Site-Wide Cut/Fill Analysis And Should Not Be Relied Upon For Final Design. Further Detailed Design May Be Required.

Gradients And Spot Elevations Displayed Reflect The Proposed Finished Floor Levels.

A 300mm Site Strip Was Calculated And Removed Prior To The Cut/Fill Analysis.

A Site Strip Volume of 27261.47 Cu. M. Has Been Calculated.

Attenuation Volume Has Been Accounted For In The Cut/Fill Analysis.

A 5% Bulking Factor Has Been Accounted For In The Cut/Fill Analysis.

Areas Not Shaded With The Cut/Fill Colour Banding Have Not Been Included In The Cut/Fill Analysis.

The Topography Used In The Cut/Fill Analysis Has Been Generated From 'Greenhatch Group, Topographical Survey, Drawing No. 20379_OGL_Rev_3. Date 05-06.06.14'

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Cut/Fill Analysis	1.000	1.000	90871.57sq.m	97663.14 Cu. M.	109425.07 Cu. M.	11761.94 Cu. M.<Fill>
Attenuation				10000.00 Cu. M.	0000.00 Cu. M.	10000.00 Cu. M.<Cut>
Bulking Factor (5%)				4883.15 Cu. M.	0000.00 Cu. M.	4883.15 Cu. M.<Cut>
Total				112546.29 Cu. M.	109425.07 Cu. M.	3121.22 Cu. M.<Cut>

Analysis has been performed using topographical surface generated from 'Greenhatch Group, Topographical Survey, Drawing No. 20379_OGL_Rev_3, Date 05-06.06.14'.

Analysis has incorporated a 300mm site strip, and so site strip volume is not included in the calculation above.

The total site strip volume calculated is 27261.47 Cu. M.

Analysis has included attenuation volume.

Analysis has included a 5% bulking factor.

REV	DESCRIPTION	DATE	BY
P02	ARCHITECT LAYOUT ALTERATION.	29.11.19	OLT
P01	FIRST ISSUE.	10.10.19	OLT

Project
ROCKINGHAM PHASE 3,
ROCKINGHAM 2&3,
HOYLAND

Drawing Title
PHASE 3 CUT/FILL ANALYSIS

INFORMATION ISSUE

Architect
THE HARRIS PARTNERSHIP

JPG
www.jpg.group
Leeds London Birmingham 0113 263 1155

JPG Project Ref	Scale at A0	Date	Checked	Drawn
4652-2	1:1000	OCT19		OLT

4652-2 - JPG - SW - 00 - DR - C - 1203 | S2 | P02

Legend:

2019 Boreholes:

- Cable Percussive Borehole (RSK, 2019)
- Rotary Boreholes (RSK, 2019)
- Trial Pits (RSK, 2019)
- Window Sampling Location (RSK, 2019)

Previous SI Location:

- Cable Percussive Borehole (RSK, February 2014)
- Rotary Borehole With Limited Coring (RSK, June 2014)
- Trial Pit (RSK)

Proposed Borehole Locations:

- Cable Percussive Borehole
- Rotary Borehole

Depth Of Fill		
Minimum Depth	Maximum Depth	Color
0.000	5.000	
5.000	10.000	
10.000	15.000	
15.000	20.000	
20.000	25.000	
25.000	30.000	
30.000	35.000	
35.000	40.000	
40.000	45.000	
45.000	50.000	
50.000	55.000	
55.000	60.000	
60.000	65.000	
65.000	70.000	

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	09/01/2020	Rotary Boreholes	DR	AC	AC
00	03/10/2019	First Draft	FC	AC	AC

Rockingham Infrastructure

RSK

TITLE:

Proposed Borehole Locations and Depth of Backfill

0 50 100
Metres

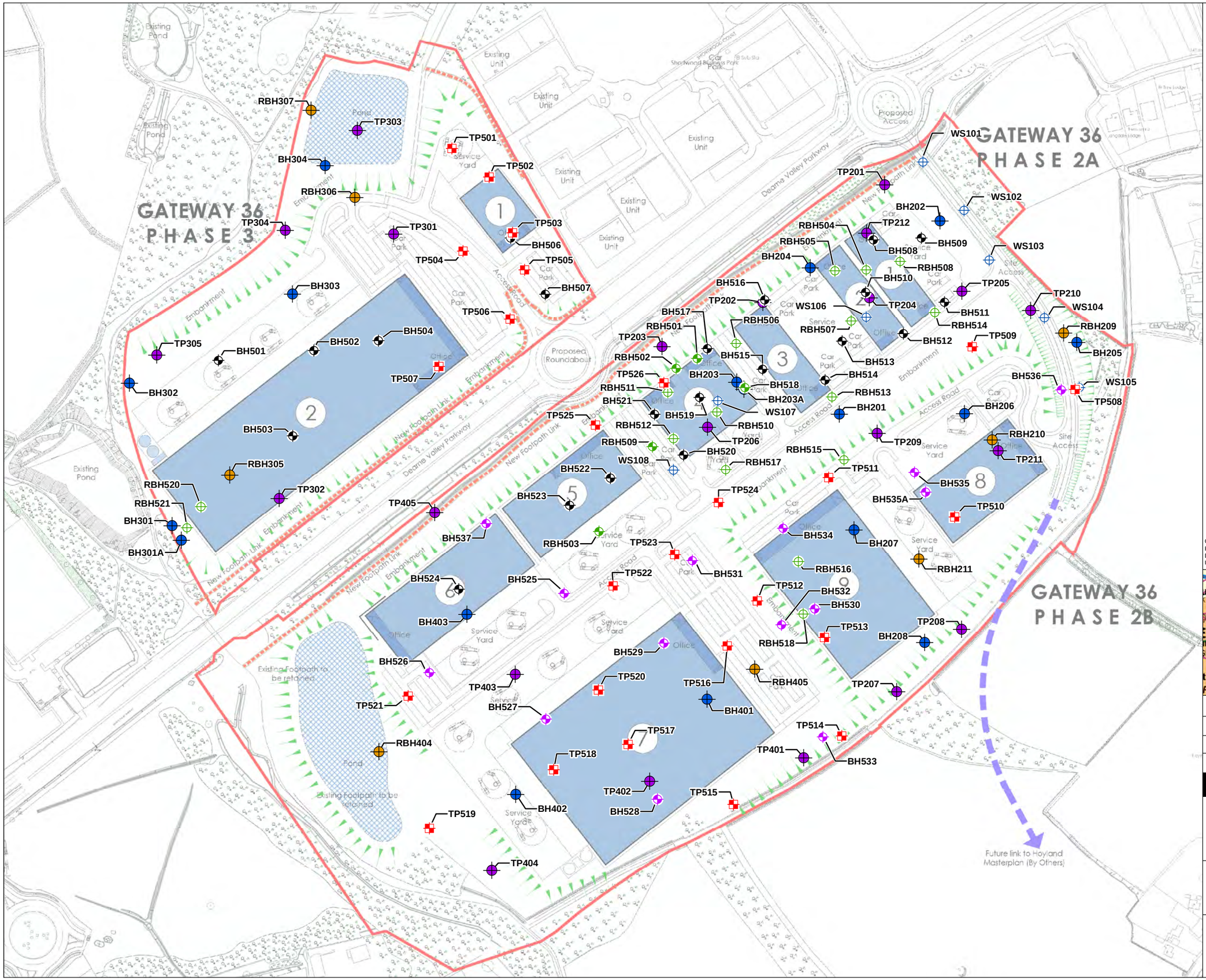
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N W E S

REV 01

Document Path: P:\Geoscience\322600 - 322699\322638 - Rockingham Phases 1-4\5. Drawings and figures\GIS\Proposed Borehole Locations and Depth of Backfill.mxd

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Legend:

Previous SI Location:

- Cable Percussive Borehole (RSK, February 2014)
- Rotary Borehole With Limited Coring (RSK, June 2014)
- Trial Pit (RSK)

2019 Boreholes:

- Cable Percussive Borehole (RSK, 2019)
- Rotary Boreholes (RSK, 2019)
- Trial Pits (RSK, 2019)
- Window Sampling Location (RSK, 2019)

2020 Borehole:

- Cable Percussive Borehole (RSK, 2020)
- Rotary Borehole (RSK, 2020)

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	20/02/2020	Aditional Rotary Borehole	NH	AC	AC
00	03/10/2019	First Draft	FC	AC	AC

Rockingham Infrastructure

RSK

TITLE:

Figure 5 -
Proposed Layout With
Proposed Borehole Locations

0 50 100
Meters

SCALE: 1:3,000 @ A3

N
W E
S

REV 01

Document Path: P:\Geoscience\322600 - 322699\322638 - Rockingham Phases 1-4\5. Drawings and figures\GIS\Figure 5 - Proposed Development With Proposed Borehole Locations.mxd

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APPENDIX C
BOREHOLE LOGS

STRUCTURAL SOILS

TRIAL PIT LOG

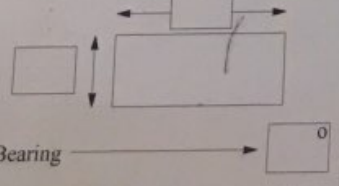
Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP01

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests +HV				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
0									
0.45	1	B	@ 0.45m 30/31/32			GL - 0.45 soft light greyish brown slightly sandy CLAY with frequent rootlets (TOPSOIL) Sand f-c. Gravel is A-SA f-c of SST + mudstone.			
0.60			@ 0.60m 38/40/36						
0.75			@ 0.75m 100/75/58.						
1.00			@ 1.00 95/99/90			0.45 - 1.00 Firm light mottled orange grey slightly sandy slightly gravelly CLAY. Sand f-c Gravel is angular to subrounded f-c of SST and pot. mudstone frags.			
						... From 0.70m, becomes friable.			
						... From 0.95m, becomes very gravelly. Gravel A-SA f-c of mudstone fragments.			

General Remarks: Water seepage at 0.25m.
Hand vanes.
@ 0.15m = 100kPa @ 0.30m = 90kPa @ 0.45m / 0.60m / 0.75 / 1.00m = 130kPa +.

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By	Checked By

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP02

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests HV				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			@0.25m 10			GL - 0.40m Dark greyish brown slightly sandy slightly gravelly CLAY with frequent rootlets (TOPSOIL). Sand f-c Gravel A-SA f-c of SST, limestone.			
0.40	2	B	@0.40 25/26/28			0.40 - 0.90 Firm - stiff light orangish grey brown slightly sandy slightly gravelly CLAY. Sand f-c. Gravel A-SR f-c of SST and potential mudstone and siltstone limorelicts			
			@ 0.55m 50/			... Becomes friable @ 0.60m.			
			0.70m 70/			... Becomes very gravelly @ 0.80m			
			0.80 90/65/55			Gravel A-SA f-c of mudstone and sandstone.			

General Remarks: • Water seepage at 0.20m
• Dry from 0.45m
• Terminated at 0.90m due to becoming very gravelly and friable giving unreliable HV readings. Results → 0.25m = 110kPa / 0.40m / 0.55m / 0.70m / 0.90m = 130kPa +

Plan (Not to Scale)

Bearing → 0

Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By BU	Checked By

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STRUCTURAL SOILS

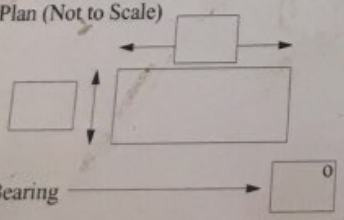
TRIAL PIT LOG

Contract: Rockingham S1	Client:	Trial Pit Ref: TP03
Contract Ref: 765071	Date: 26/2/20	Ground Level (	Co-Ordinates:	Sheet: 1 of 1

Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			@0.15m 20/			GL-0.45m Dark greyish brown slightly sandy slighty gravelly CLAY with frequent rootlets. Sand f-c. Gravel is A-SA f-c of SST, limestone. (TOPSOIL)			
			0.30m 20/						
			@0.45m 55/						
			@0.60m 58/			0.45-0.95m Firm light orangish grey brown slightly sandy slighty gravelly CLAY. Sand f-c. Gravel is A-SA f-c of SST, mudstone + low dense slag like material.			
			@0.75 30/						
			0.85m 35/						
			0.95m 40/35/32						
						... At 0.50m cobble of mudstone.			
						... At 0.55m clay becomes very friable (dry).			
						... At 0.70 clay becomes very gravelly of A-SA f-c mudstone + SST.			
						... At 0.85m, cobble of SST.			

General Remarks: Water seepage @ 0.20m and @ 0.90m
Terminated @ 0.95m due to very gravelly friable clay giving unreliable readings.
Hand Vanes → @0.15m = 90kPa / 0.30m = 120kPa / 0.45m / 0.60m / 0.75m / 0.85m / 0.95m = 130kPa +

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By	Checked By

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP04

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
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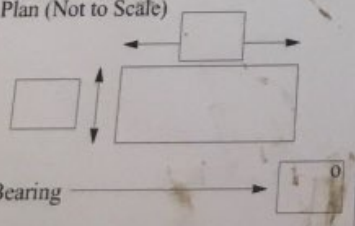
Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			@ 0.15m 13/			GL - 0.30 Soft dark greyish brown slightly sandy gravelly CLAY. Sand f-c. Gravel is A-SR f-c of SST, mudstone (TOPSOIL).			
			@ 0.30m 70/			0.30 - 0.90 Firm dark orangish grey brown slightly sandy gravelly friable CLAY Sand f-c. Gravel is A-SR f-c of SST, mudstone and possible siltstone			
			@ 0.45 60						
			@ 0.60m 55/						
			@ 0.75m 60/						
			0.90 70/						
						@ 0.90m, brick frags.			
						@ 0.85, became very gravelly clay.			

General Remarks: Slight seepage @ 0.40m.

Very gravelly + Very friable from 0.85m, causing unreliable readings

Hand Vanes
@ 0.15m = 95kPa
@ 0.30m / 0.45m / 0.60m / 0.75m / 0.90m = 130kPa +

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By BU	Checked By

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP05

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			@ 0.15m			GL - 0.35m Soft dark greyish brown slightly sandy slightly gravelly CLAY with frequent rootlets. (TOPSOIL)			
			@0.35m 70/			0.35 - 0.85m Firm to stiff light orangish grey brown slightly sandy gravelly very friable CLAY. Sand f-c. Gravel is A-SR f-c of SST, mudstone frags (reworked)..			
			@0.50m 80/			... From 0.50, occasional cobbles of mudstone.			
			0.65 95/			... At 0.85m -, becomes very gravelly. Gravel A-SA f-c of mudstone.			
			0.80m 105/						

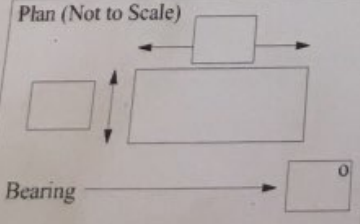
Sand f-c. Gravel is A-SR f-c of SST, mudstone and pot coal.

General Remarks: Water seepage @ 0.20m

Terminated at 0.85, very difficult digging and unreliable HV readings in very gravelly & friable clay.

Hand Vanes 0.15m = 110KPa | @ 0.35m / 0.50m / 0.65m / 0.80m = 130KPa +

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By	Checked By

Template release: 19/04/2013 17:22:31

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSM	TP06

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

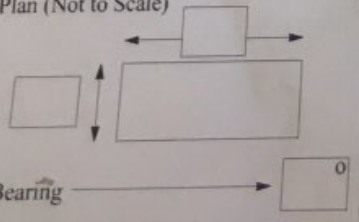
Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			0.15m 15/						
		190+	0.30 50/			GL - 0.30 Soft dark greyish brown slightly sandy gravelly CLAY with frequent rootlets. (TOPSOIL) of SST + pot coal frags. ← Sand f-c. Gravel A-SA f-c			
		190+	0.45m 70/						
		190+	0.60m 50/						
		190+	0.75m 80/						
		190+	0.80m 40/						
						0.30 - 0.85m Firm dark orangish grey brown slightly sandy slightly gravelly very friable CLAY with occasional rootlets. Sand f-c. Gravel is A-SA f-c of SST, mudstone and coal frags.			

General Remarks: • Water seepage at 0.20m. • Very friable clay from 0.80m causing hand vanes to become unreliable.
• Dry from 0.30m.

Hand vanes

@ 0.15m = 40kPa | @ 0.30m = 130kPa+ | @ 0.45m @ 0.60 @ 0.75m @ 0.80m = 130kPa+

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By	Checked By

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP07

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

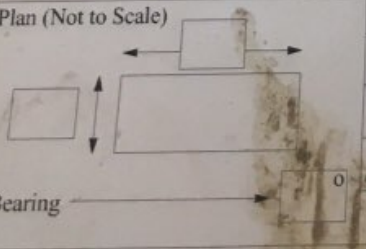
Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			0.15m			GL-0.10m (TOPSOIL) Soft dark greyish			
		140+	10			brown slightly sandy slightly gravelly			
			0.30			CLAY with frequent rootlets. Sand f-c.			
		190	60			Gravel is A-SA f-c of SST, potential			
			0.45			coal + mudstone.			
		140+	15			0.10-0.90m Firm dark orangish			
			0.60						
		190+	6			grey brown slightly sandy slightly gravelly			
			0.75			friable CLAY with occasional rootlets.			
		190+	30			Sand f-c. Gravel A-SA f-c of SST, mudstone			
						and coal frags.			
						... At 0.75, becomes v. gravelly			
						and very friable.			
						... At 0.90m, potential mudstone			
						cobble.			

General Remarks: Seepage at 0.10m, becomes dry and friable at 0.20m.

Hand Vane Results

@ 0.15m = 100kPa @ 0.30m/0.45m/0.60m/0.75m = 130kPa.

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By	Checked By
		BU	

Template release: 19/04/2013 17:22:31

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP08
Contract Ref:	**Date:**	**Ground Level ( ) / Co-Ordinates:**	**Sheet:**
765071	26/2/20		1 of 1

Samples and In-situ Tests HV				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
		MC +	0.15m 110			0-0.50 (TOPSOIL) Soft light greyish brown slightly sandy CLAY with frequent rootlets. Sand is f-C.			
		190+	0.30m 90						
		190+	0.45 60						
			0.60			0.50-0.90 Soft to firm light orangish grey brown sandy gravelly friable CLAY. Sand f-c Gravel A-SA f-c of mudstone, coal, SST. ... Becomes very friable from 0.65m			
		190+	0.75m 90						
		140+	0.90 60						

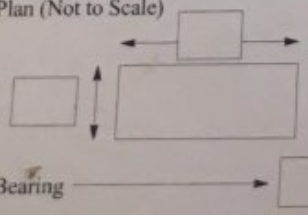
General Remarks: Seepage at 0.10m and 0.70m.

Hand Vanes

@ 0.15m = 130kPa @ 0.30m = 130kPa @ 0.45m = 130kPa+ @ 0.60m = 130kPa+

@ 0.75m = 130kPa+ @ 0.85m = 130kPa+

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP09

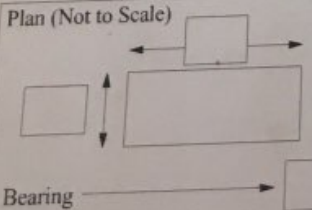
Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			0.15m 130 kPa.			0 - 0.30m (TOPSOIL) Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets.			
		140+	0.30m 42						
		140+	0.45m 36						
			0.60m						
			0.75m			0.30 - 0.90m Firm dark orangish black brown sandy gravelly friable CLAY with occasional rootlets. Sand f-c Gravel is A-SE f-c of coal, SST mudstone and occasional brick frags. ... Became very friable from 0.80m.			
		140	0.90m 30						

General Remarks: Water seepage @ 0.20m.

Hand Vanes
@ 0.15m = 120kPa | @ 0.30m = 130kPa+ | @ 0.45m = 130kPa+ | @ 0.60m = 130kPa+ |
@ 0.75m = 130kPa | @ 0.90m = 130kPa+ |

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By BU	Checked By

Template release: 19/04/2013 17:22:31

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP10
Contract Ref:	**Date:**	**Ground Level ( )**	**Co-Ordinates:**	**Sheet:**
765071	26/2/20			1 of 1

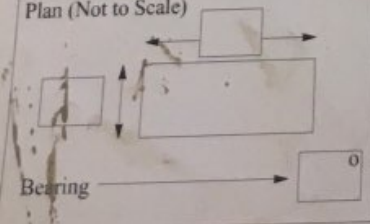
Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
		HV 1.5m				0 - 0.30 (TOPSOIL) Soft dark brown slightly sandy gravelly CLAY with frequent rootlets.			
		190+	40						
		0.70m							
		190+	50			0.30 - 0.70 Light grey slightly clayey A-SA M-C GRAVEL of limestone.			
						... At 0.30m, cobble of brick			
						0.70 - 0.90 Firm dark mottled orangish grey brown slightly sandy gravelly friable CLAY. Sand f-c. Gravel is A-SA f-c of SST and mudstone.			
						Refusal @ 0.90m on very gravelly friable CLAY.			

General Remarks: Water seepage at 0.60m.

Hand vane Results

@ 0.15m = 100kPa @ 0.70m = 130kPa+

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By BU	Checked By

Template release: 19/04/2013 17:22:31

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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Client:	Trial Pit Ref:
Rockingham S11	RSK	TP11

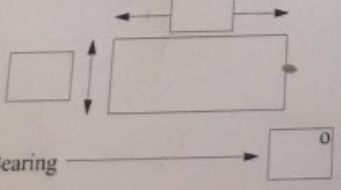
Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests HV				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			0.15m			0-0.10m (TOPSOIL) Soft light greyish brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand f-c. Gravel is A-SR f-c of SST and mudstone.			
			0.30m						
		190+	90						
			0.45m						
		190+	20						
			0.60m						
			130						
						0.10-0.70 Firm light orangish mottled grey brown slightly sandy slightly gravelly friable CLAY. Sand is f-c. Gravel is A-SA f-m of SST, coal, mudstone			
						Refusal @ 0.70m on potential SST cobble.			

General Remarks:
- Water seepage at 0.15m.
- Trial pit terminated at 0.70m on potential SST cobble.
- Hand Vane Results

@ 0.15m - 50kPa @ 0.30m = 130+kPa @ 0.45m = 130kPa @ 0.60m = 130 kPa

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:

Method Used	Plant Used	Logged By BH	Checked By

Template release: 19/04/2013 17:22:31

Scanned with CamScanner

STRUCTURAL SOILS

TRIAL PIT LOG

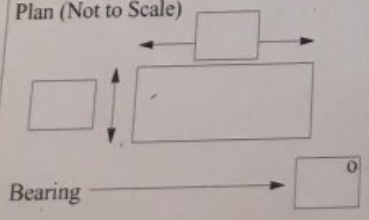
Contract:	Client:	Trial Pit Ref:
Rockingham S1	RSK	TP12

Contract Ref:	Date:	Ground Level ( )	Co-Ordinates:	Sheet:
765071	26/2/20			1 of 1

Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Reduced Level? YES | NO	Depth (Thickness)	Legend
Depth	No	Type	Results						
			HV 0.15m 60			0 - 0.10m. (TOPSOIL) Soft light greyish brown slightly sandy gravelly CLAY with frequent rootlets. Sand f-c. Gravel is A-SA f-c of SST + mudstone.			
			0.30m						
		190+	80						
			0.95m						
		190+	40						
			0.60m			0.10 - 0.70 Firm - stiff dark orange mottled greyish brown sandy gravelly very friable CLAY. Sand f-c. Gravel is A-SA f-c of mudstone, lithorelicts, coal, SST.			
		190+	50						
			[redacted]			.... At 0.70, clay [redacted] very friable becoming gravel of mudstone.			

General Remarks: Water seepage at 0.10m.
Trial pit terminated at 0.70m on potential mudstone cobble.
Hand vanes difficult to order take @ 0.70m in very friable clay above mudstone cobble.

Plan (Not to Scale)



Tools used, e.g. hand vane (Record on 1st log of day):

Device:	Serial Number:	Manufacturer:
Geonor H-60	72789	
Vane borer		

Method Used	Plant Used	Logged By BU	Checked By

Template release: 19/04/2013 17:22:31

Scanned with CamScanner

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates Investments Ltd**	**BH301**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
321393	**12.02.14**	**---**	**---**	**1** of **1**
	End: **12.02.14**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL comprising soft brown slightly gravelly clay with many rootlets. Gravel is fine to coarse angular to subrounded of mudstone, sandstone and siltstone	0.40	
0.50-1.20	1	B				MADE GROUND (comprising soft to firm orange/brown gravelly clay. Gravel is fine to coarse angular to subangular of mudstone, sandstone and siltstone)	(1.40)	
1.20-1.65	1	SPT(c)	N=22				1.80	
2.00-2.45	2	SPT(c)	N=34			MADE GROUND (comprising firm to stiff dark grey very gravelly clay. Gravel is fine to coarse angular to subangular of mudstone, sandstone and siltstone with some coal)		
2.00-2.45	3	B						
3.00-3.11	3	SPT(c)	25/50 for 35mm				(3.70)	
4.00-4.45	4	SPT(c)	N=25					
4.00-4.45	5	B						
5.00-5.45	5	SPT(c)	N=50					
5.00-5.45	6	B					5.50	
5.60-5.83	6	SPT(c)	25/39,11 for 75mm			MADE GROUND (light grey mudstone suspected boulder)	5.60	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
3.10	3.40	01:00
5.50	5.60	01:00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Groundwater was not encountered.
3. Terminated at 5.60m and moved 2.00m north (see log BH310A) due to mudstone obstruction.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**JB Site Investigations**	**EJones**	

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0001 | Log CABLE PERCUSSION LOG | 321393 - ROCKINGHAM.GPJ - v8_05 | 23/09/14 - 10:56 | FC.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726633, Fax: 01928 726606, Web: www.rsk.co.uk.

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates Investments Ltd**	**BH301A**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
321393	**13.02.14**	**129.48**	**E:435281.7 N:400992.6**	**1** of **1**
	End: **13.02.14**			

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL comprising soft brown slightly gravelly clay with many rootlets. Gravel is fine to coarse angular to subrounded of mudstone, sandstone and siltstone	0.40	
						MADE GROUND (comprising soft to firm orange/brown gravelly clay. Gravel is fine to coarse angular to subangular of mudstone, sandstone and siltstone)	(1.40)	
							1.80	
						MADE GROUND (comprising firm to stiff dark grey very gravelly clay. Gravel is fine to coarse angular to subangular of mudstone, sandstone and siltstone with some coal)	(3.90)	
							5.70	
						MADE GROUND (light grey mudstone, suspected boulder)	6.00	
6.00-6.15	1	SPT(c)	25/50 for 75mm					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
5.70	6.00	01:00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Groundwater was not encountered.
3. Standpipe installed to 6.00m: 3.00m plain, 3.00m slotted.
4. Terminated at 6.00m due to mudstone obstruction.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**JB Site Investigations**	**EJones**	

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0001 | Log CABLE PERCUSSION LOG | 321393 - ROCKINGHAM.GPJ - v8_05 | 23/09/14 - 10:57 | FC.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 725633, Fax: 01928 726006, Web: www.rsk.co.uk.

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates Investments Ltd**	**BH302**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
321393	**13.02.14**	**122.87**	**E:435237.7 N:401125.4**	**1** of **1**
	End: **13.02.14**			

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over TOPSOIL comprising soft brown slightly gravelly clay. Gravel is fine to coarse angular to subrounded of mudstone, sandstone and siltstone	0.40	
0.60-0.80	ES1	ES	Tub+2xJ+2xV			MADE GROUND (comprising firm to stiff grey mottled brown/orange gravelly clay. Gravel is fine to coarse angular to subangular of sandstone and mudstone)	(0.80)	
0.80-1.00	1	B					1.20	
1.20-1.65	1	SPT(c)	N=15			MADE GROUND (comprising firm black friable very gravelly clay. Gravel is fine to coarse angular to subangular of mudstone, sandstone, coal and rare brick fragments)		
1.20-1.65	2	B				. . . becomes more brown with fewer coal gravel from 1.40m with bands of black coal rich gravel		
2.00-2.45	2	SPT(c)	N=29					
2.00-2.45	3	B						
3.00-3.45	3	SPT(c)	N=27					
3.00-3.45	4	B					(5.30)	
4.00-4.45	4	SPT(c)	N=28					
4.00-4.45	5	B						
5.00-5.45	5	SPT(c)	N=25					
5.00-5.45	6	B						
							6.50	
6.50-6.64	6	SPT(c)	25/50 for 60mm			MADE GROUND (comprising light grey mudstone recovered as slightly clayey angular mudstone cobbles and gravel (suspected boulder))	6.70	
6.70-6.83	7	SPT(c)	25/50 for 55mm					

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress

From	To	Duration (hh:mm)
3.70	4.00	00:45
6.50	6.70	01:00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Standpipe installed to 6.00m: 3.00m plain, 3.00m slotted.
3. Terminated at 6.70m due to mudstone obstruction.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**JB Site Investigations**	**EJones**	

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0001 | Log CABLE PERCUSSION LOG | 321393 - ROCKINGHAM.GPJ - v8_05 | 23/09/14 - 10:57 | FC.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk.

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH501**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **17.10.19**	**124.26**	**E:435312.7 N:401144.9**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.25	1	D				MADE GROUND: Grass over soft to firm sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of mixed lithologies. (MADE GROUND)	(1.20)	
0.50	2	B						
0.60	3	D						
0.90	4	D				. . . 0.80m, becoming firm and firm to stiff.	1.20	
1.20	5	D				MADE GROUND: Soft to firm dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone, burnt shale and coal fragments. (MADE GROUND)	(0.80)	
1.20-1.65	6	SPT(c)	N=12					
1.20	7	B					2.00	
2.00	8	D				MADE GROUND: Light grey gravelly mudstone BOULDER. (MADE GROUND)	(0.50)	
							2.50	
2.50-2.95	9	SPT	N=28			MADE GROUND: Dense grey red and black silty angular to subangular fine to coarse GRAVEL of mudstone, burnt shale, brick and coal fragments. (MADE GROUND)	(0.50)	
2.50	9	DSPT					3.00	
3.00	10	D				MADE GROUND: Stiff to very stiff black slightly sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone. (MADE GROUND)	(1.00)	
3.50-3.95	11	SPT	N=21					
3.50	11	DSPT						
3.50-3.95	12	B					4.00	
4.00	13	D				MADE GROUND: Soft to firm light grey silty CLAY with high cobble content of mudstone. (MADE GROUND)	(2.50)	
4.50-4.90	14	SPT	N=60*					
4.50	14	DSPT						
4.50-4.95	15	B						
6.00-6.45	16	SPT	N=10					
6.00	16	DSPT					6.50	
7.00	17	B				MADE GROUND: Very dense grey very clayey slightly sandy angular to subangular fine to coarse GRAVEL of siltstone with low cobble content. (MADE GROUND)	(2.50)	
7.50-7.85	18	SPT	N=61*					
7.50	18	DSPT						
8.50	19	B					9.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/10/19		3.00	3.00		Dry
17/10/19		3.00	3.00		Dry
17/10/19		13.45	4.50		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
2.30	2.50	00:45
7.40	7.60	00:45
12.80	13.00	00:50

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 13.00m depth on completion. Response zone 9.00m to 13.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ACox**	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 14/01/20 - 16:33 | EOR1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH501**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **17.10.19**	**124.26**	**E:435312.7 N:401144.9**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.41	20	SPT(c)	N=34			MADE GROUND: Firm grey sandy gravelly CLAY with moderate cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone with rare coal fragments. (MADE GROUND)	(1.50)	
9.00-9.45	21	B						
10.00	22	D					10.50	
10.50-10.95	23	UT	50 blows 100% recovery			MADE GROUND: Firm to stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone with rare coal fragments. (MADE GROUND)	(1.00)	
11.00	24	D					11.50	
11.50	25	B				MADE GROUND: Dense to very dense grey clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and siltstone with a moderate cobble content. (MADE GROUND)	(1.95)	
12.00-12.45	26	SPT(c)	N=41					
12.50	27	B						
13.00-13.42	28	SPT	N=56*				13.45	
13.00	28	DSPT				Cable percussion borehole terminated at 13.45m depth due to gas egress from borehole.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

4. 50mm diameter gas/groundwater monitoring well complete with flush protective cover installed to 3.00m depth on completion. Response zone 1.00m to 3.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**Central Alliance**	**ACox**	AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 14/01/20 - 16:33 | EOR1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**1** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				MADE GROUND: Grass over firm to stiff brown slightly sandy slightly gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mixed lithologies. (MADE GROUND)	(2.00)	
0.50-1.20	2	B						
1.20-1.65	3	SPT	N=17					
1.20-1.65	3	DSPT						
1.20-1.65	4	B					2.00	
2.00-2.45	5	SPT	N=23			MADE GROUND: Firm black and brown gravelly CLAY. Gravel is fine to coarse angular to subangular of mudstone and coal fragments. (MADE GROUND)		
2.00-2.45	5	DSPT						
2.00-2.45	6	B						
3.00-3.45	7	SPT	N=13				(2.80)	
3.00-3.45	7	DSPT						
3.00-3.45	8	B						
4.00-4.45	9	SPT	N=12					
4.00-4.45	10	B						
4.00-4.45	9	DSPT						
4.50	11	D					4.80	
5.00-5.41	12	SPT	N=51*			MADE GROUND: Light grey COBBLES AND BOULDERS of siltstone (recovered as a gravel). (MADE GROUND)		
5.00	12	DSPT						
5.00-5.45	13	B						
6.00-6.42	14	SPT(c)	N=55*					
6.00-6.45	15	B						
7.50-7.90	16	SPT(c)	N=53*				(5.20)	
7.50-7.95	17	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/10/19		5.00	3.00		Dry
17/10/19		5.00	3.00		Dry
17/10/19		13.95	3.00		Dry
18/10/19		13.95	3.00		Dry
18/10/19		19.00	3.00		Dry

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
4.50	5.00	01:00
5.00	6.00	01:00
11.50	12.00	01:00
18.70	19.00	01:00

General Remarks

1. Position scanned with a CAT and Genny prior to excavation.
2. No groundwater encountered.
3. 50mm diameter gas/groundwater monitoring well complete with raised protective cover installed to 19.00m depth on completion. Response zone 17.00m to 19.00m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	AGS

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 14/01/20 - 16:33 | EOR1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**2** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.40 9.00-9.45	18 19	SPT(c) B	N=55*			MADE GROUND: Light grey COBBLES AND BOULDERS of siltstone (recovered as a gravel). (MADE GROUND) *(stratum copied from 4.80m from previous sheet)*	10.00	
10.00	20	D				MADE GROUND: Stiff grey, black and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subangular of mudstone and coal fragments. (MADE GROUND)	(1.50)	
10.50-10.95	21	U	28 blows 60% recovery					
11.00	22	D					11.50	
11.60	23	D				MADE GROUND: Light grey BOULDER of siltstone (recovered as a gravel). (MADE GROUND)	(0.50)	
12.00-12.37 12.00-12.45	24 25	SPT(c) B	N=57*				12.00	
						MADE GROUND: Stiff grey, black and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subangular of mudstone and coal fragments. (MADE GROUND)		
13.50-13.95 13.50-13.95	26 27	SPT(c) B	N=46					
15.00-15.45	29	B					(6.70)	
16.50-16.90 16.50-16.95	30 31	SPT(c) B	N=53*					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	

GINT_LIBRARY_V8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 322638 - HARWORTH ESTATE.GPJ - v8_07.
RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 14/01/20 - 16:33 | EOR1 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Rockingham	**Harworth Estates**	**BH503**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
322638	**16.10.19** End: **21.10.19**	**131.08**	**E:435375.9 N:401081.0**	**3** of **3**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
18.00-18.38 18.00-18.45	32 33	SPT(c) B	N=57*					
							18.70	
						MADE GROUND: Light grey BOULDER of siltstone (recovered as a gravel). (MADE GROUND)	(0.65)	
19.00-19.35	34	SPT(c)	N=59*				19.35	
						Borehole terminated at 19.35m depth.		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

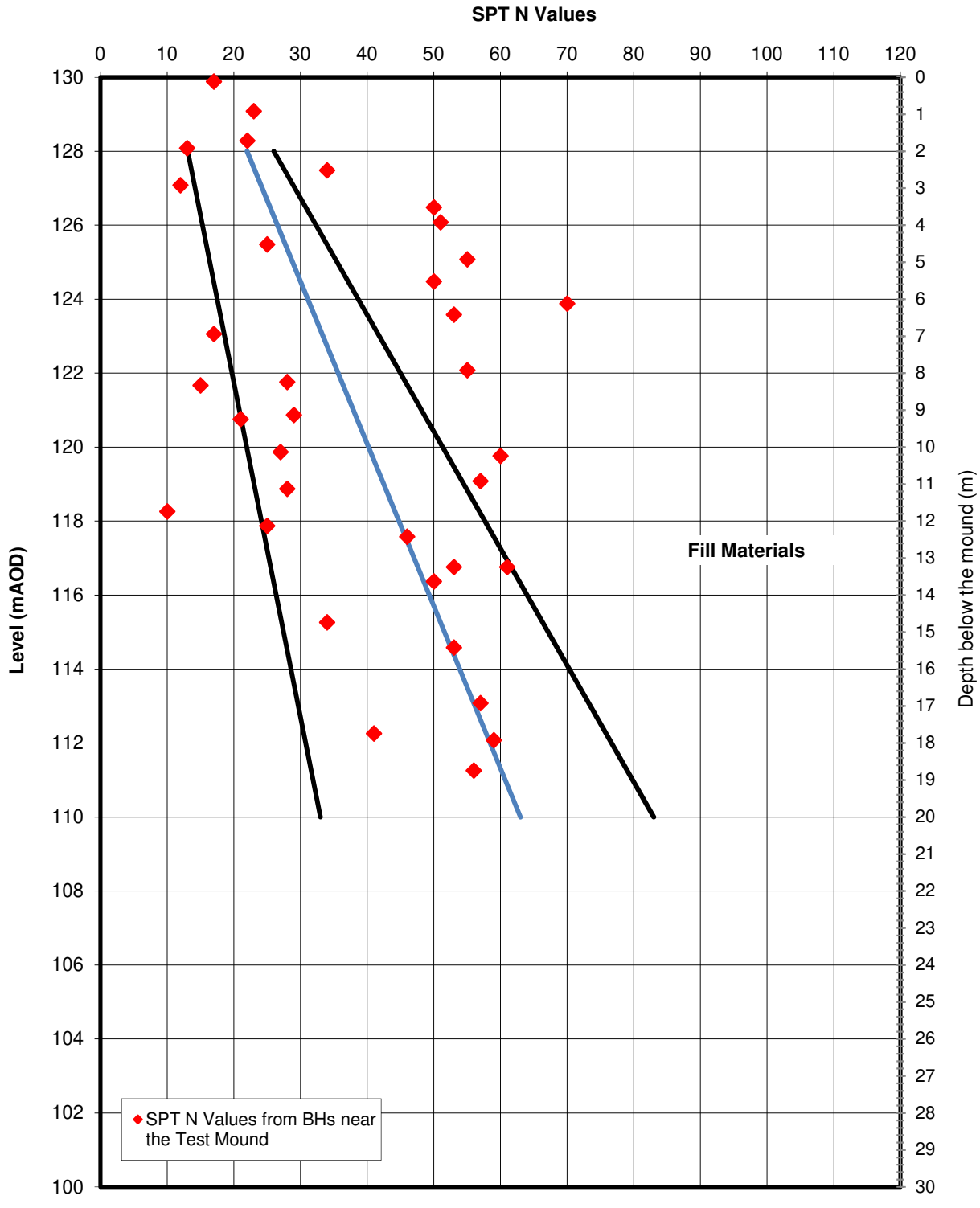
Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 2000**	**PB Drilling**	**ACox**	

AGS

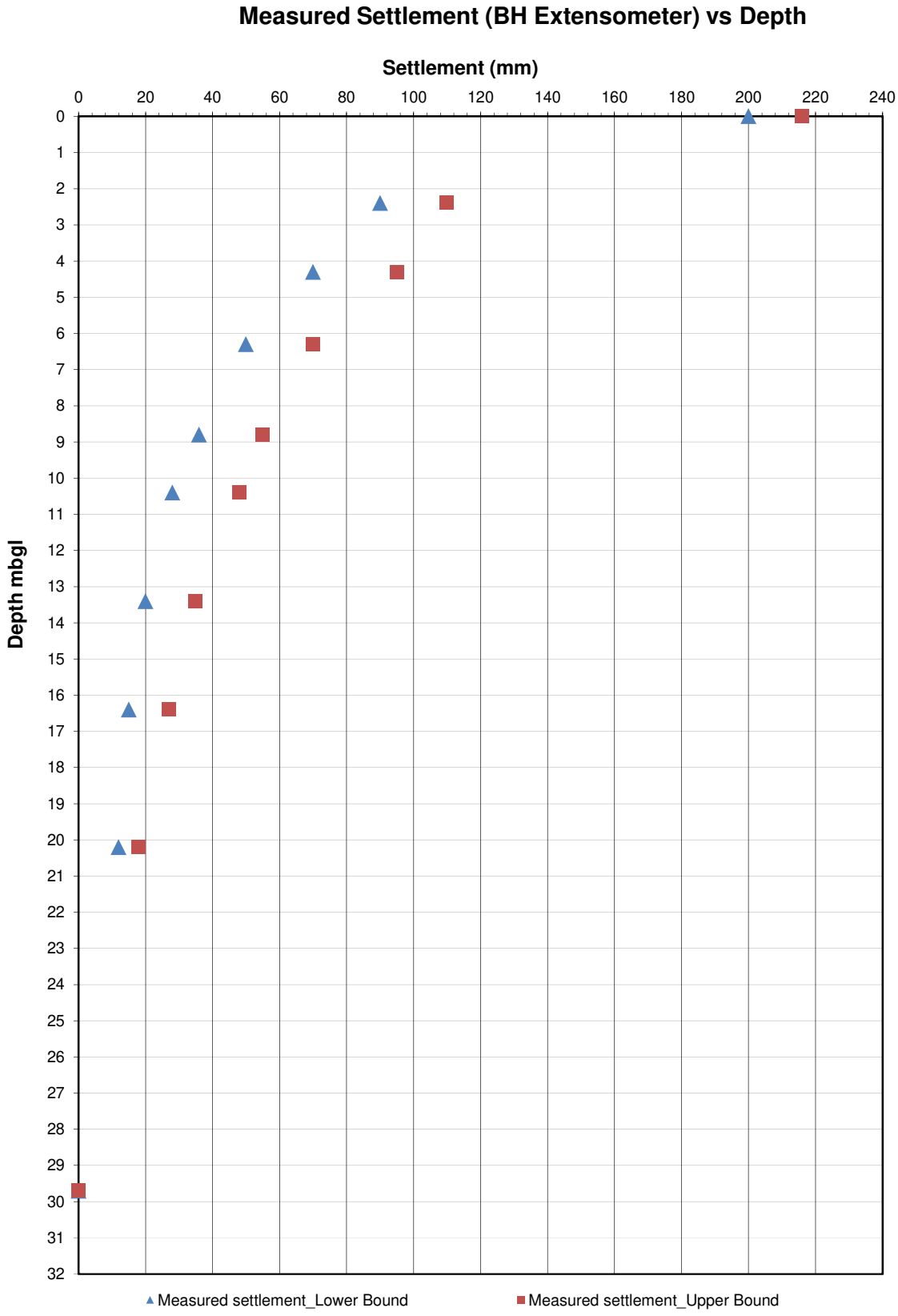
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RSK Environment Ltd, Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR. Tel: 01928 726006, Fax: 01928 725633, Web: www.rsk.co.uk. | 14/01/20 - 16:33 | EOR1 |

APPENDIX D
SPT N, SETTLEMENT, STIFFNESS VS DEPTH PLOTS

	Site	SPT N Values vs Level	
RSK	Rockingham Phases 2 & 3	Client: Harworth Estates	Job Number 372029

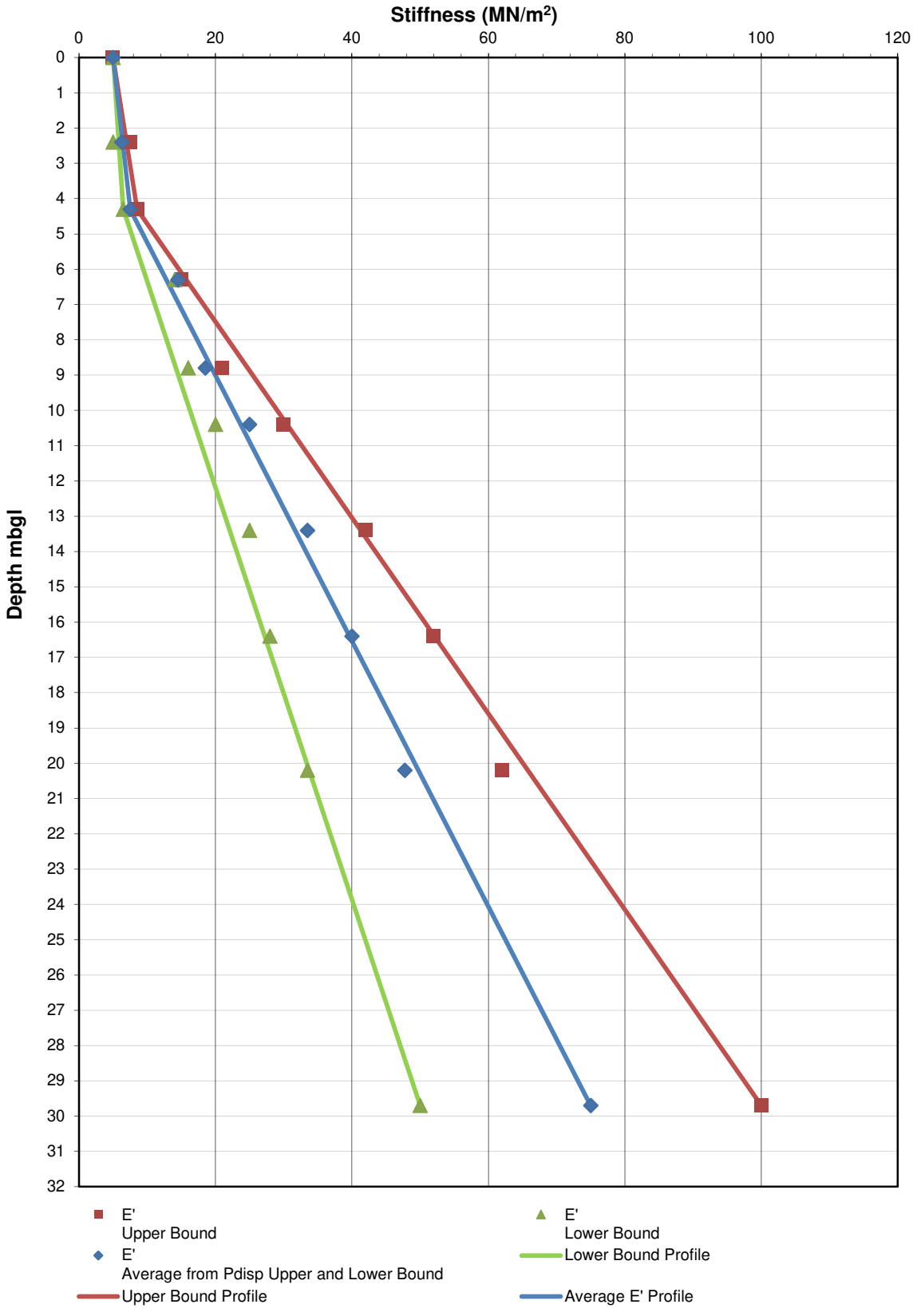


RSK	**Measured Settlement vs Depth**		
Site: Rockingham Phase 2-3	**Client:** Harworth Estates	**Job Number:**	372079
		Appendix:	

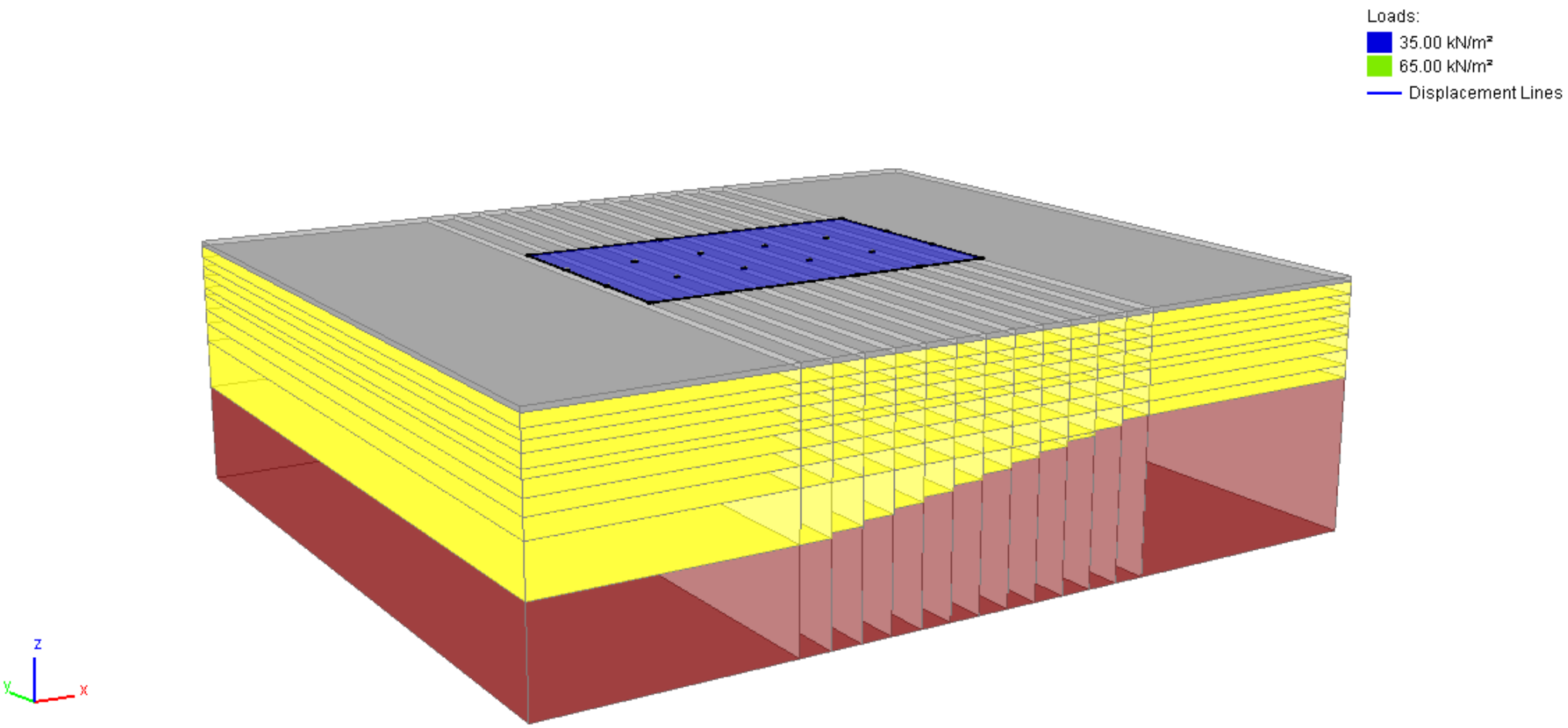


RSK	Stiffness vs Depth		
Site: Rockingham Phase 2-3	Client: Harworth Estates	Job Number:	372079
		Appendix:	

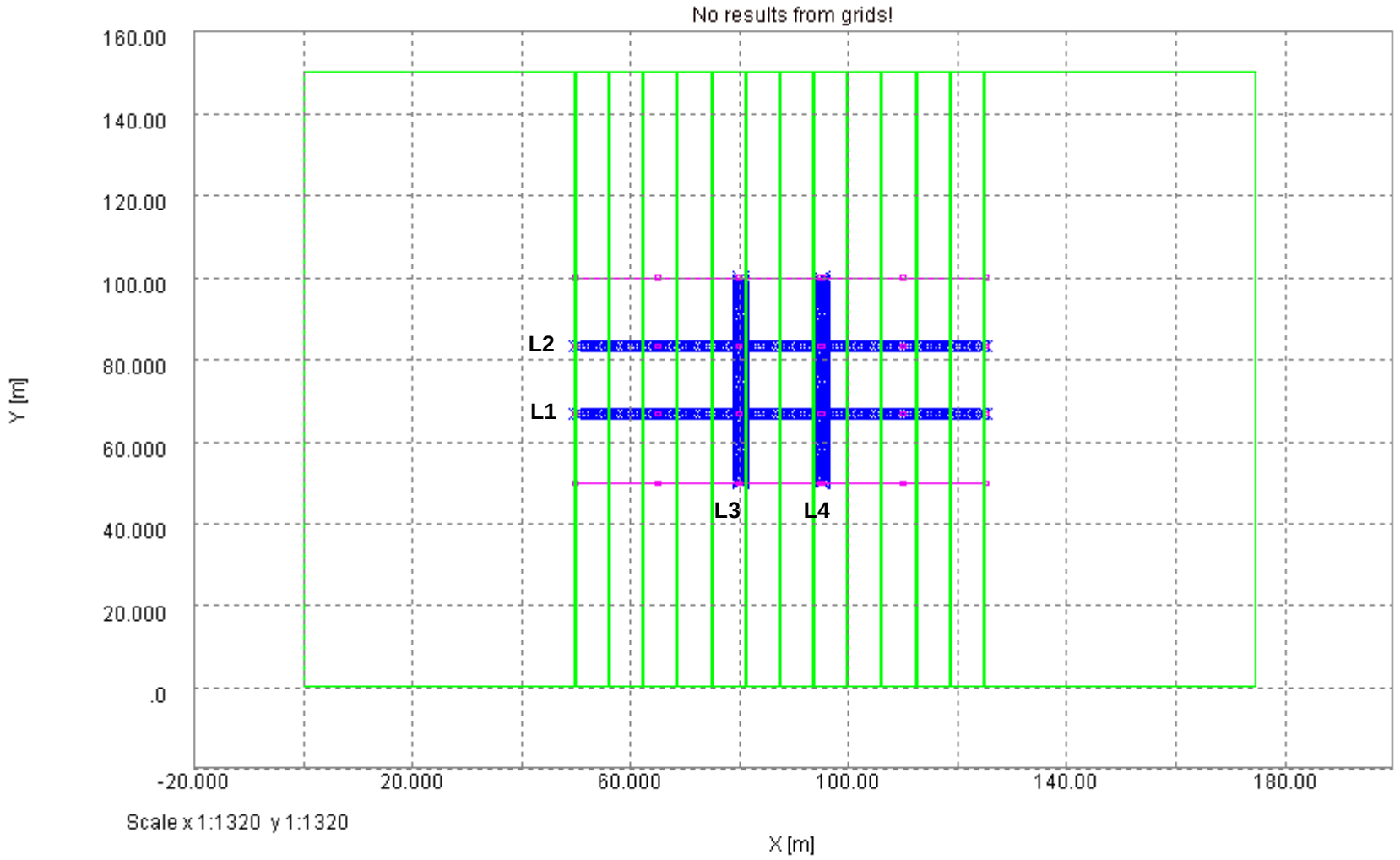
PDisp Back Calculated Stiffness vs Depth



APPENDIX E
PDISP OUTPUT AND FOUNDATION DIFFERENTIAL MOVEMENT PLOTS



RSK	**UNIT 1 – PHASE 3** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



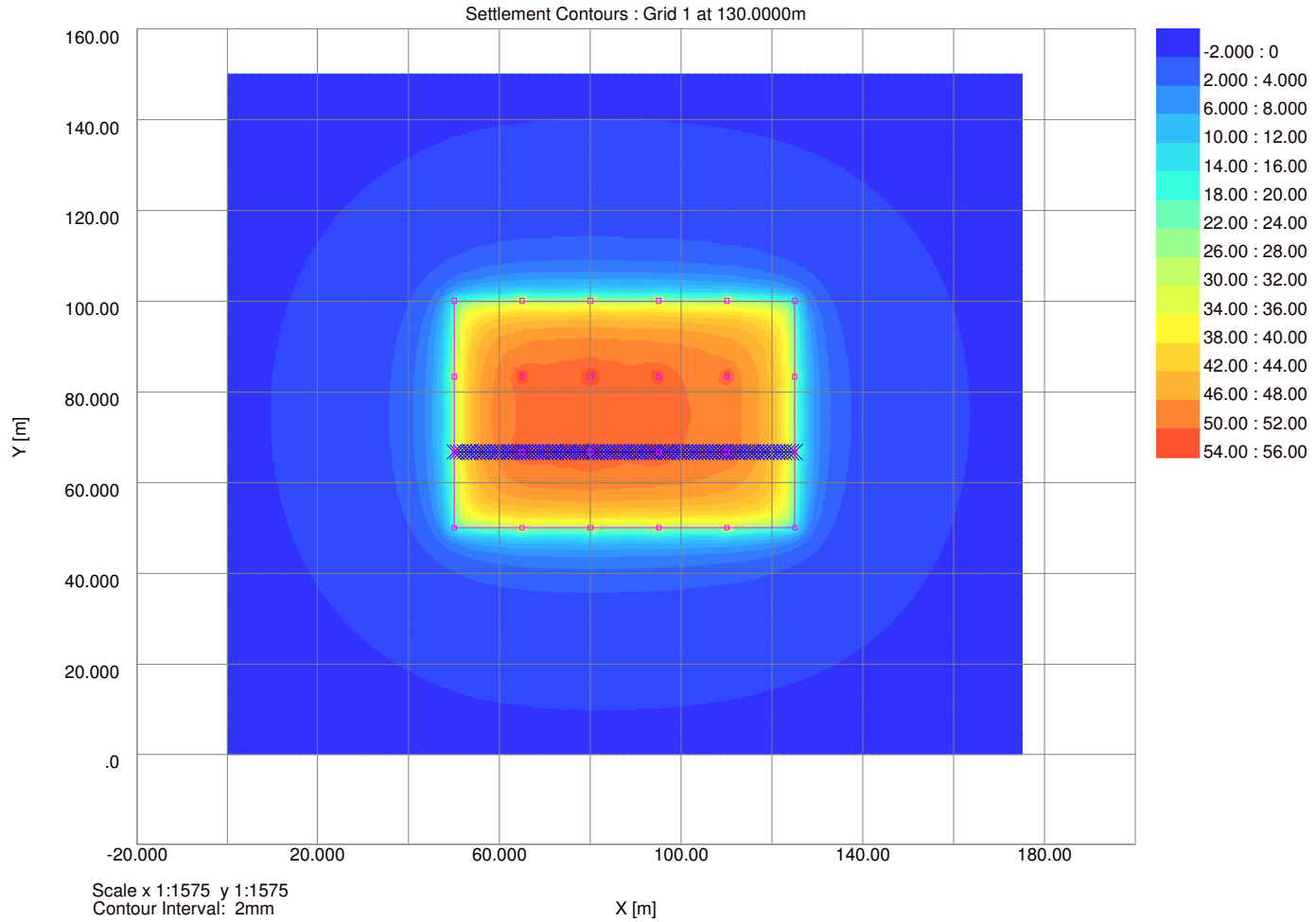
RSK	**UNIT 1 PHASE 3 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

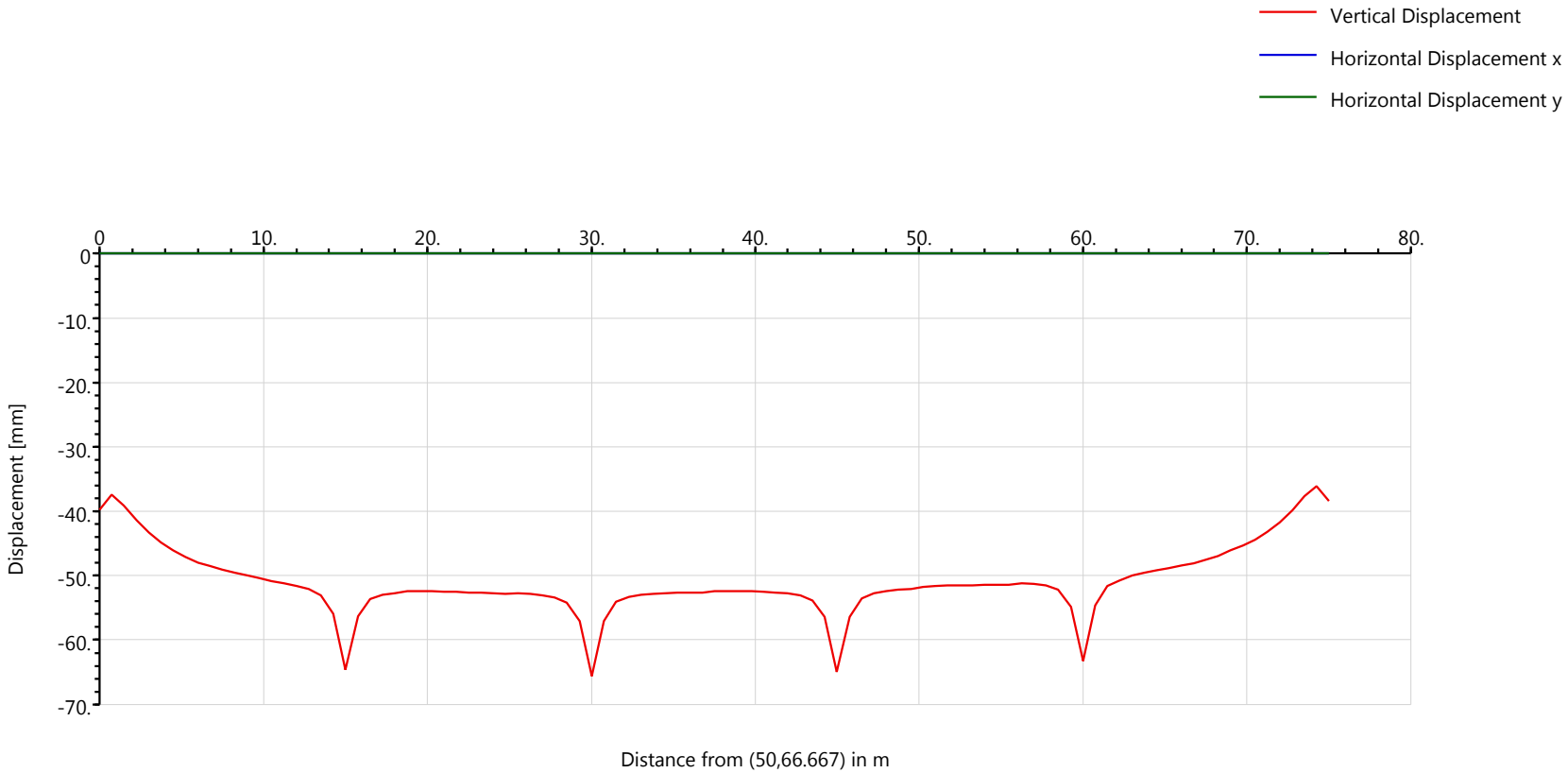
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ROCKINGHAM 2-3
Unit 1 Phase 3

Job No.	Sheet No.	Rev.
372079		
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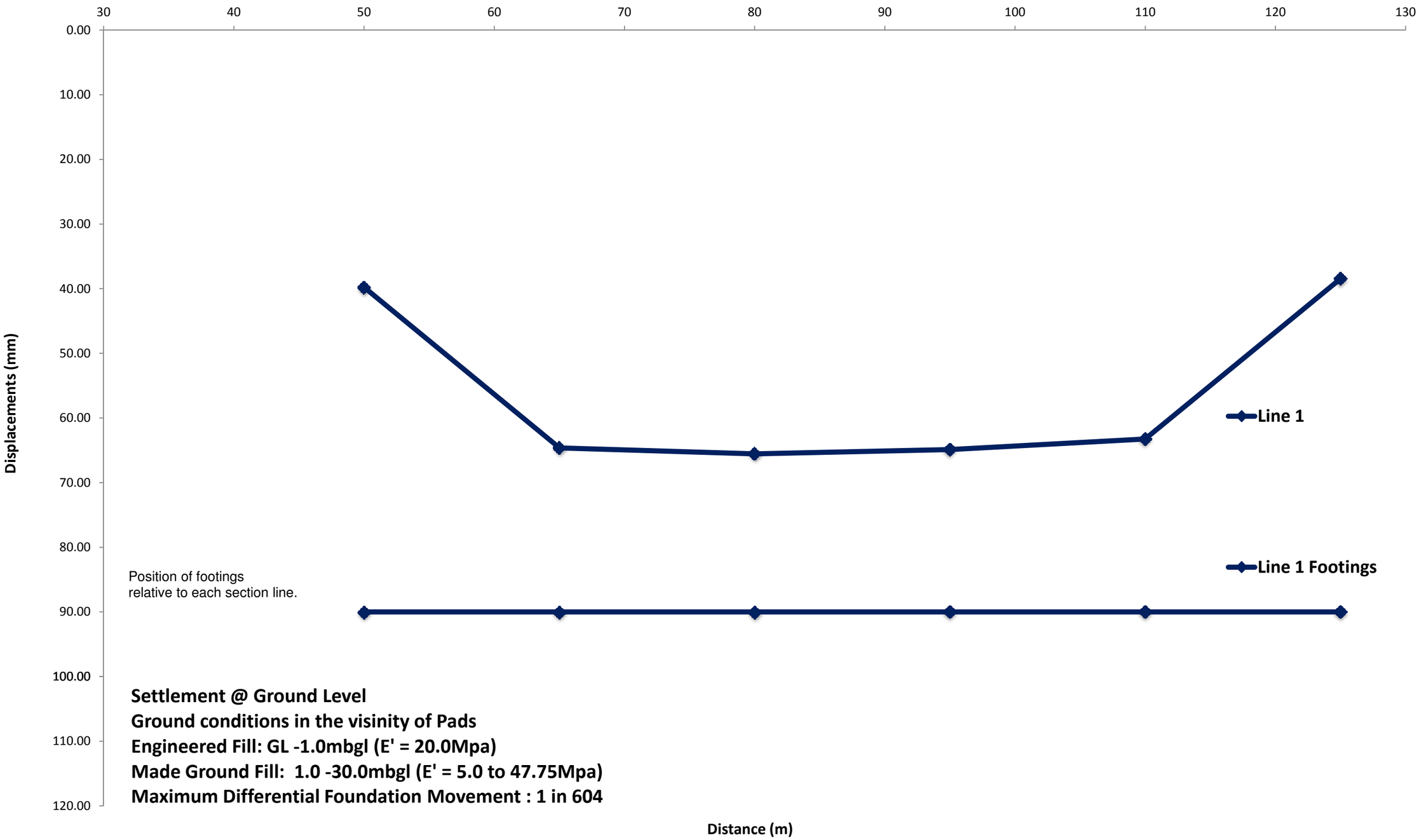


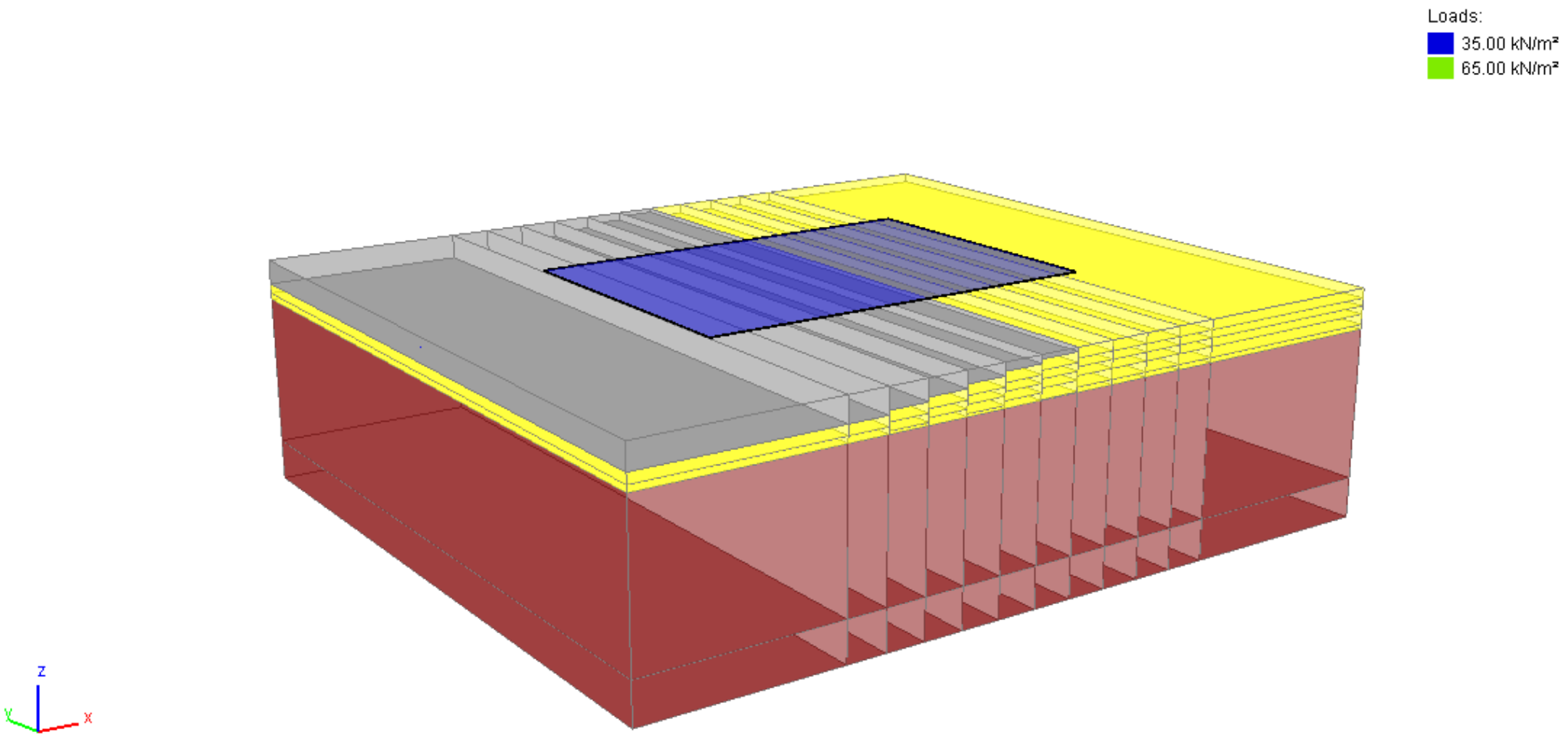
Displacement for L1



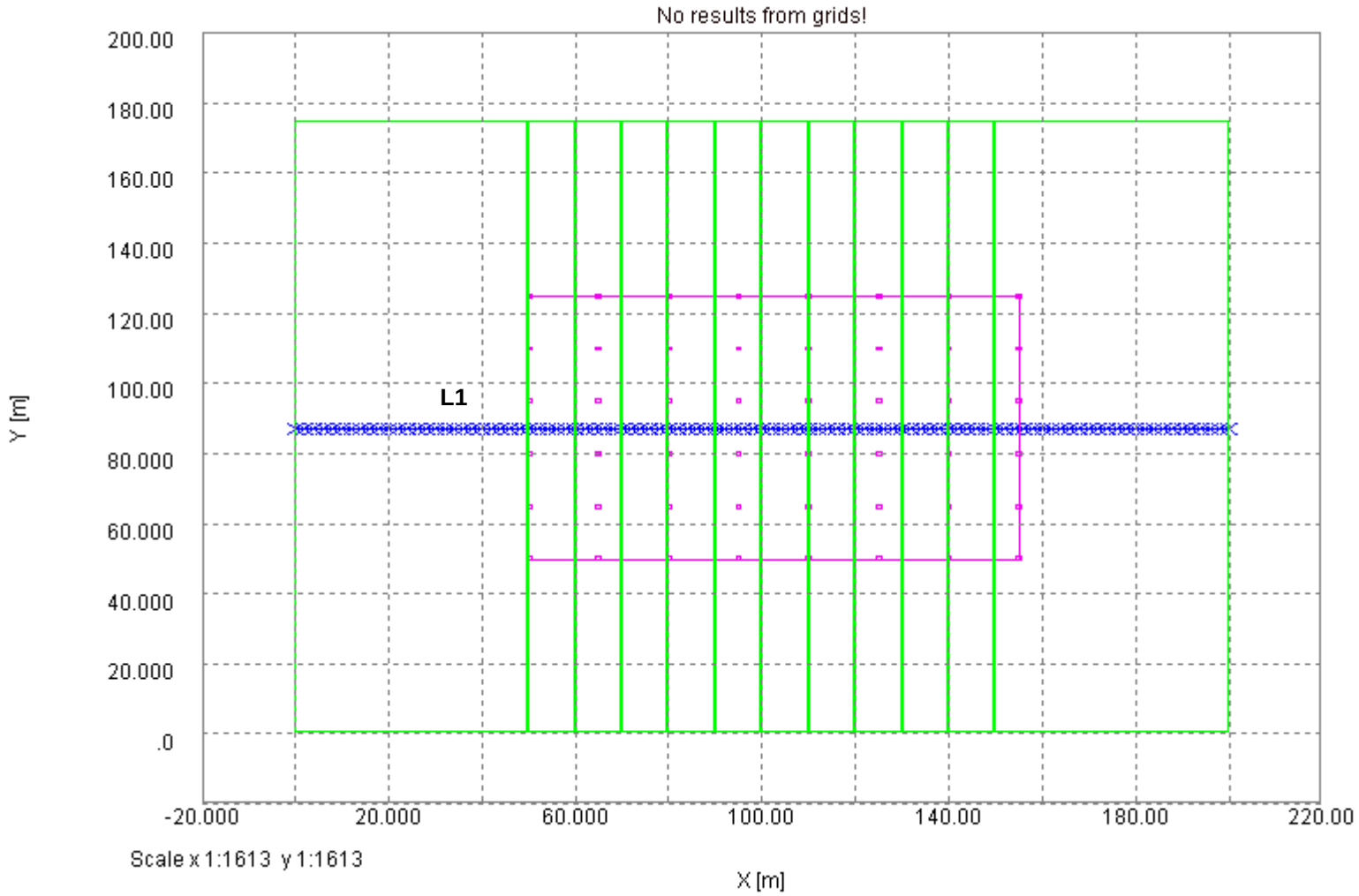
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 1-PHASE3 - Line 1





RSK	**UNIT 1&2 – PHASE 2 3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 1&2 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:**	Harworth Estates	**Figure No:**
		Site:	Rockingham 2-3	**Job No:** 372079
		Scale:	NTS	**Source:** PDISP

Oasys

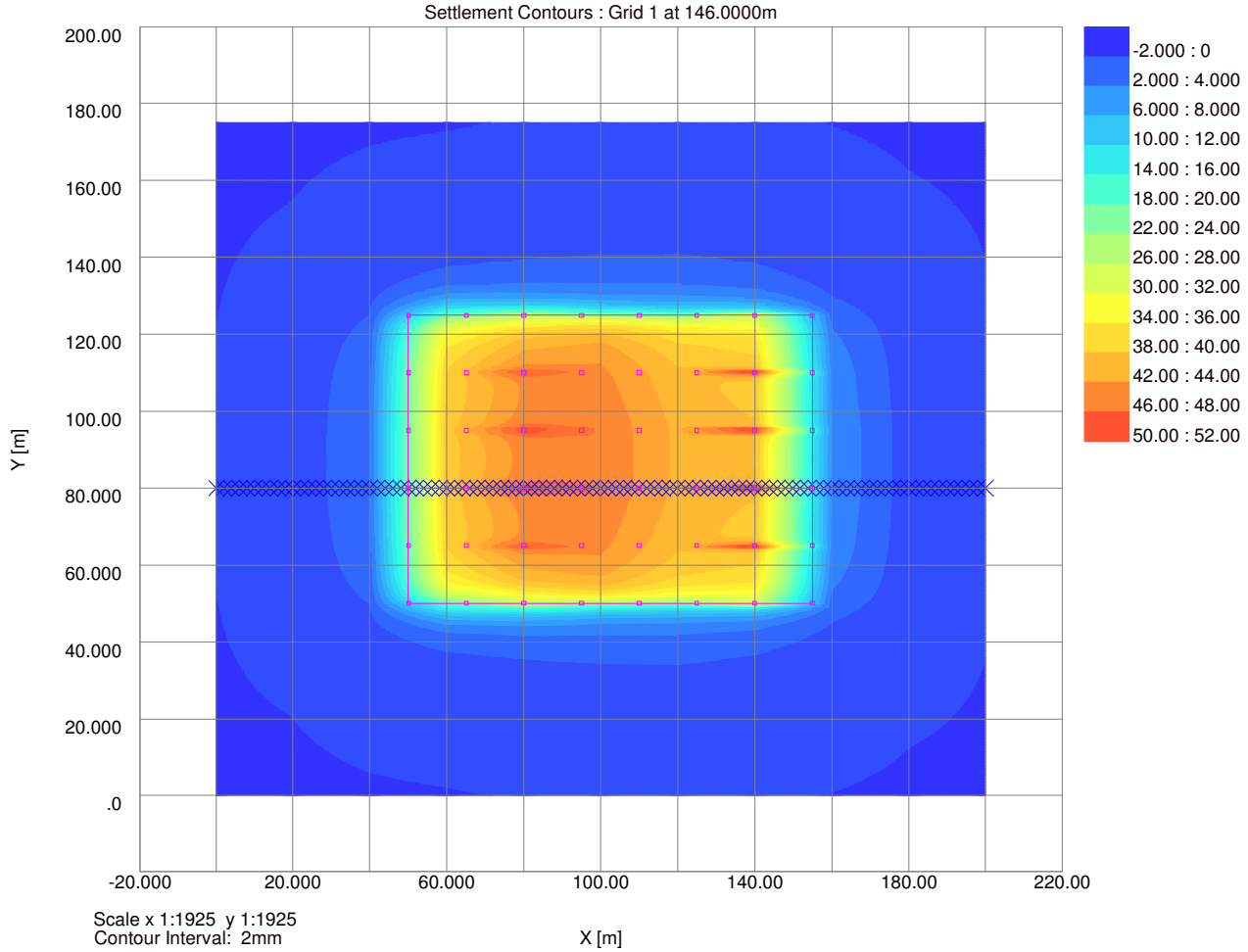
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ROCKINGHAM 2-3
Unit 1-2

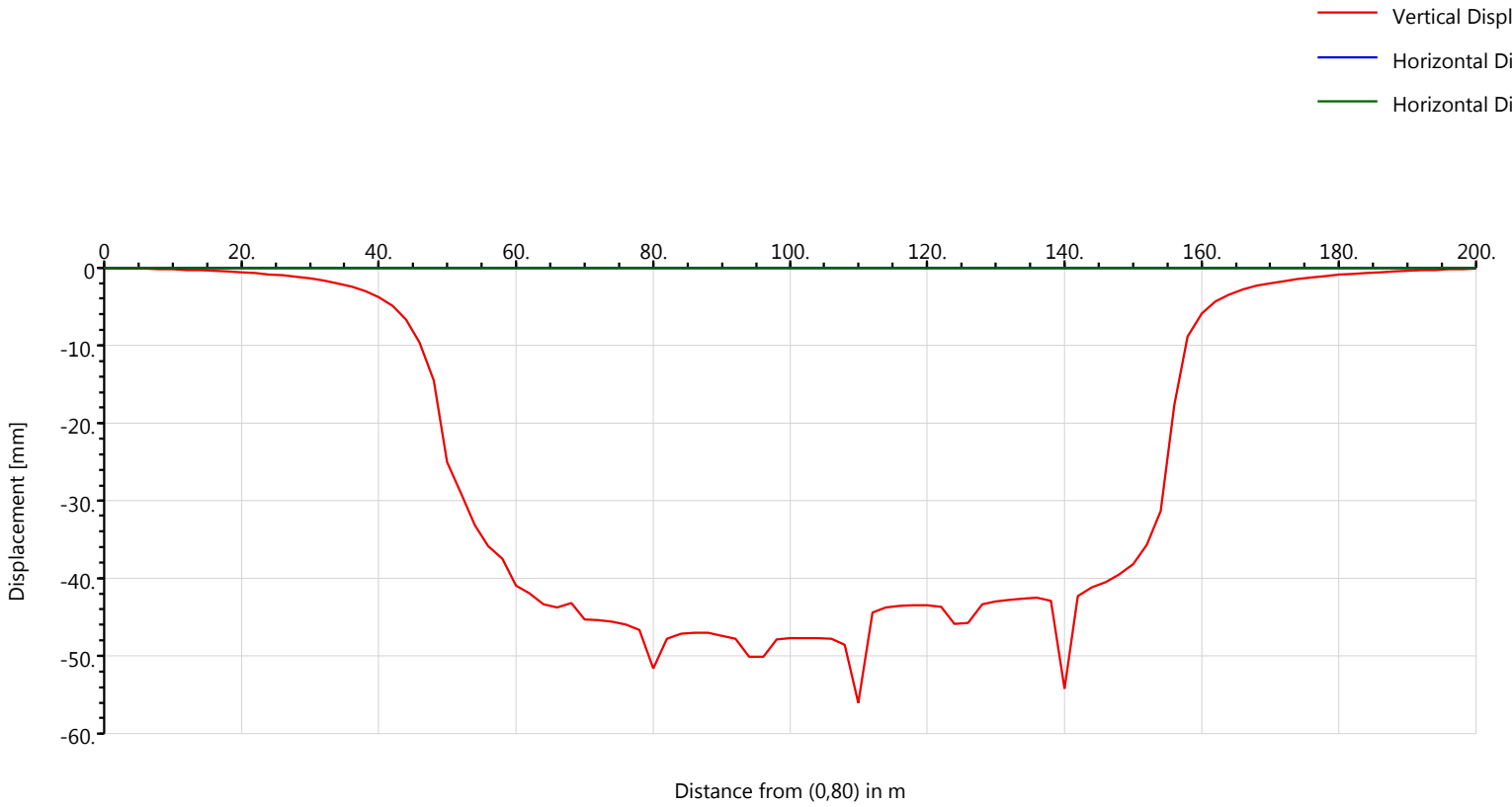
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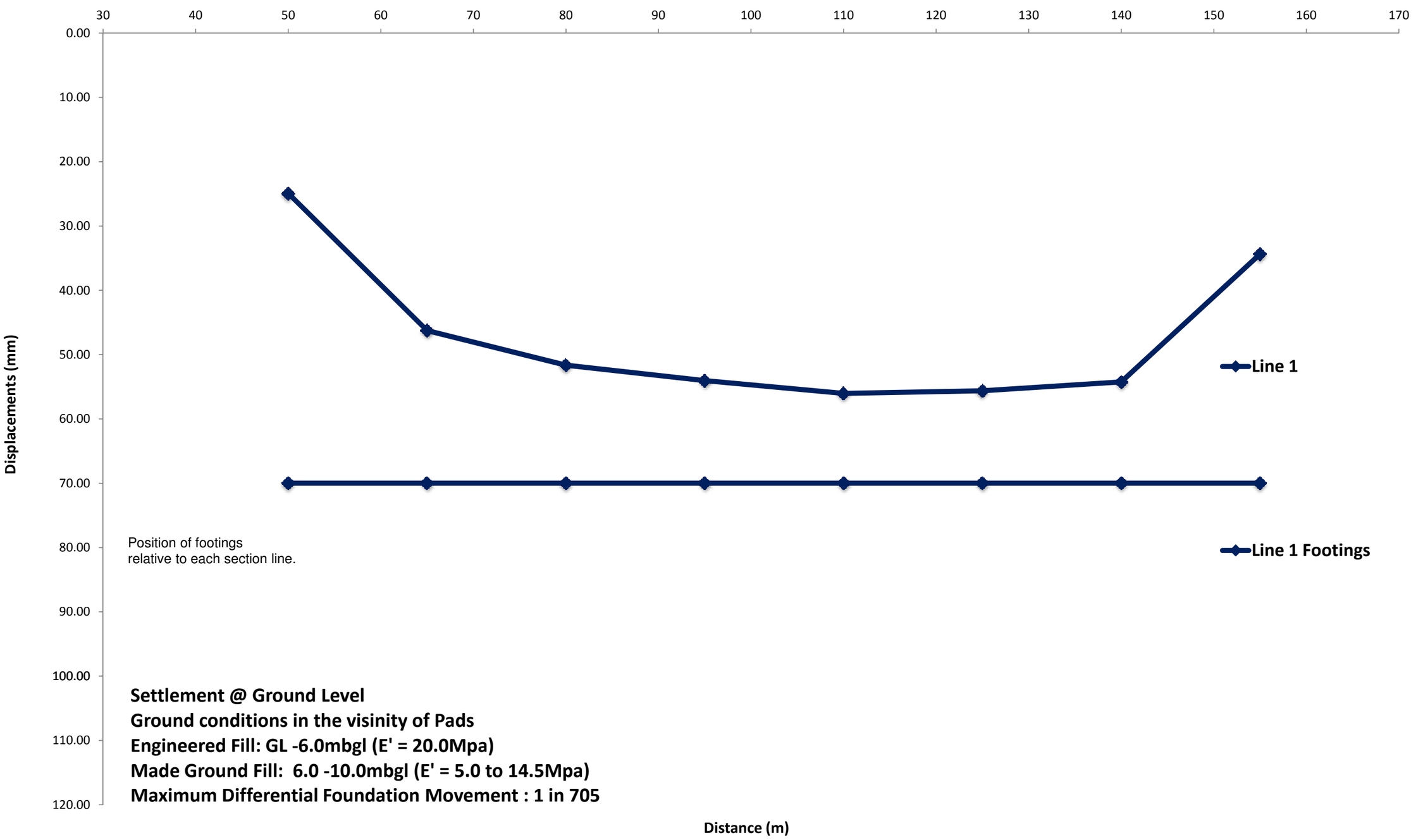


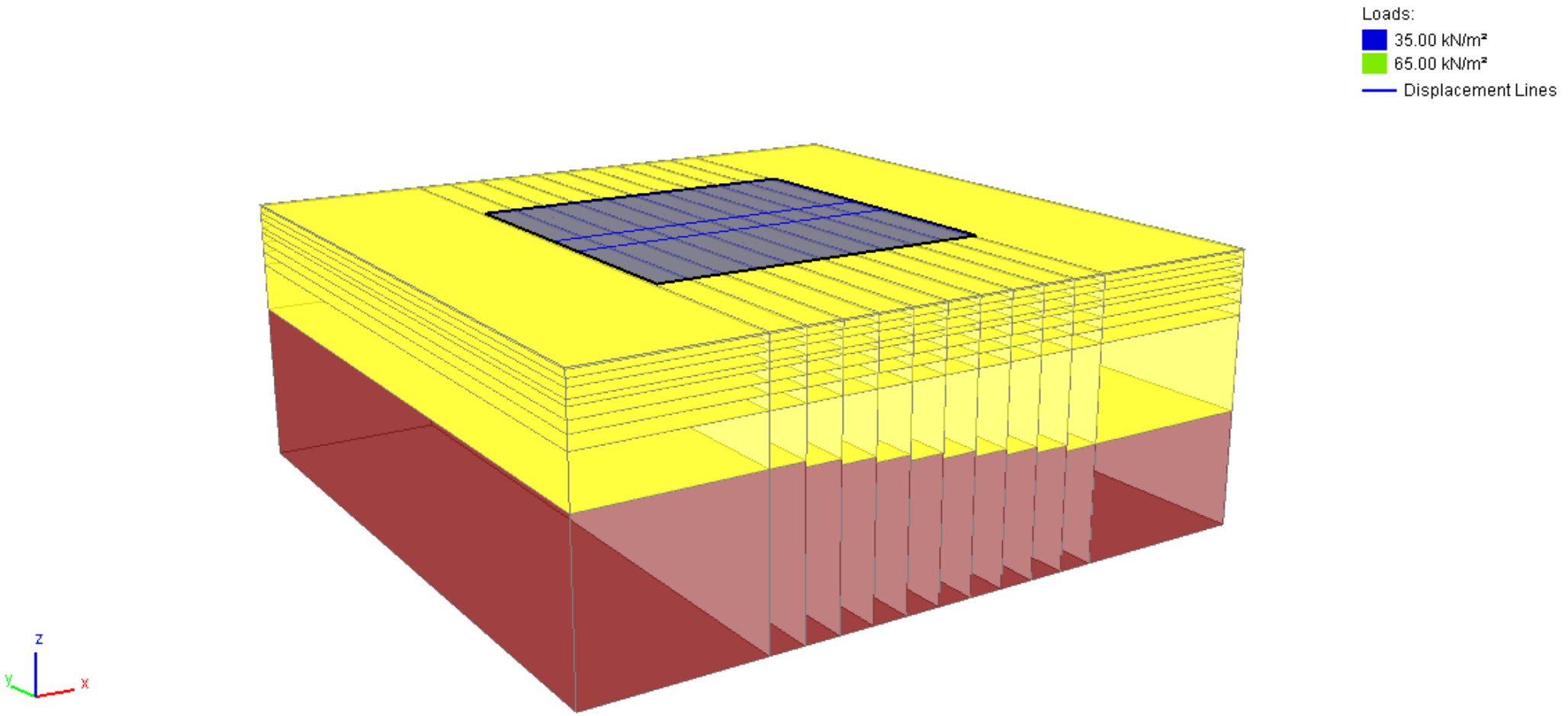
Displacement for L1



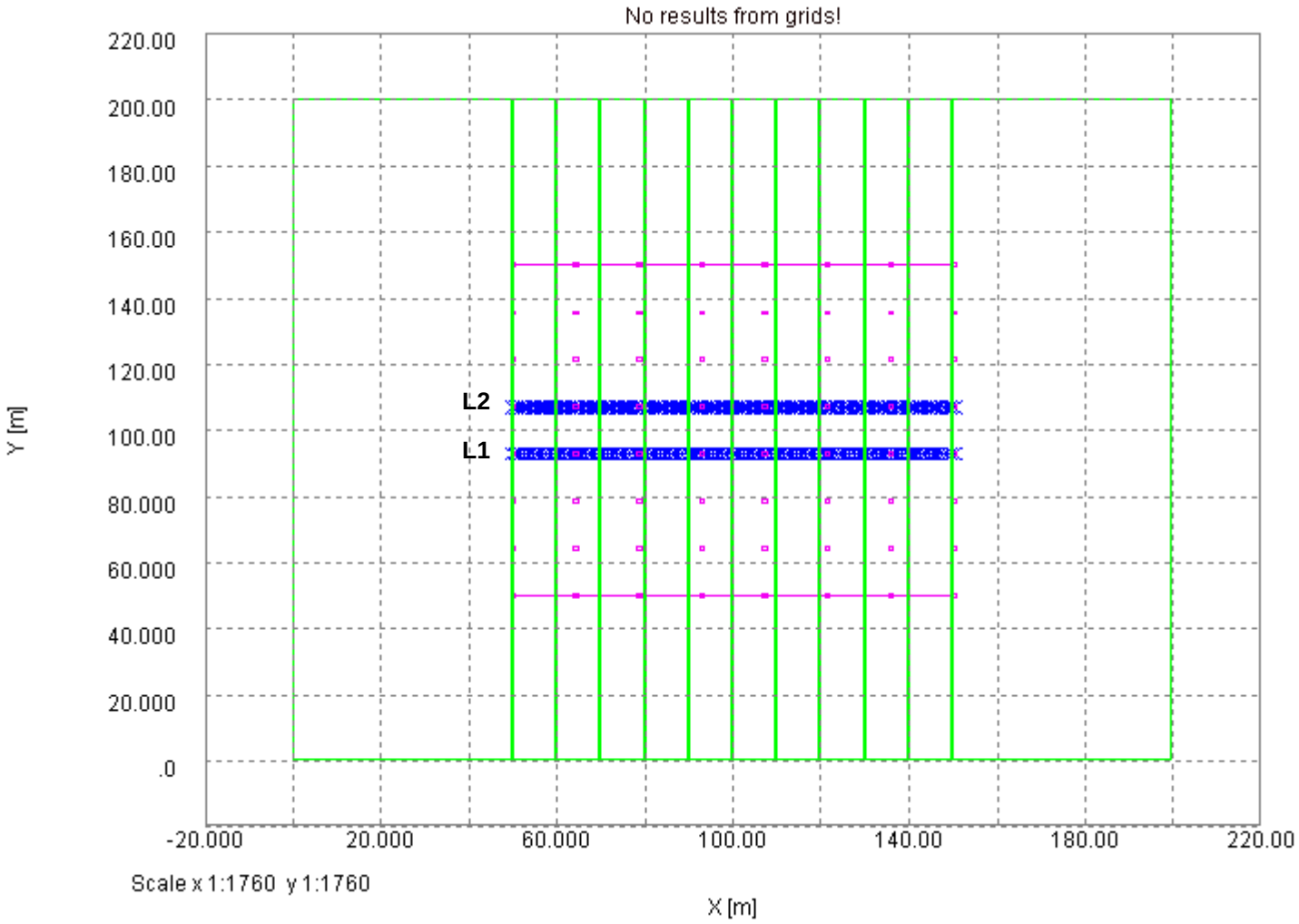
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 1-2 - Line 1





RSK	**UNIT 2 – PHASE 3** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 2 PHASE 3 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

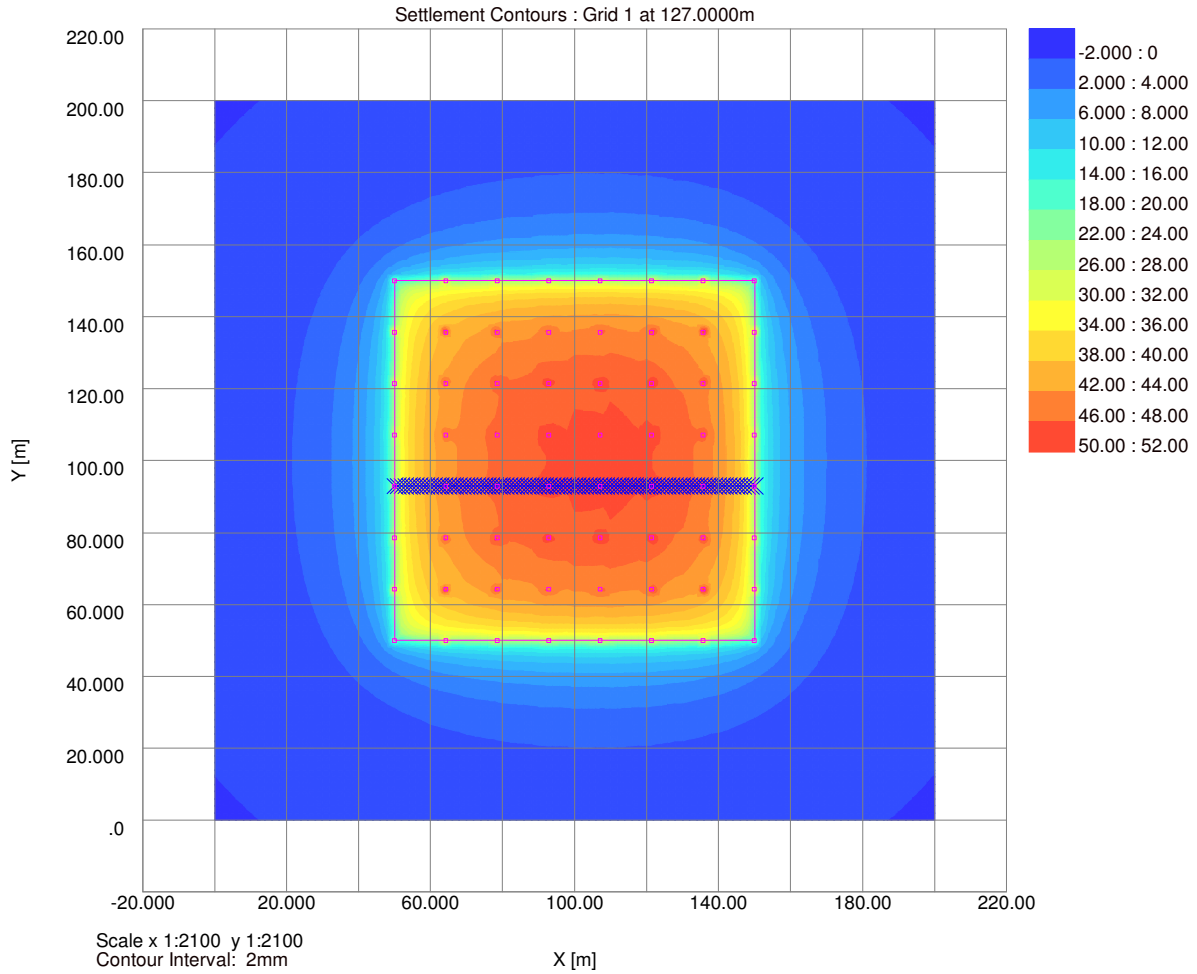
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ROCKINGHAM 2-3
Unit 2 PHASE 3

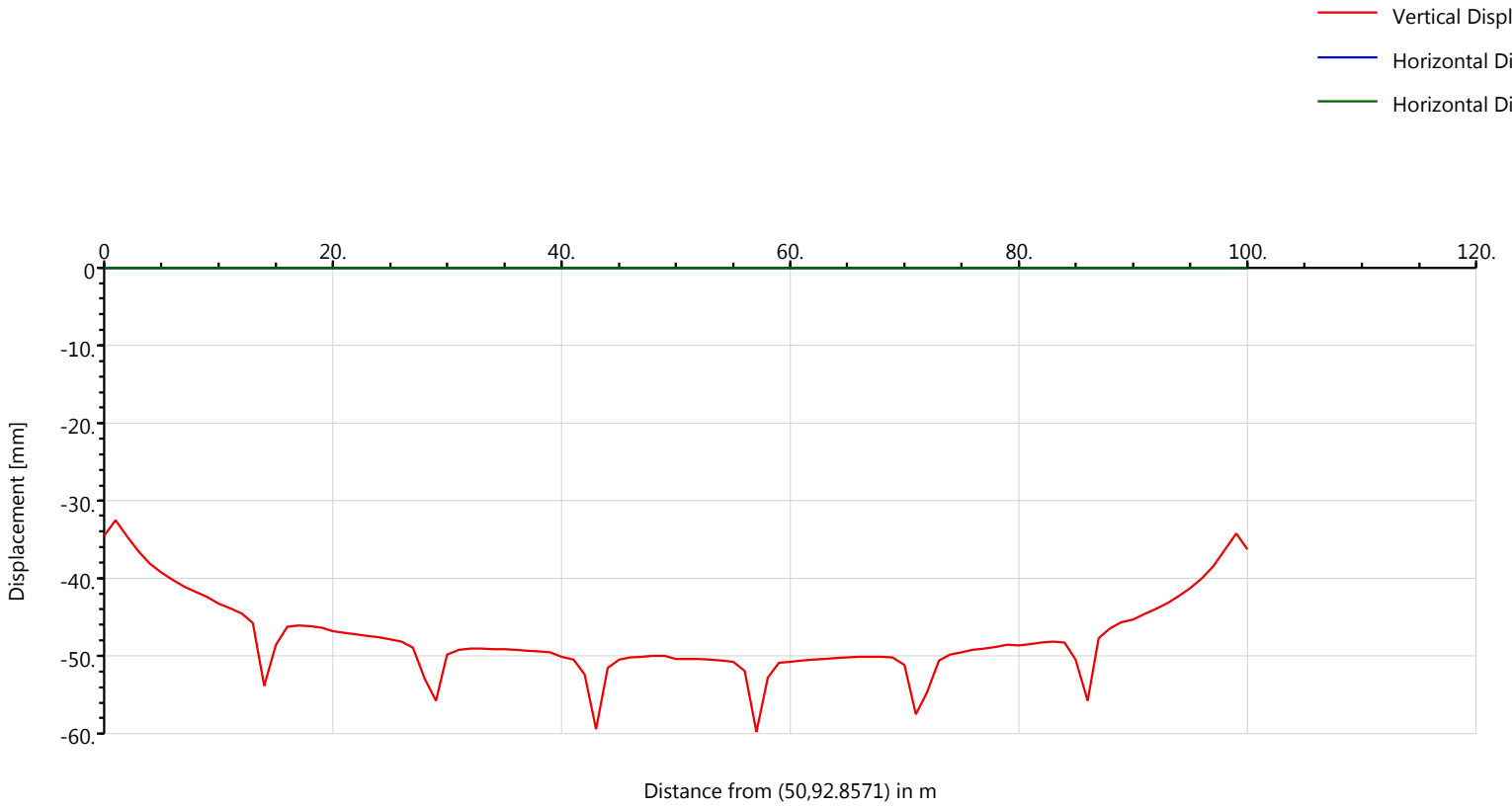
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372079		

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Made by	Date	Checked
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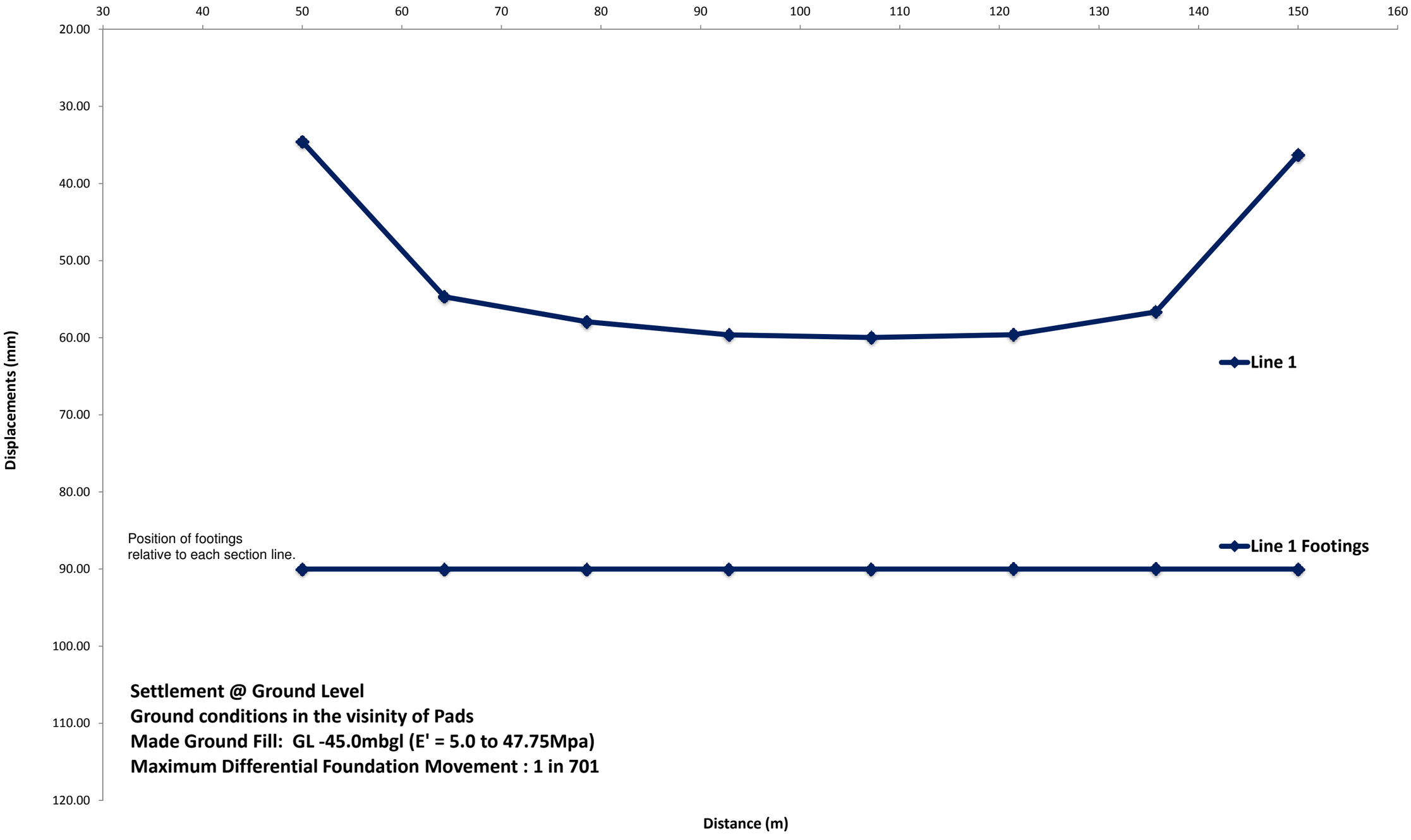


Displacement for L1



With Pads (100kPa) & Slab (35kPa) Loading

UNIT 2 PHASE 3 - Line 1



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NOTES

Cut/Fill Depth By Colour Banding			
Number	Minimum Elevation	Maximum Elevation	Colour
1	-12.00	-10.00	
2	-10.00	-8.00	
3	-8.00	-6.00	
4	-6.00	-4.00	
5	-4.00	-2.00	
6	-2.00	0.00	
7	0.00	2.00	
8	2.00	4.00	
9	4.00	6.00	
10	6.00	8.00	
11	8.00	10.00	
12	10.00	12.00	

Site Specific
Maximum Cut Depth: -7.63m
Maximum Fill Build-Up: 8.32m

PROPOSED LEVELS

Cut/Fill In Brief
Cut: 328371.11 Cu. M.
Fill: 337108.02 Cu. M.
Net Shortfall: 8736.91 Cu. M.

Site Perimeter Has Battered To Existing Levels At 1:3.

A 1:4 Batter Between Proposed Plateaus Has Been Shown To Account For A Break In Slope In A 1:3 Batter.

This Is A Site-Wide Cut/Fill Analysis And Should Not Be Relied Upon For Final Design. Further Detailed Design Is Required.

Levels Have Been Produced To Tie Into Proposed Link Road, Alignment Option 2E.

Gradients And Spot Elevations Displayed Reflect The Proposed Finished Floor Levels.

A 300mm Site Strip Was Calculated And Removed Prior To The Cut/Fill Analysis.

A Site Strip Volume of 72008.98 Cu. M. Has Been Calculated.

Attenuation Volume Has Been Accounted For In The Cut/Fill Analysis.

A 5% Bulking Factor Has Been Accounted For In The Cut/Fill Analysis.

Areas Not Shaded With The Cut/Fill Colour Banding Have Not Been Included In The Cut/Fill Analysis.

The Topography Used In The Cut/Fill Analsis Has Been Generated From Combining 'Greenhatch Group, Topographical Survey, Drawing No. 20379_OGL_Rev_3, Date 05-06.06.14'

Existing Pond
Pond
Existing Unit
Existing Unit
Existing Unit
Existing Unit
Existing Unit
Proposed Access
Dearne Valley Parkway
Dearne Valley Parkway
Service Yard
Service Yard
Service Yard
Car Park
Car Park
Car Park
Proposed Roundabout
Detailed Earthworks Batter To Incorporate Berm
Existing Footpath to be retained
138.000m
Pond
Playing Field
Caravan Site
Sandale Lodge
Beneathno
A 6195

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Cut/Fill Analysis	1.000	1.000	240029.93sq.m	303210.58 Cu. M.	337108.02 Cu. M.	33897.44 Cu. M.<Fill>
Attenuation				10000.00 Cu. M.	0000.00 Cu. M.	10000.00 Cu. M.<Cut>
Bulking Factor (5%)				15160.53 Cu. M.	0000.00 Cu. M.	15160.53 Cu. M.<Cut>
Total				328371.11 Cu. M.	337108.02 Cu. M.	8736.91 Cu. M.<Fill>

Analysis has been performed using topographical surface generated from 'Greenhatch Group, Topographical Survey, Drawing No. 20379_OGL_Rev_3, Date 05-06.06.14'.

Analysis has incorporated a 300mm site strip, and so site strip volume is not included in the calculation above.

The total site strip volume calculated is 72008.98Cu. M.

Analysis has included attenuation volume.

Analysis has included a 5% bulking factor.

REV	DESCRIPTION	DATE	BY
P05	ARCHITECT LAYOUT ALTERATION.	29.11.2019	OLT
P04	LAYOUT ALTERATION IN LINE WITH HARWORTH COMMENTS.	25.11.19	OLT
P03	PROPOSED LEVELS ALTERATION IN LINE WITH LINK ROAD ADJUSTMENTS.	07.11.2019	OLT
P02	ALTERATIONS TO LEVELS IN LINE WITH ARCHITECTS COMMENTS.	26.09.2019	OLT
P01	FIRST ISSUE.	09.09.2019	OLT

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ROCKINGHAM PHASE 2A & 2B,
ROCKINGHAM 2&3,
HOYLAND

Drawing Title
CUT/FILL ANALYSIS

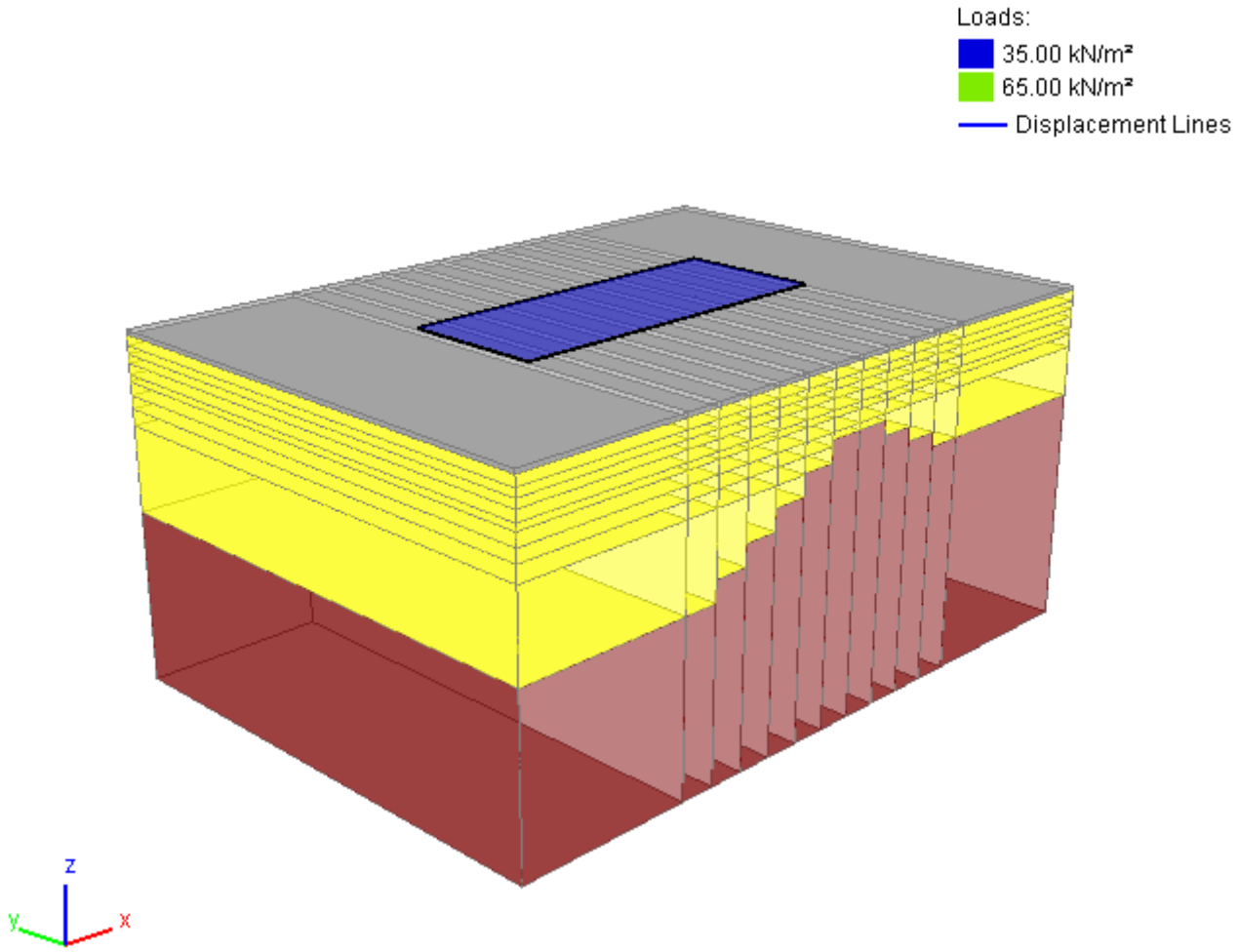
INFORMATION ISSUE

Architect
THE HARRIS PARTNERSHIP

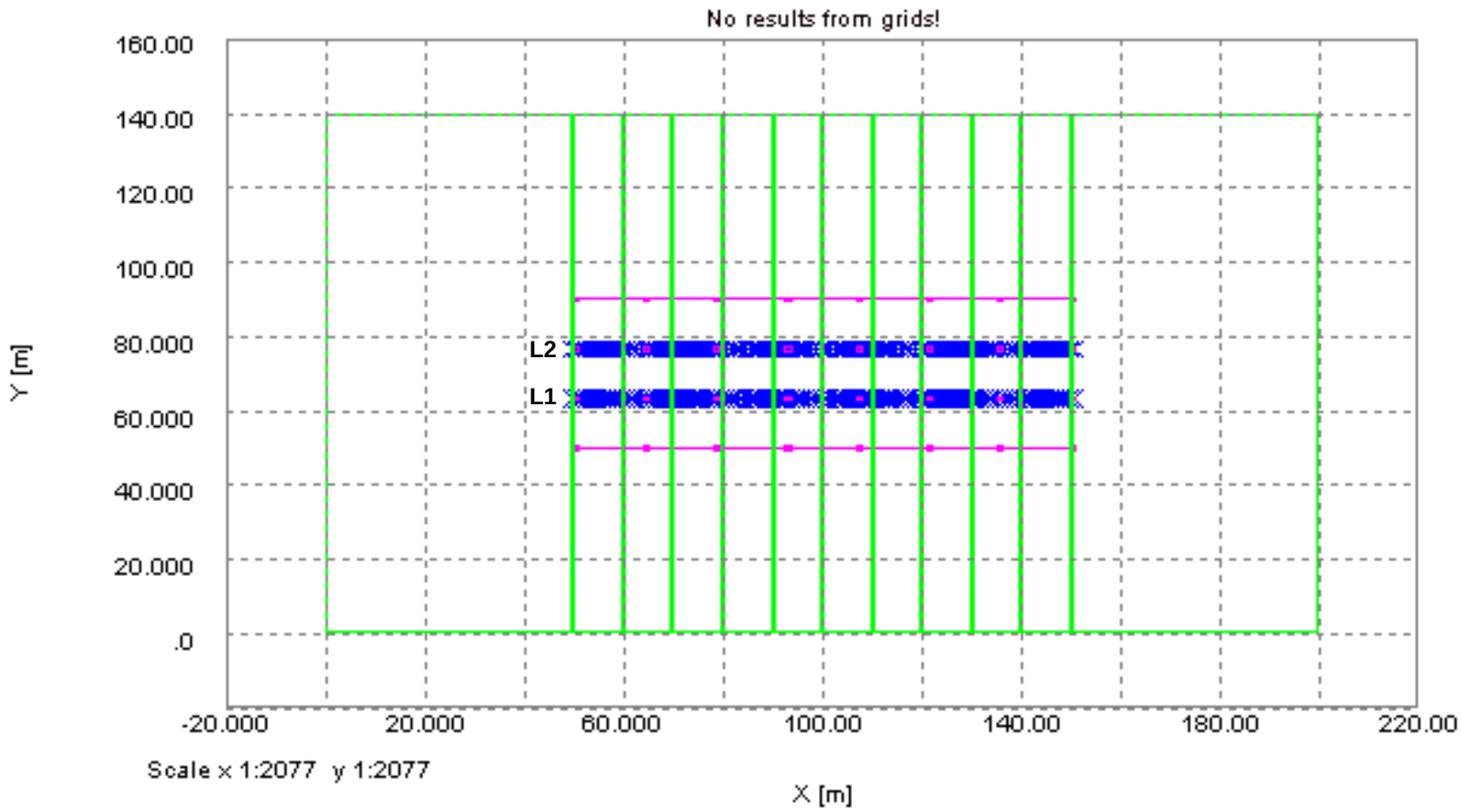
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RSK	**UNIT 3 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



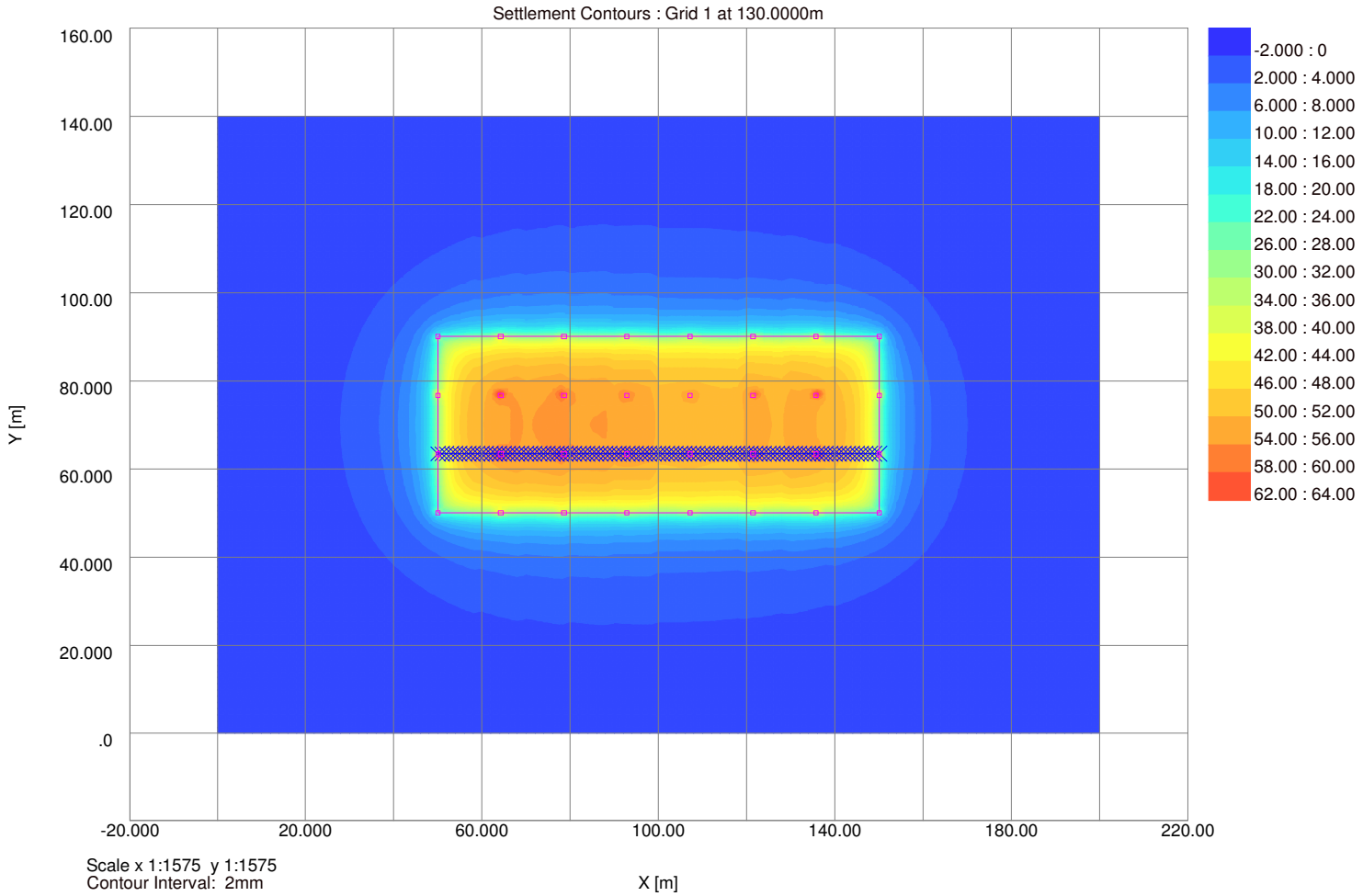
RSK	**UNIT 3 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

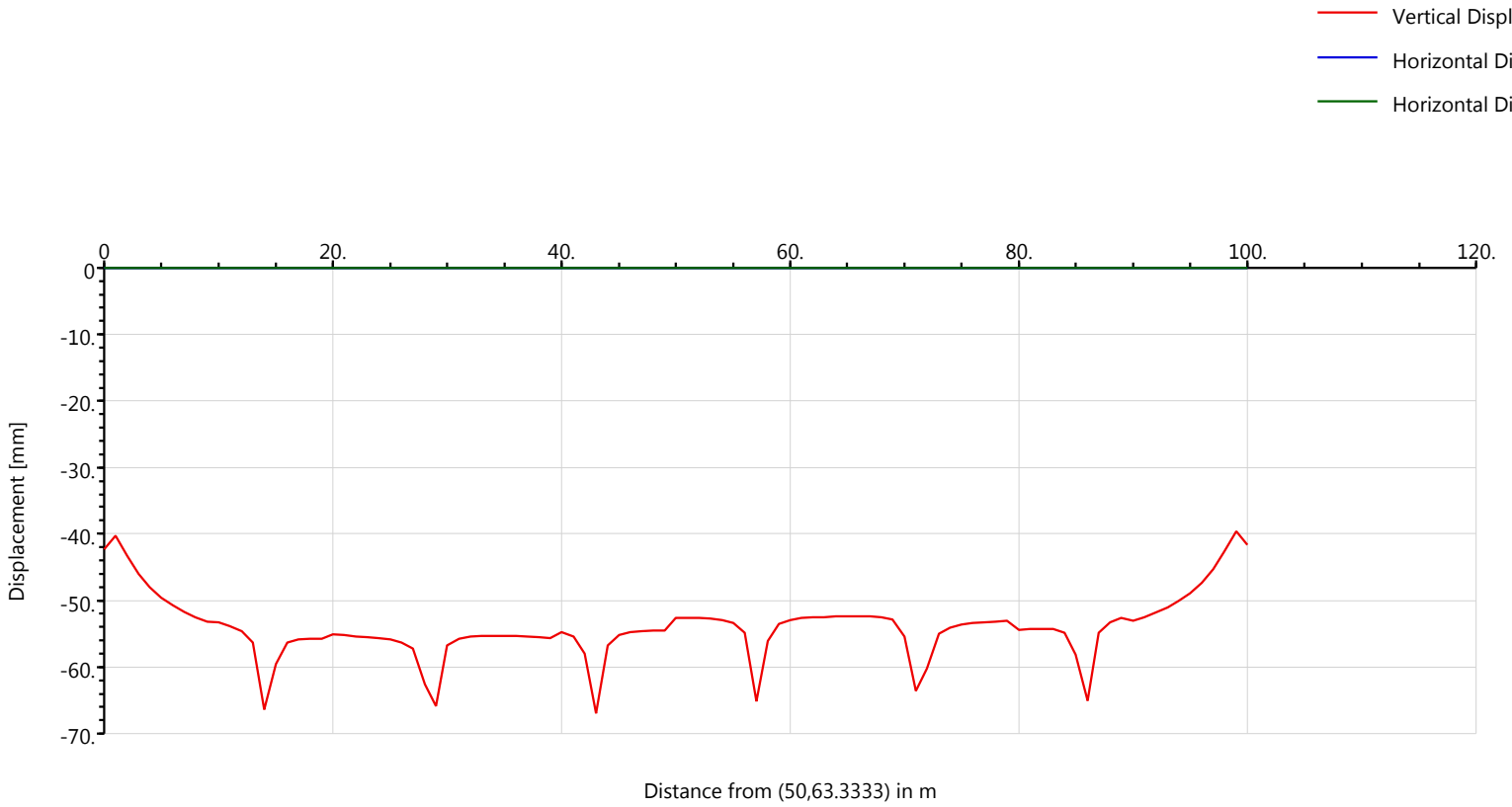
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ROCKINGHAM 2-3
Unit 3

Job No.	Sheet No.	Rev.
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Drg. Ref.		
Made by GS	Date	Checked

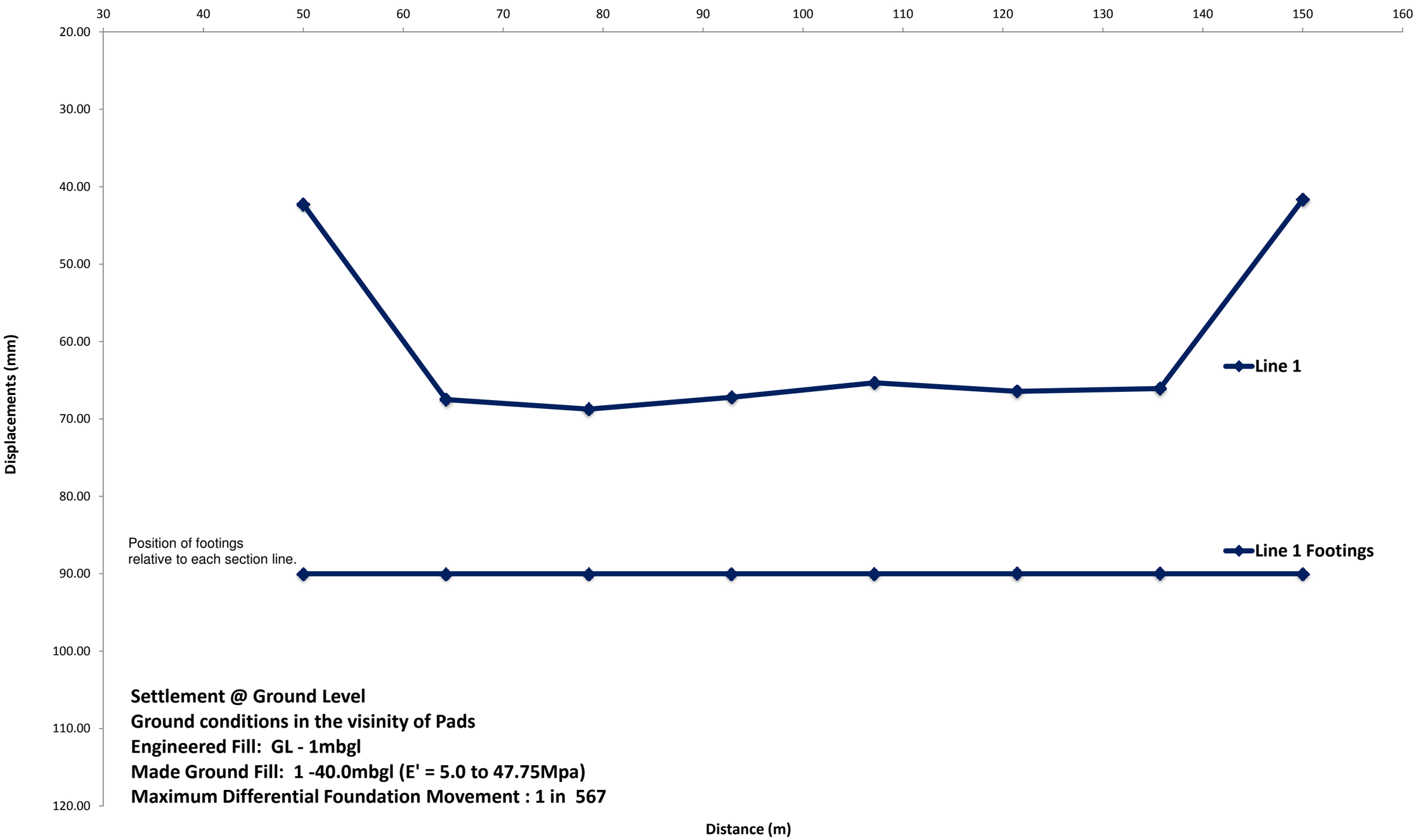


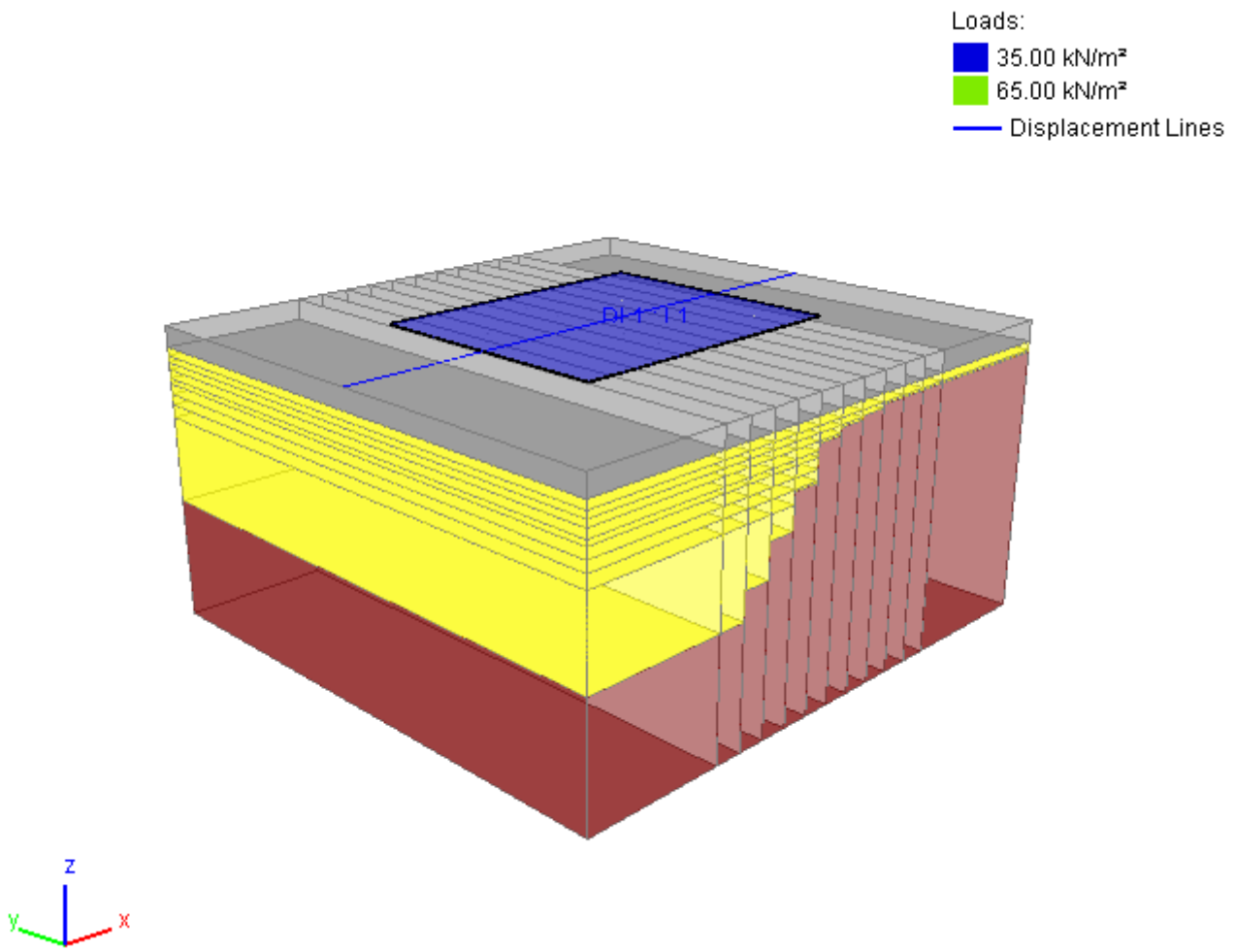
Displacement for L1



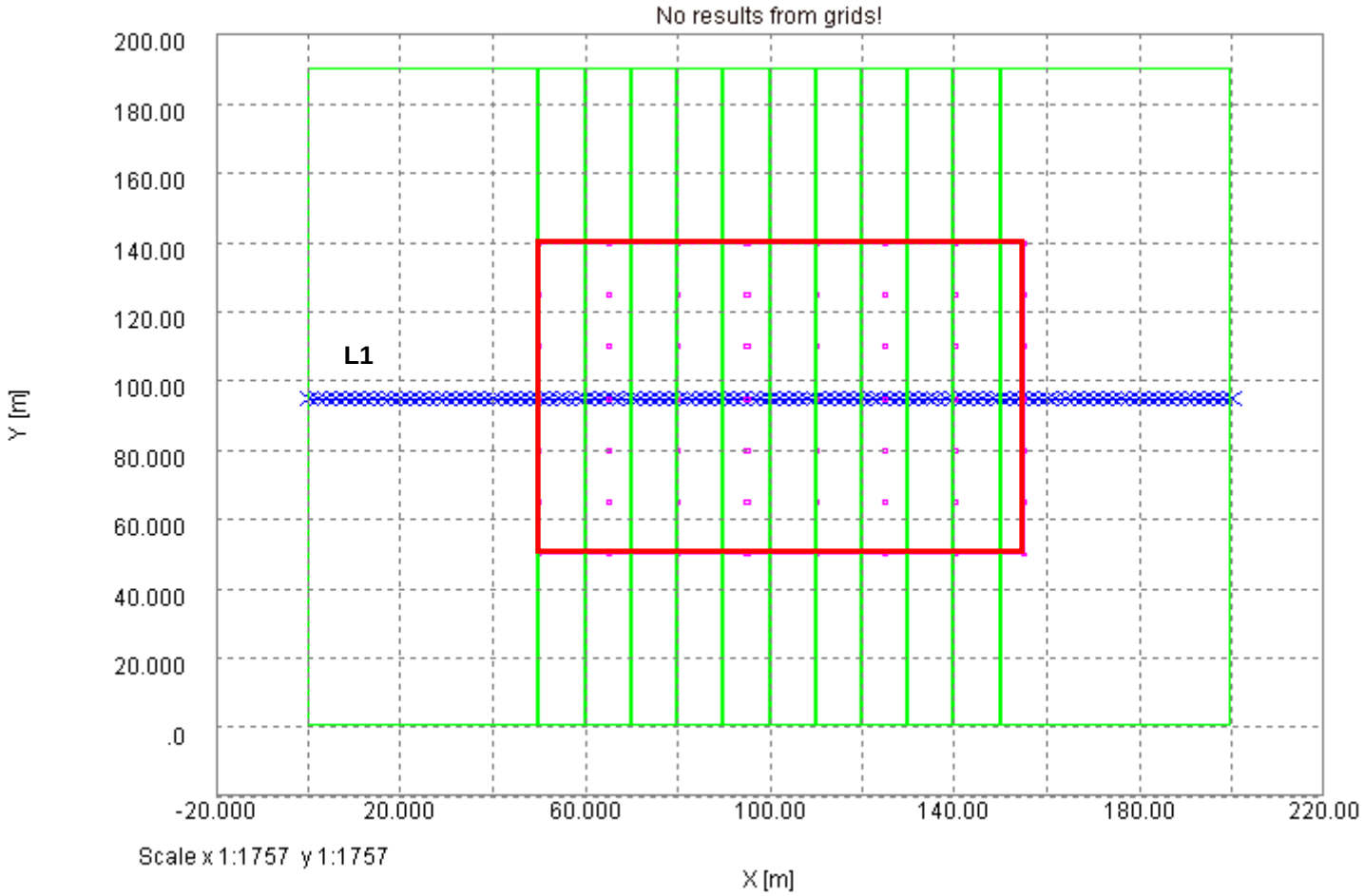
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UNIT 3 - Lines 1





RSK	**UNIT 4 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 4 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

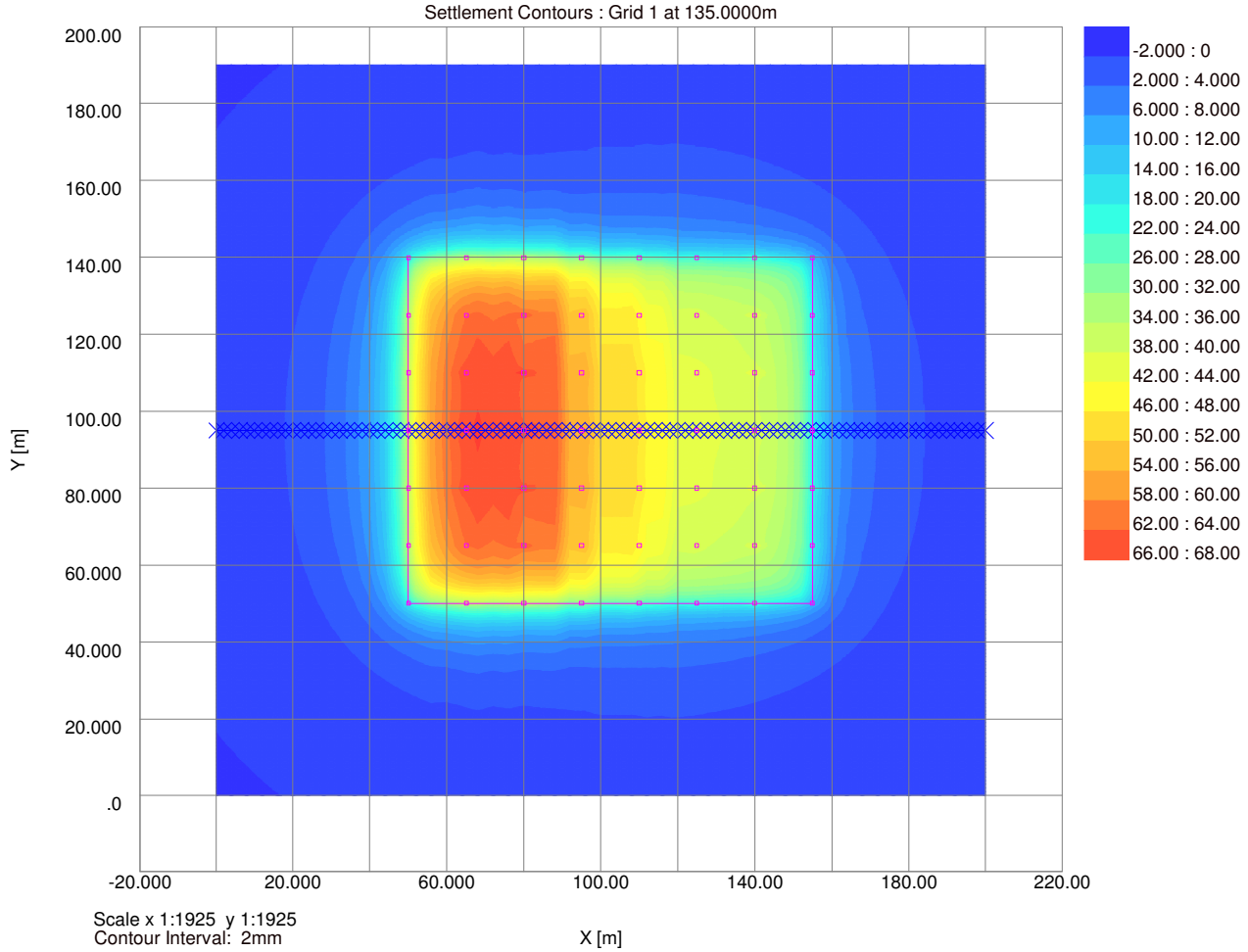
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ROCKINGHAM 2-3
Unit 4

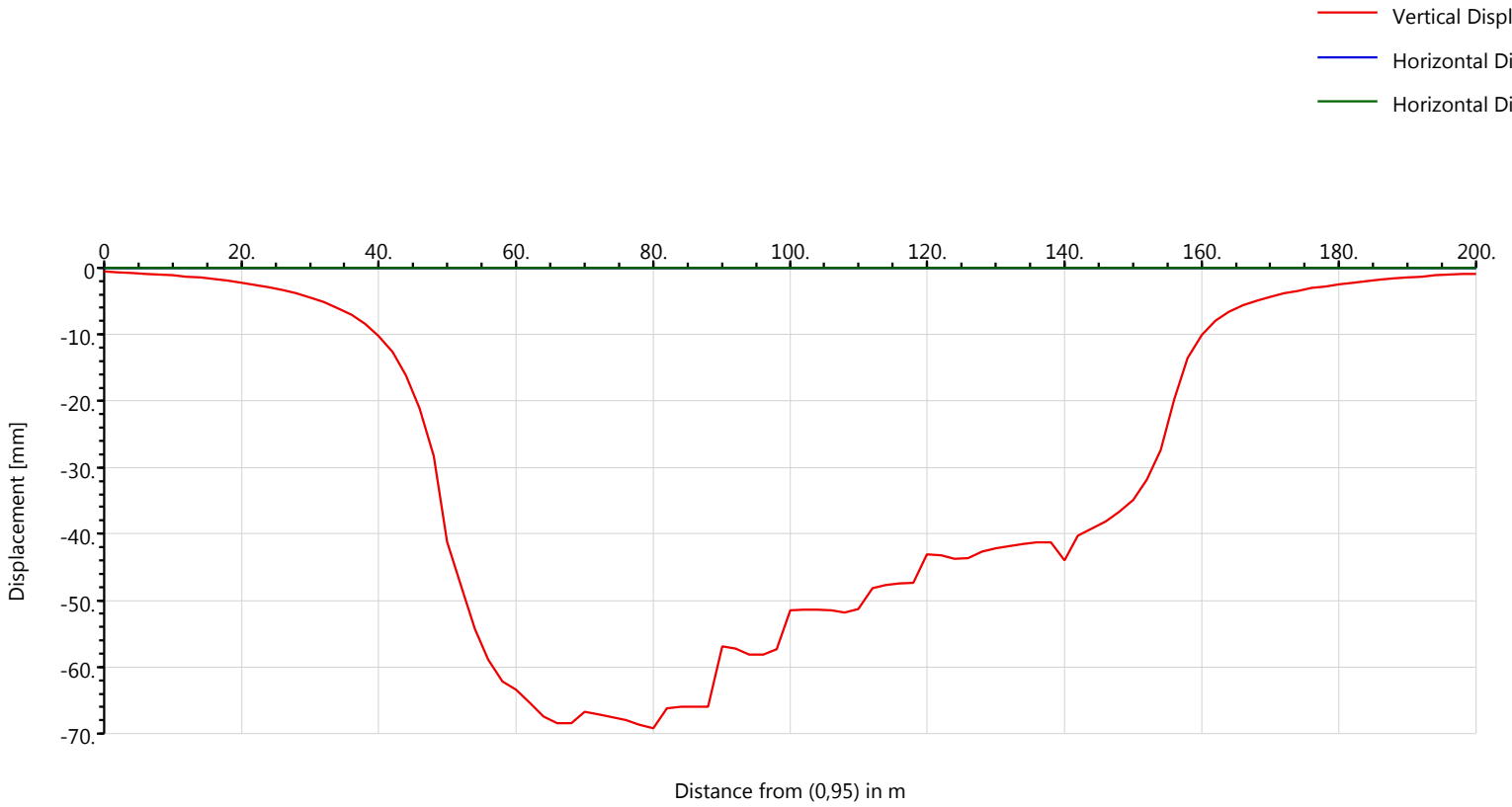
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372079		

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Made by	Date	Checked
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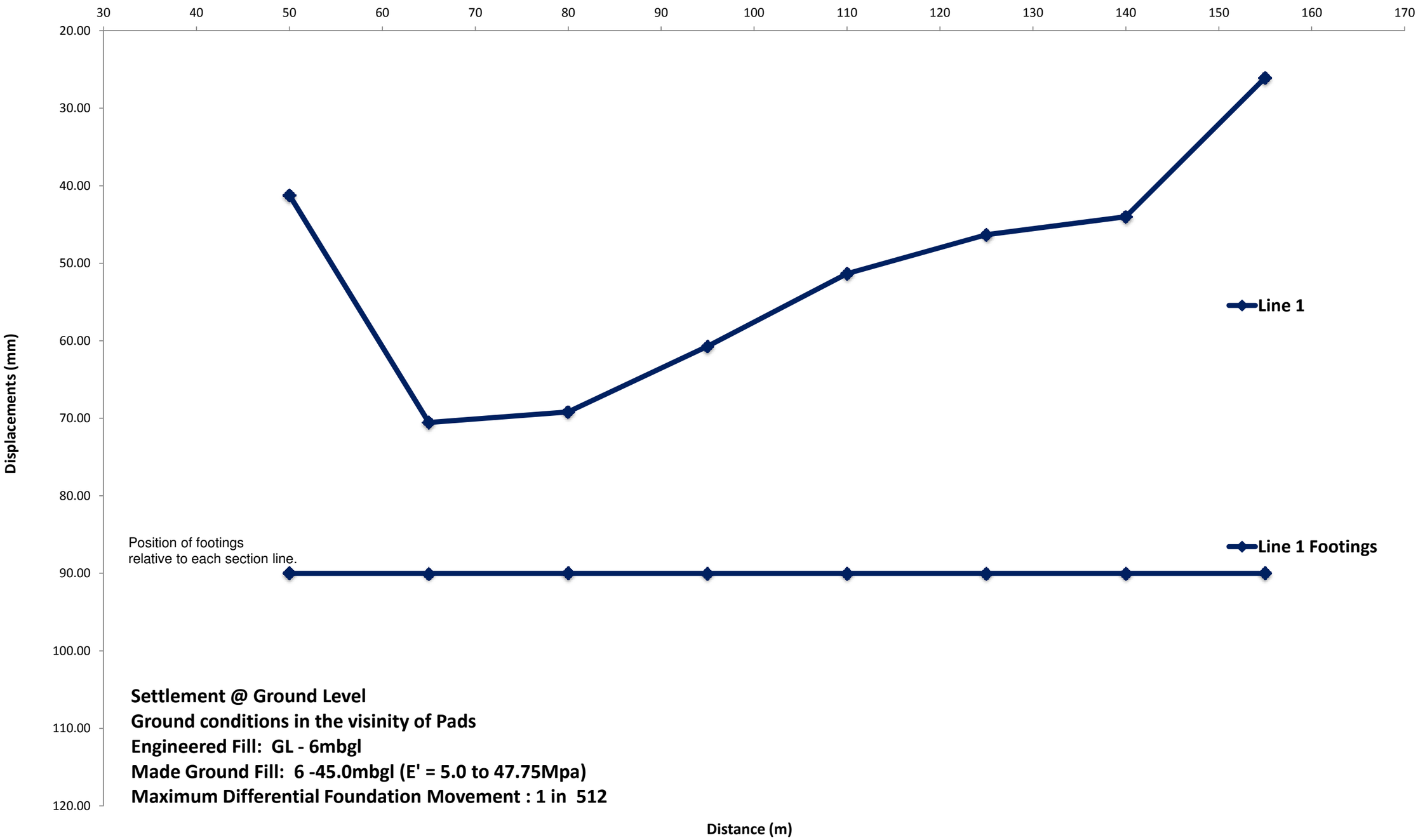


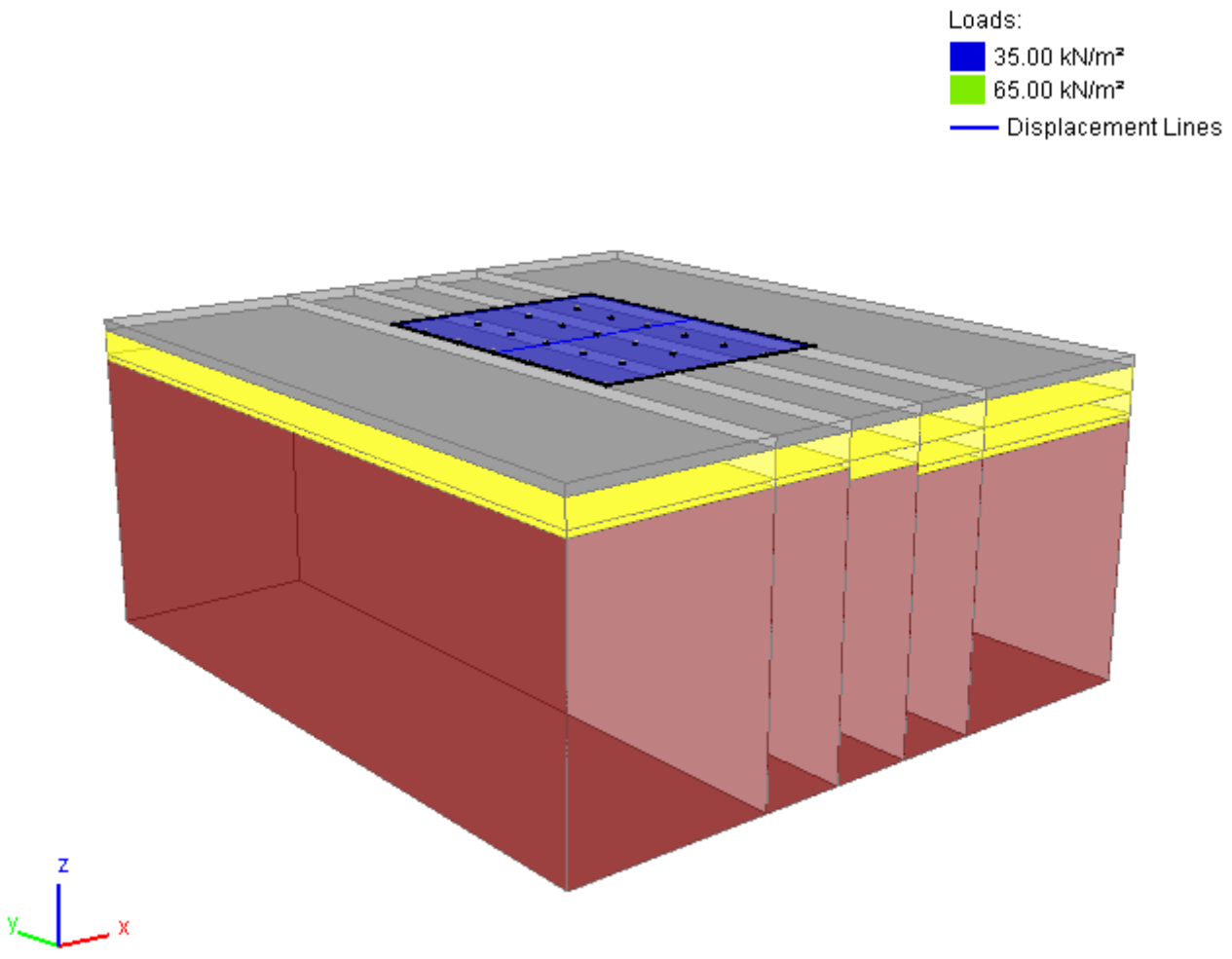
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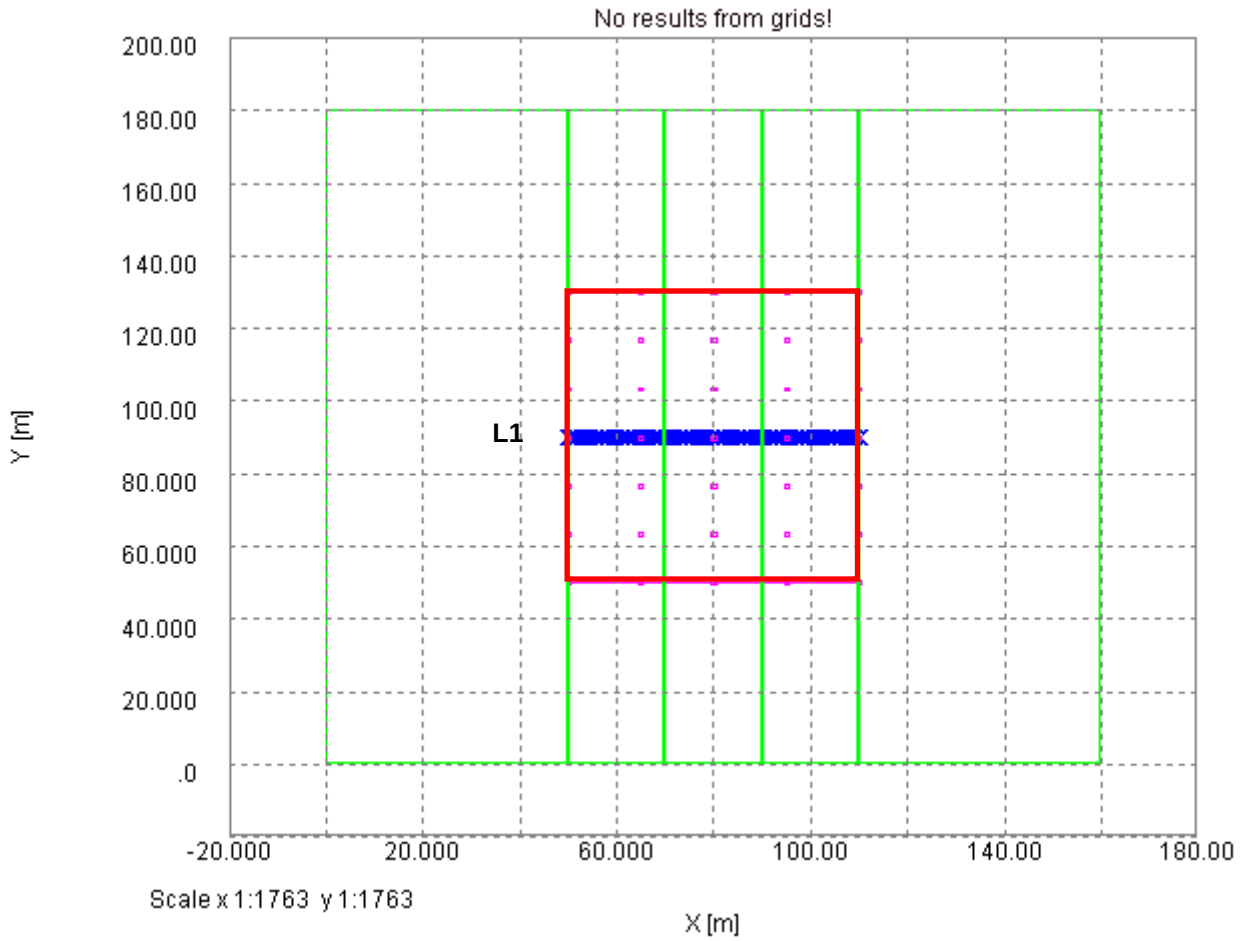
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UNIT 4 - Lines 1





RSK	**UNIT 4 – PHASE 2 (OPTION B)** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 4 PHASE 2 – OPTION B DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

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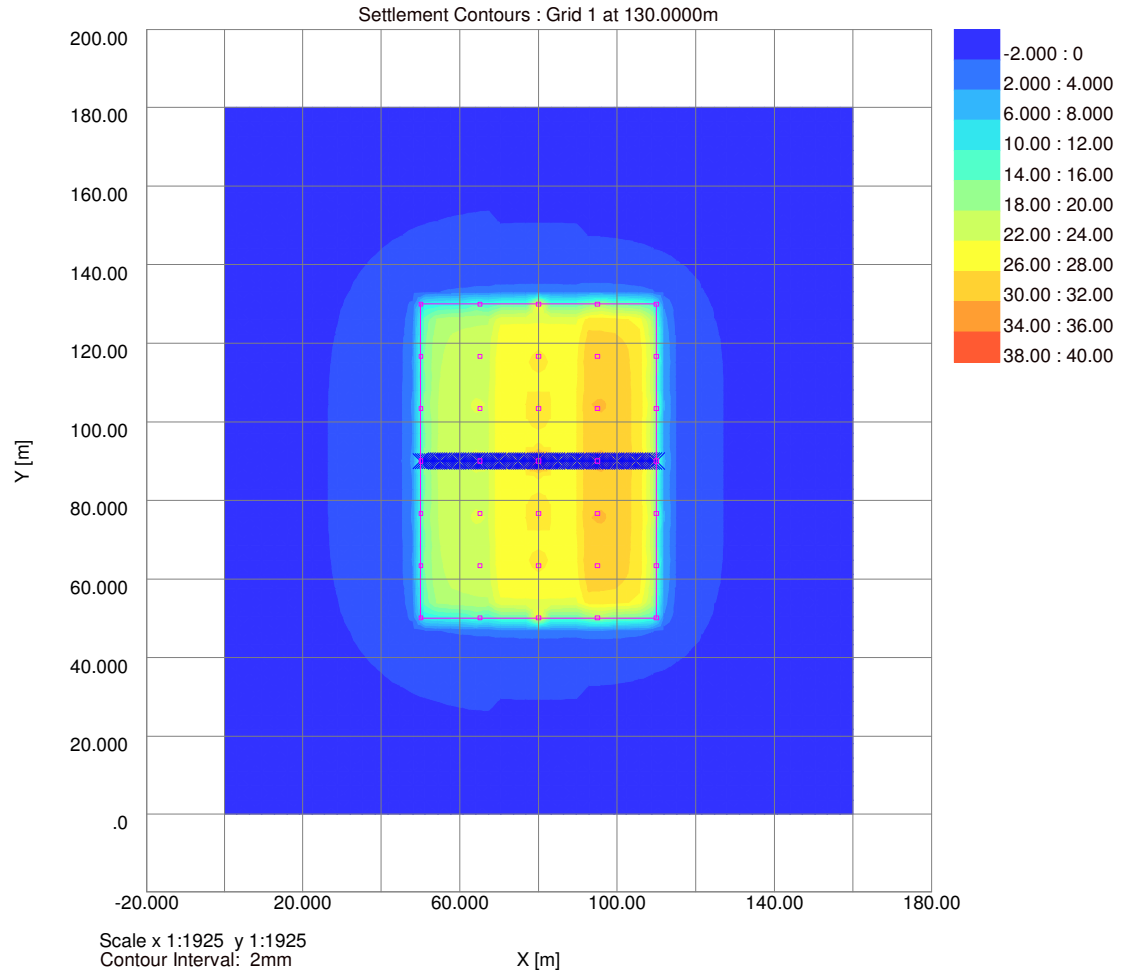
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ROCKINGHAM 2-3
Unit 4-OPTION B

Job No.	Sheet No.	Rev.
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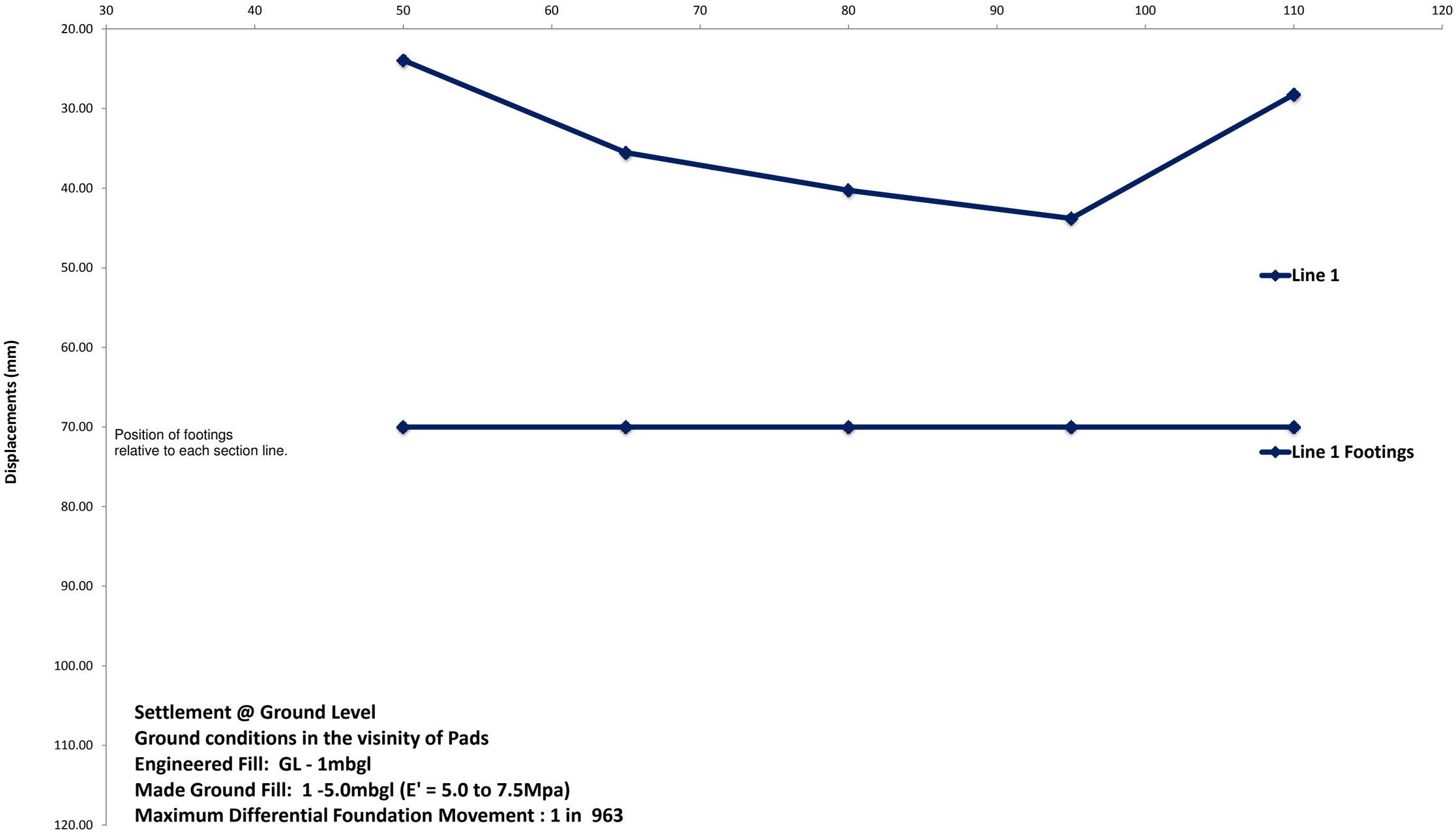


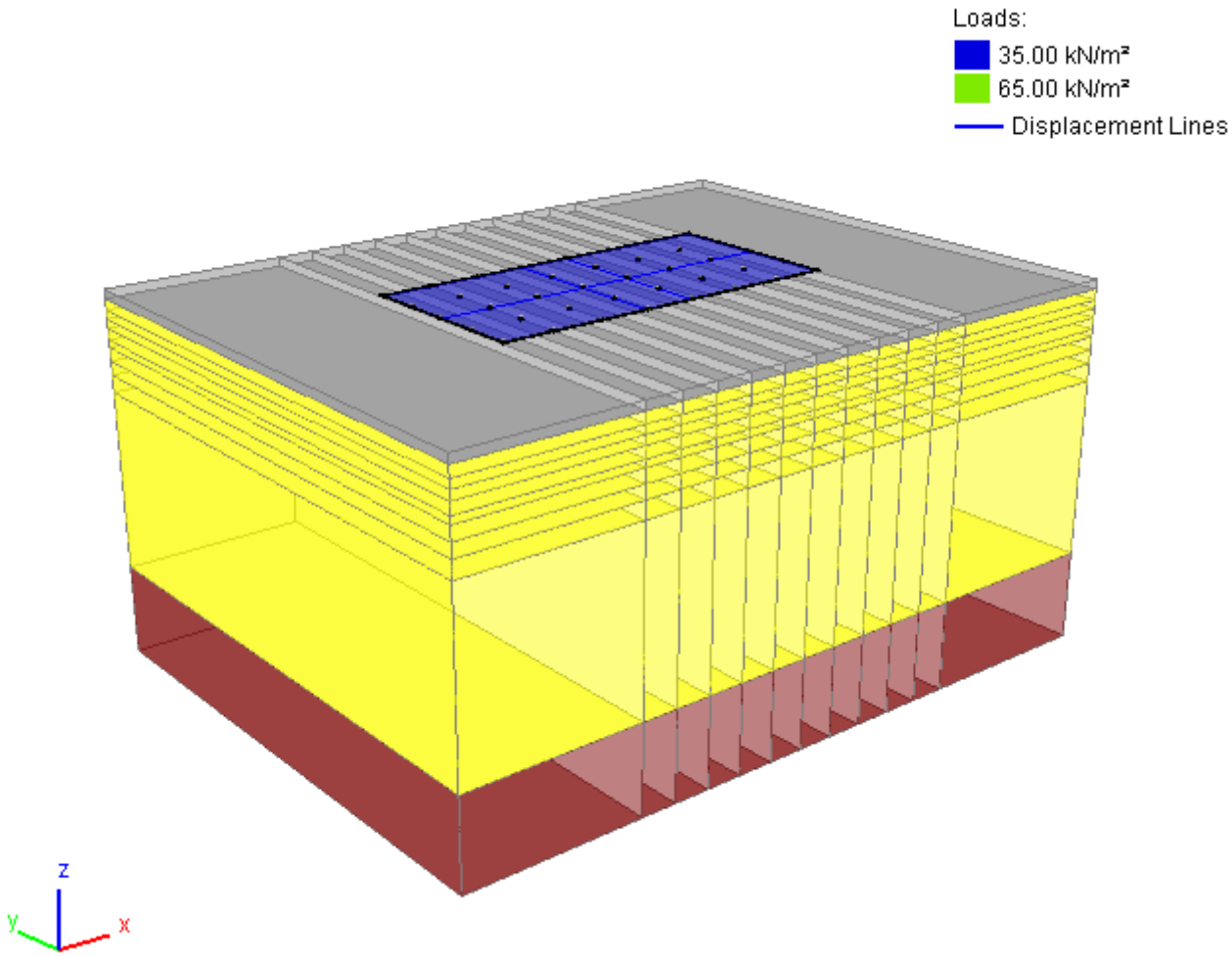
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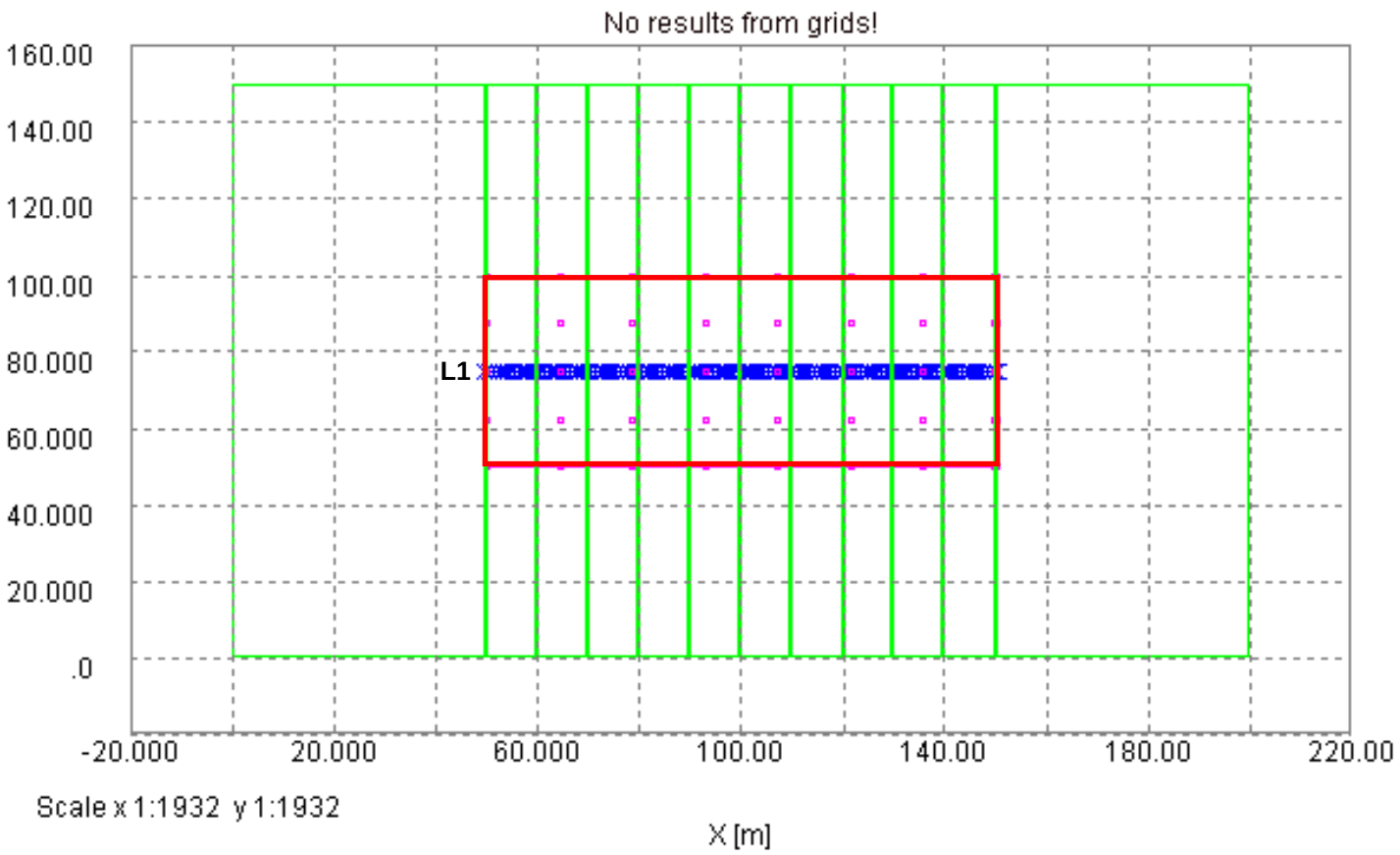
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UNIT 4B - Lines 1





RSK	**UNIT 5 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



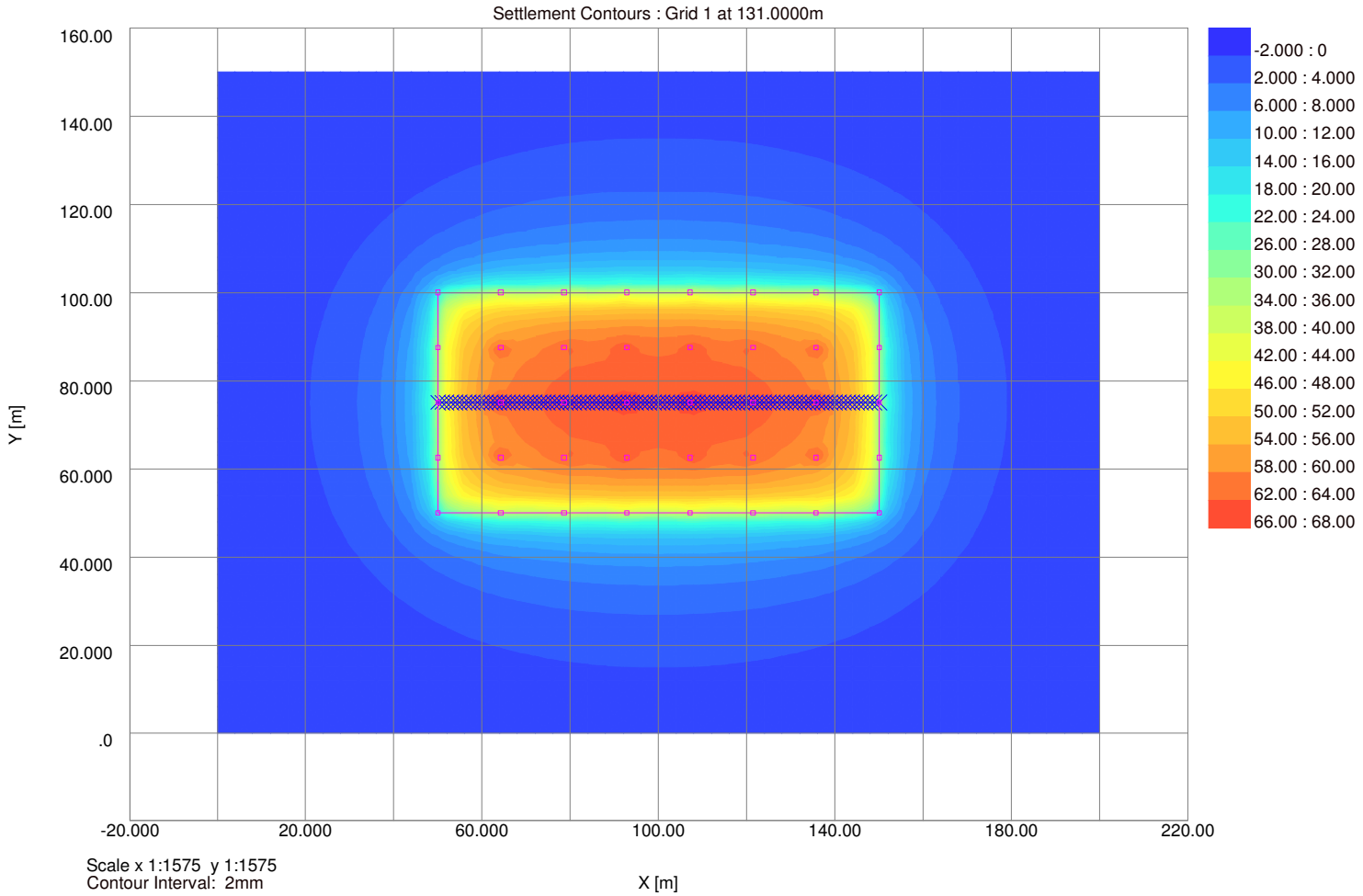
RSK	**UNIT 5 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

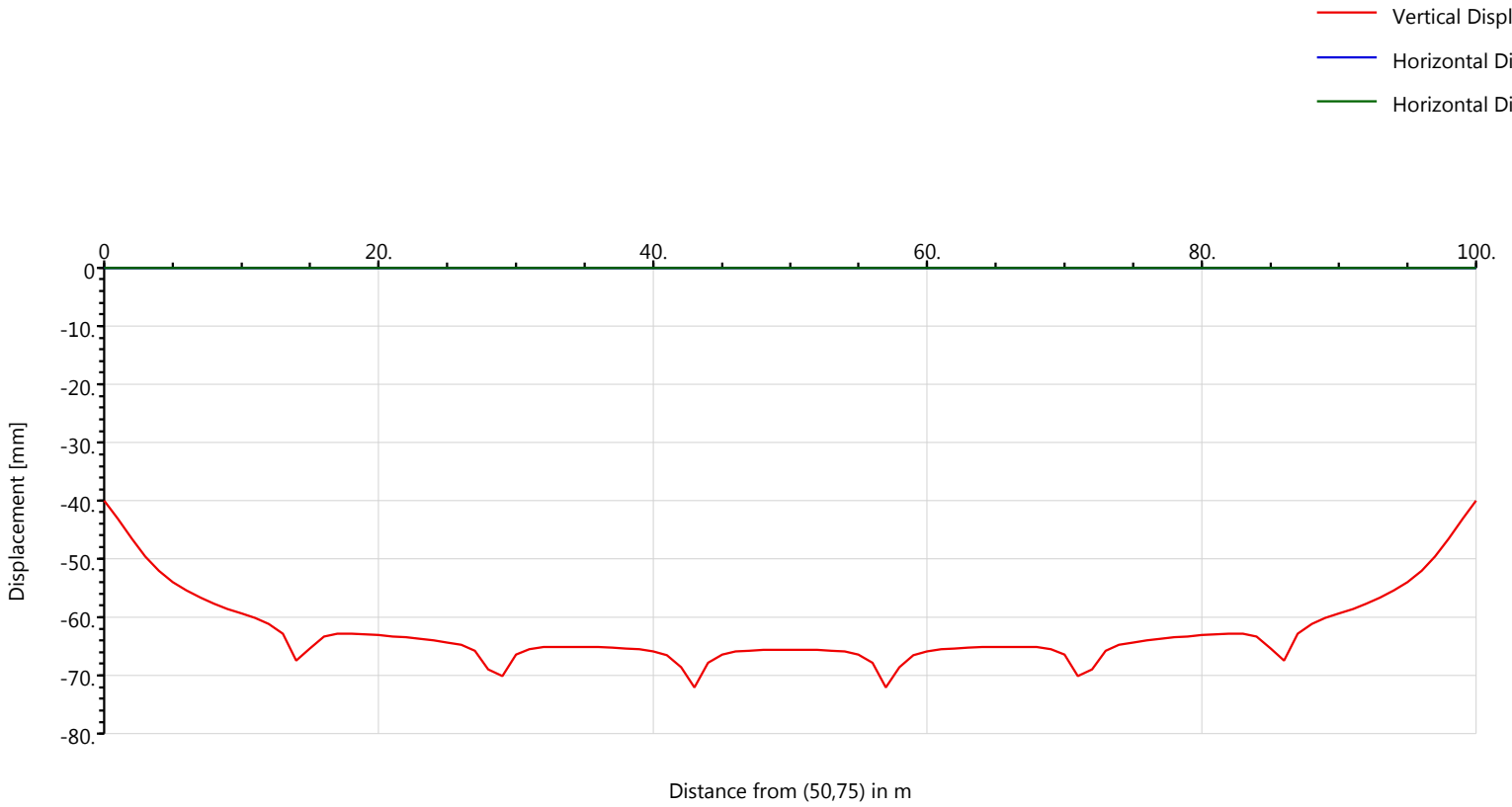
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ROCKINGHAM 2-3
Unit 5

Job No.	Sheet No.	Rev.
372079		
Drg. Ref.		
Made by GS	Date	Checked

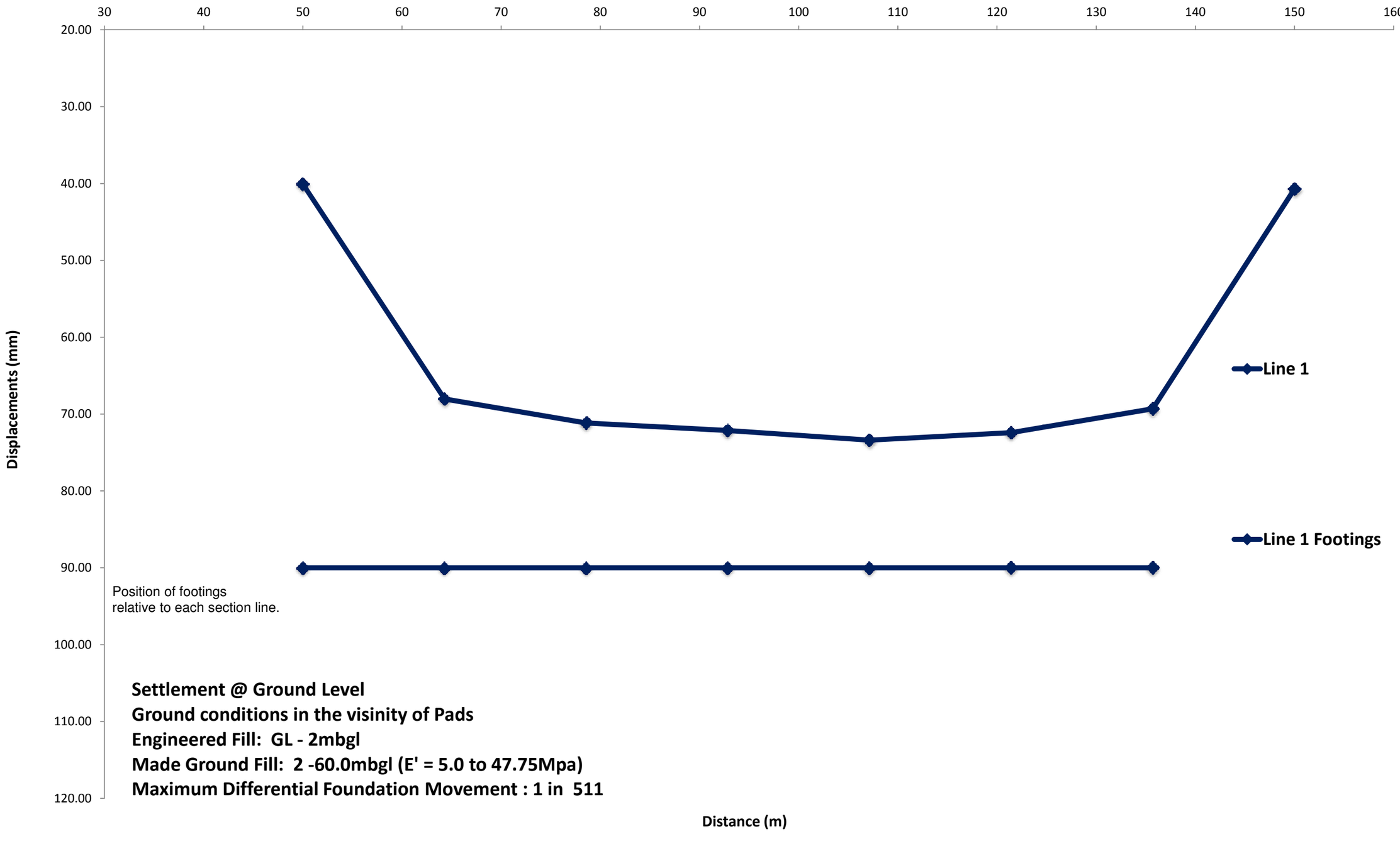


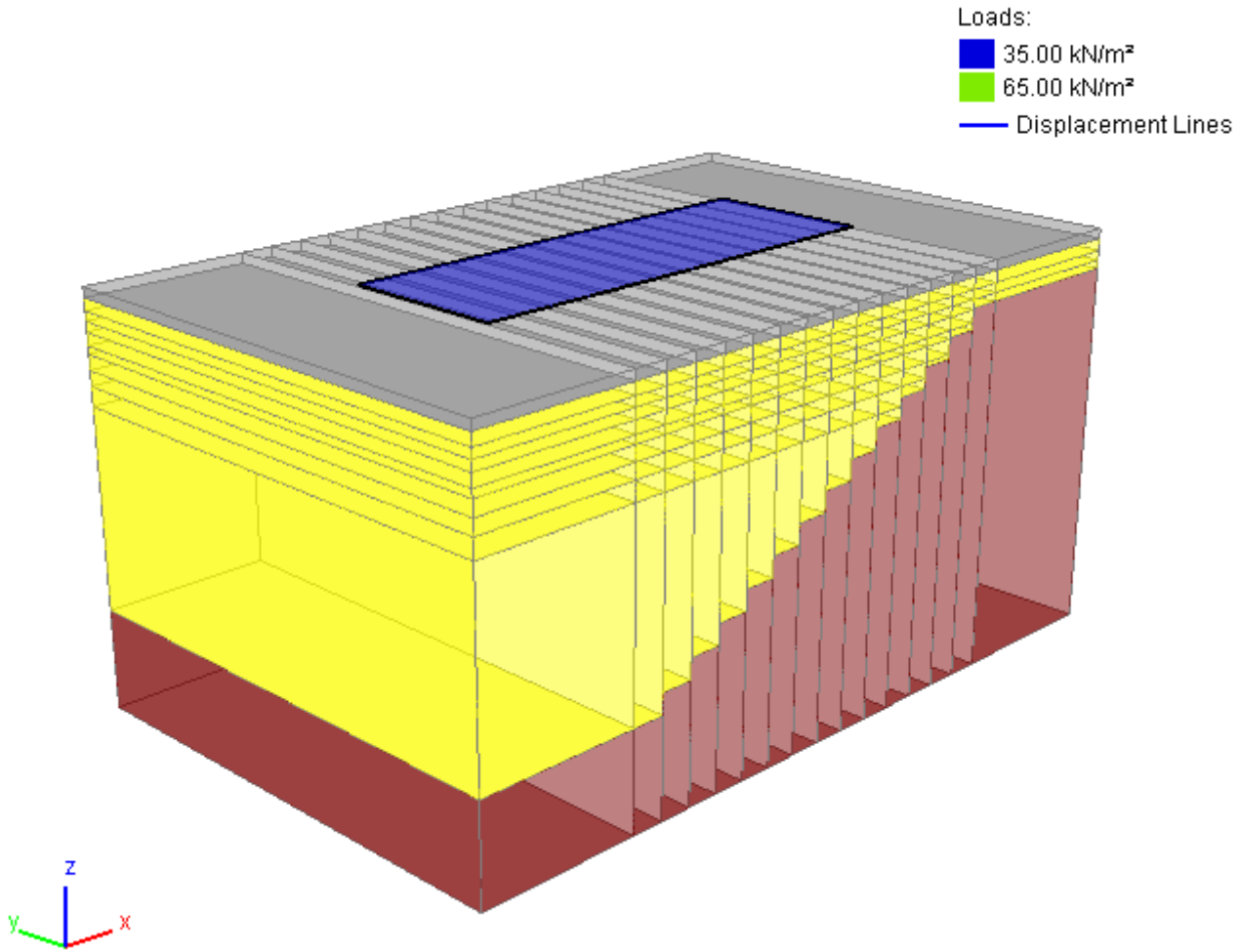
Displacement for L1



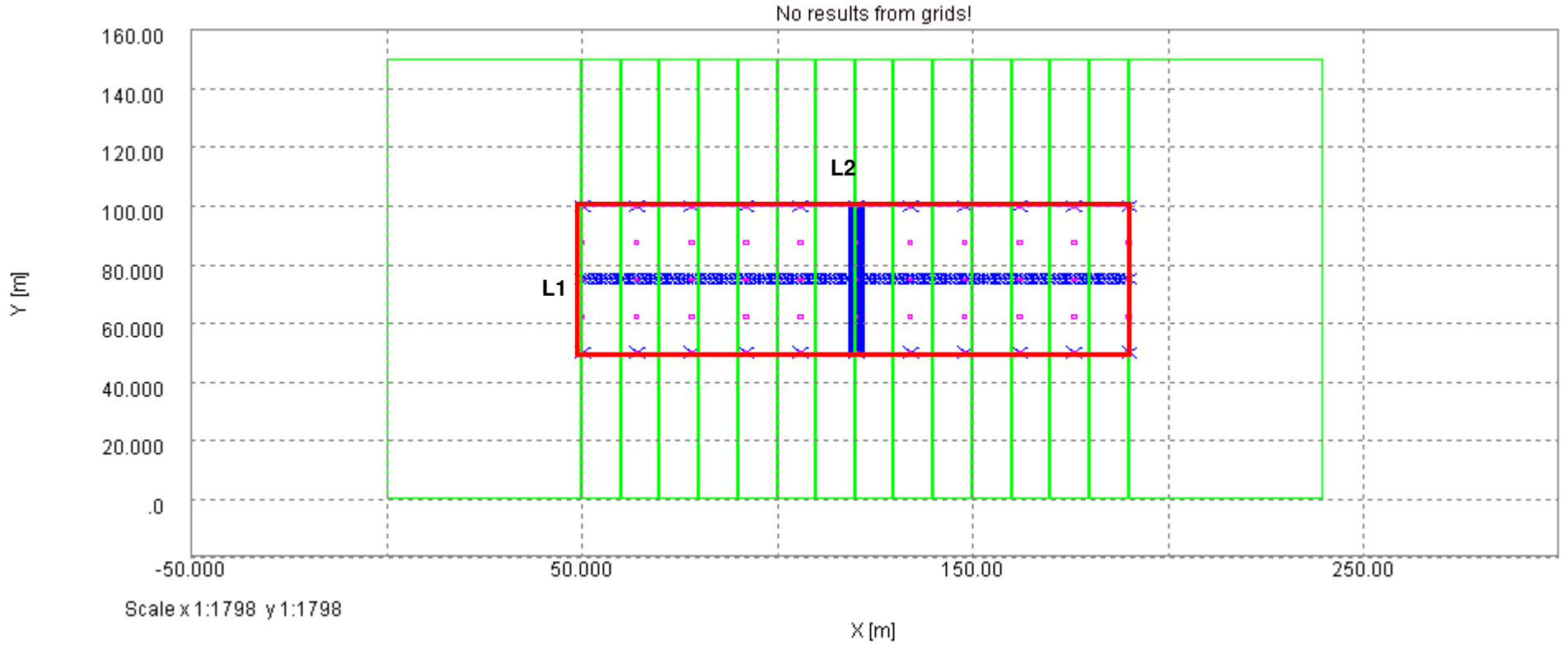
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 5 - Lines 1





RSK	**UNIT 6 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 6 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

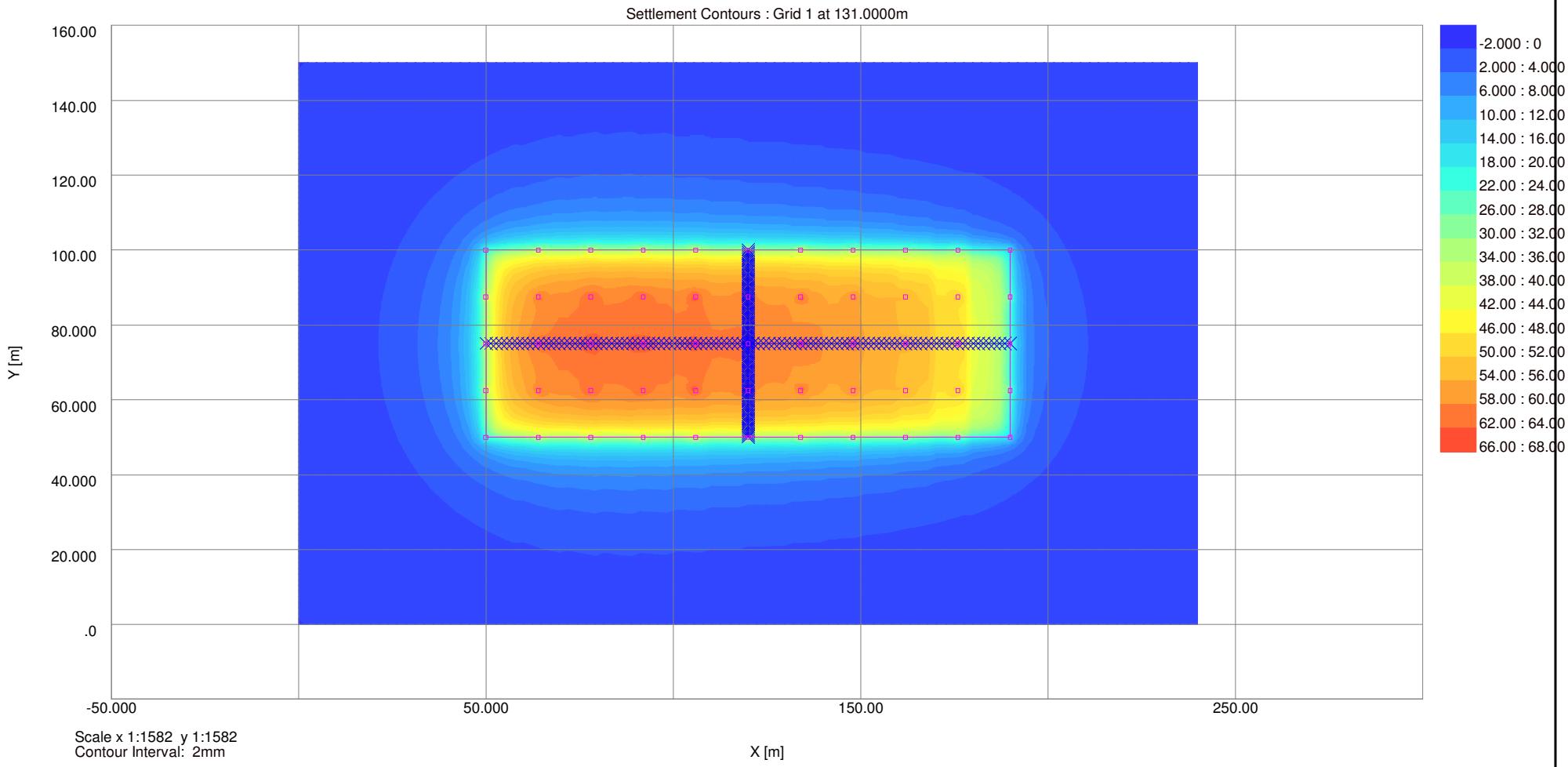
RSK ENVIRONMENT LIMITED

ROCKINGHAM 2-3
Unit 6

Job No.	Sheet No.	Rev.
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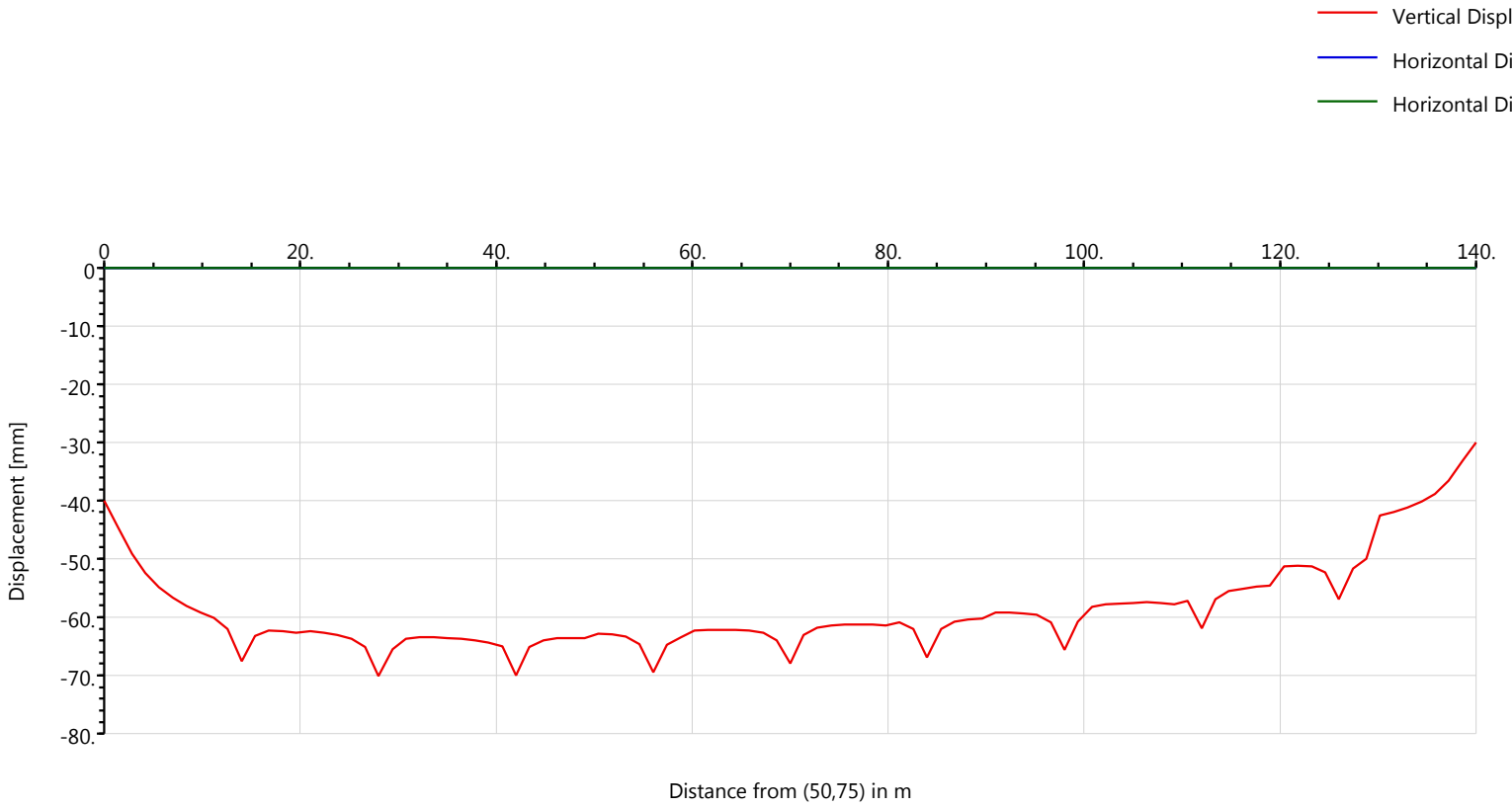
Drg. Ref.

Made by	Date	Checked
GS		



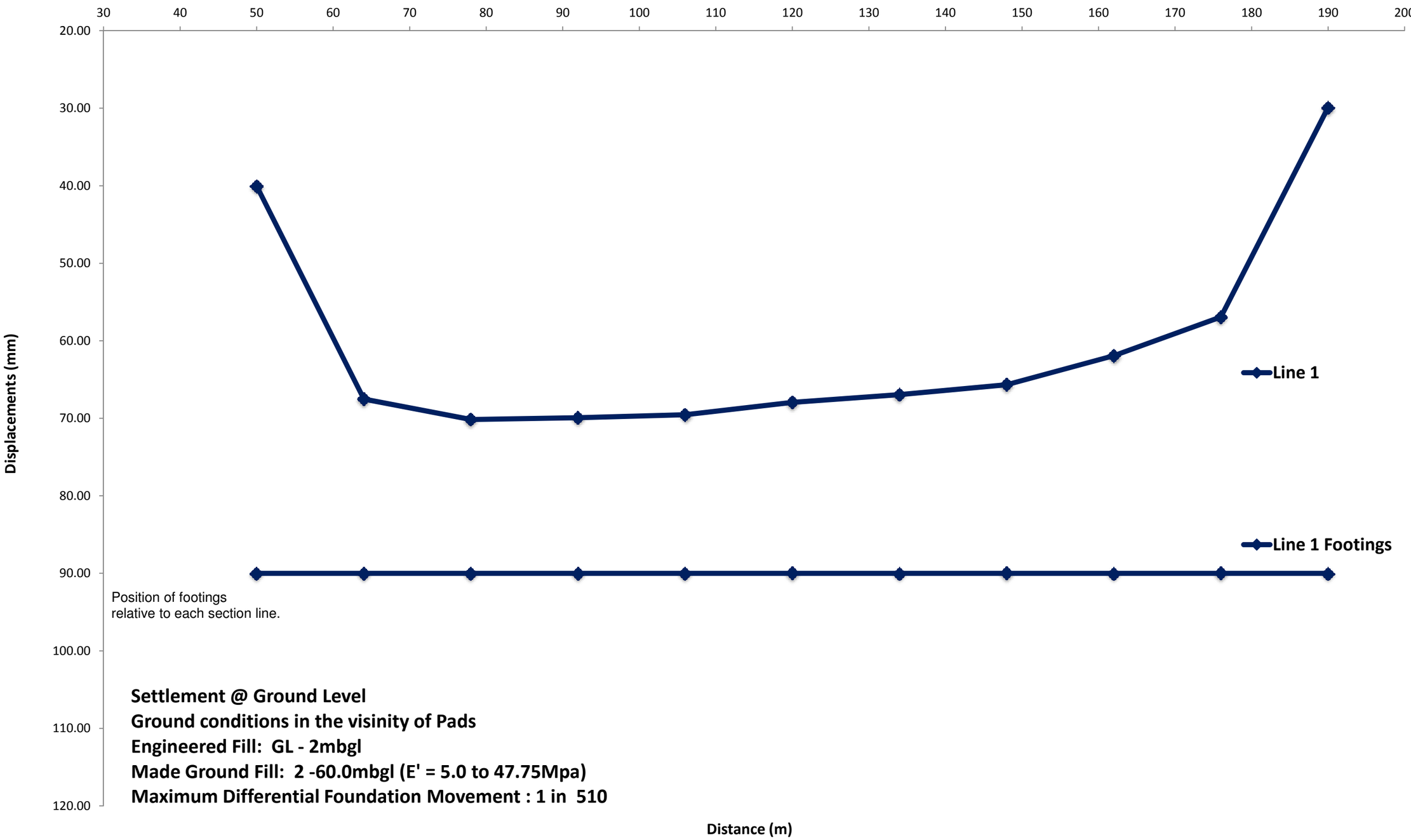
Scale x 1:1582 y 1:1582
Contour Interval: 2mm

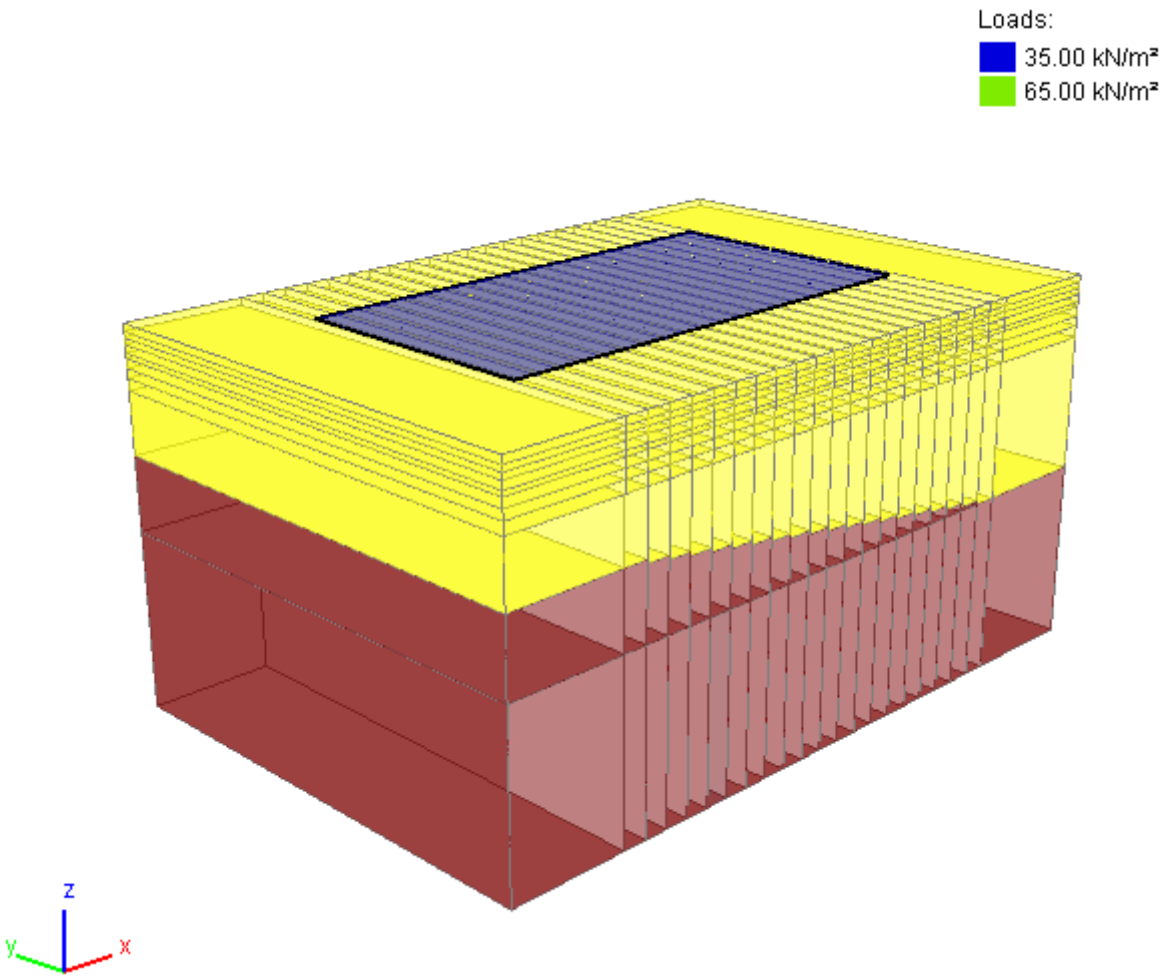
Displacement for L1



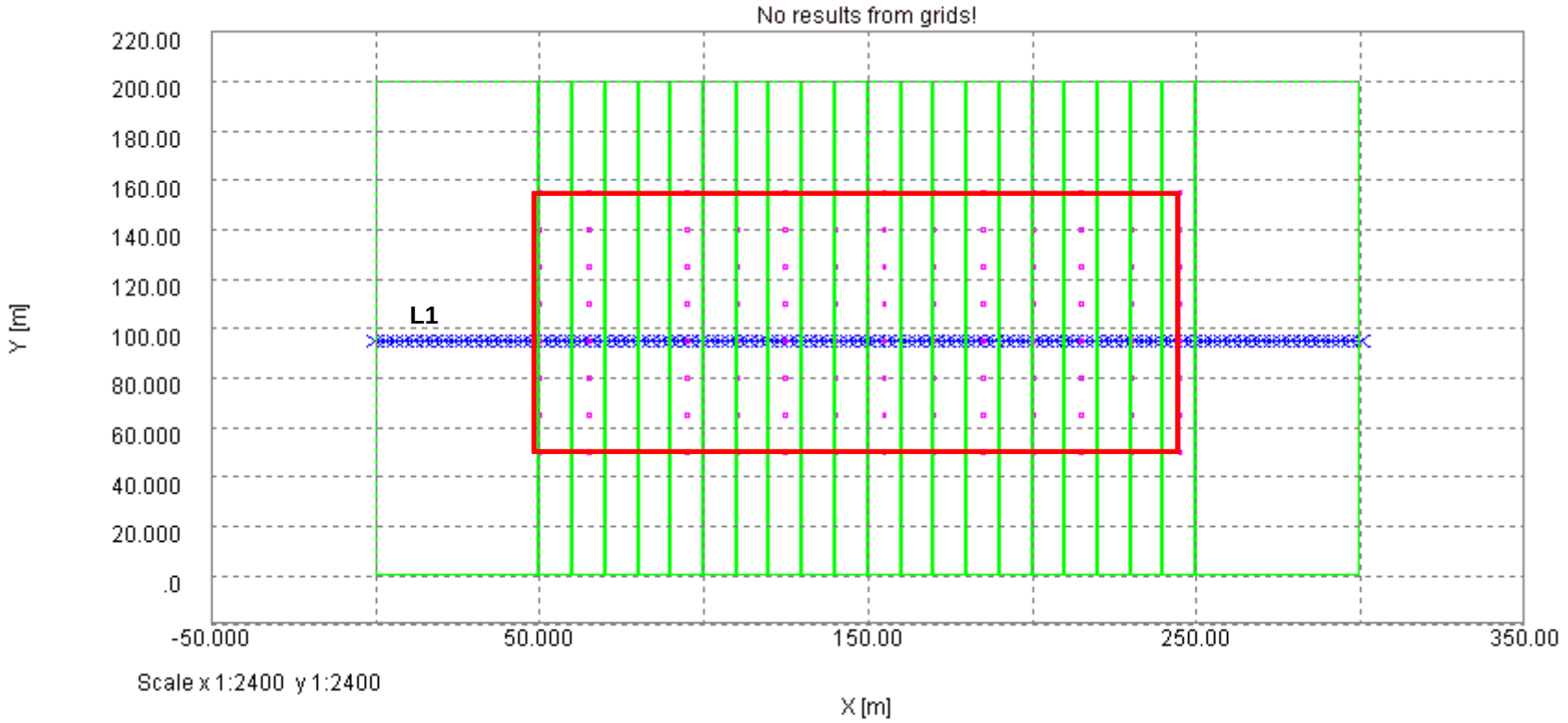
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 6 - Lines 1





RSK	**UNIT 7 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



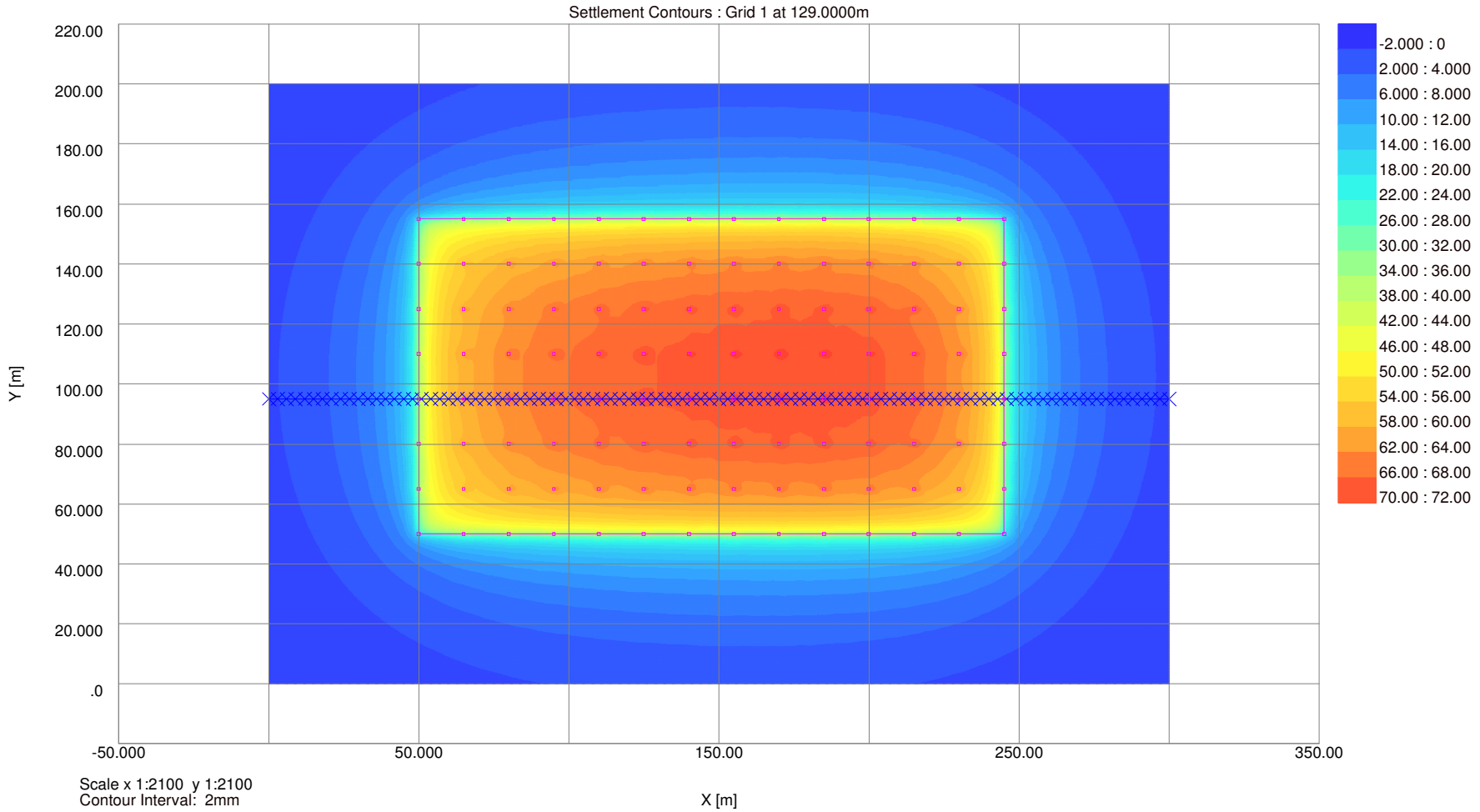
RSK	**UNIT 7 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

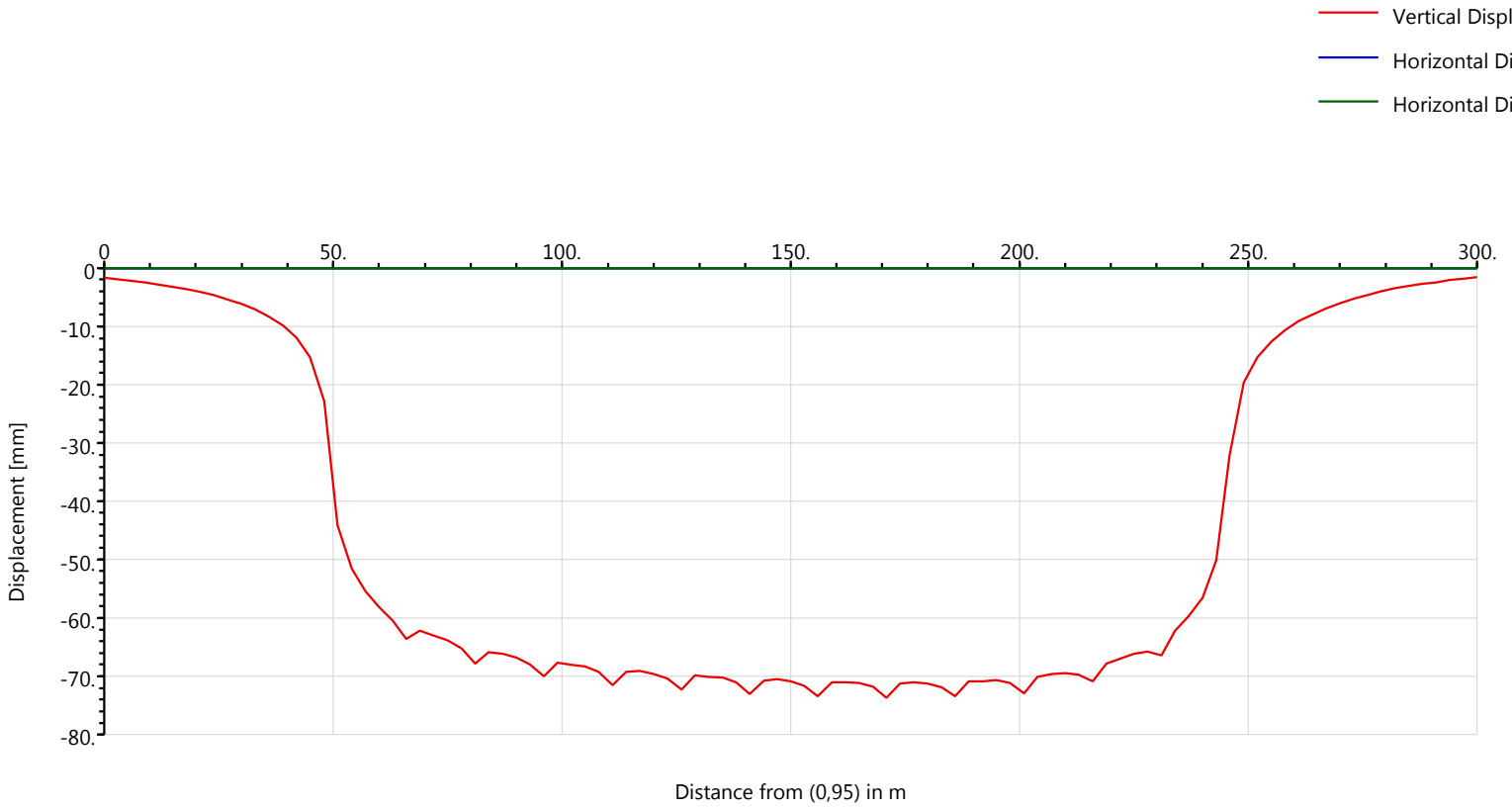
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ROCKINGHAM 2-3
Unit 7

Job No.	Sheet No.	Rev.
372079		
Drg. Ref.		
Made by GS	Date	Checked

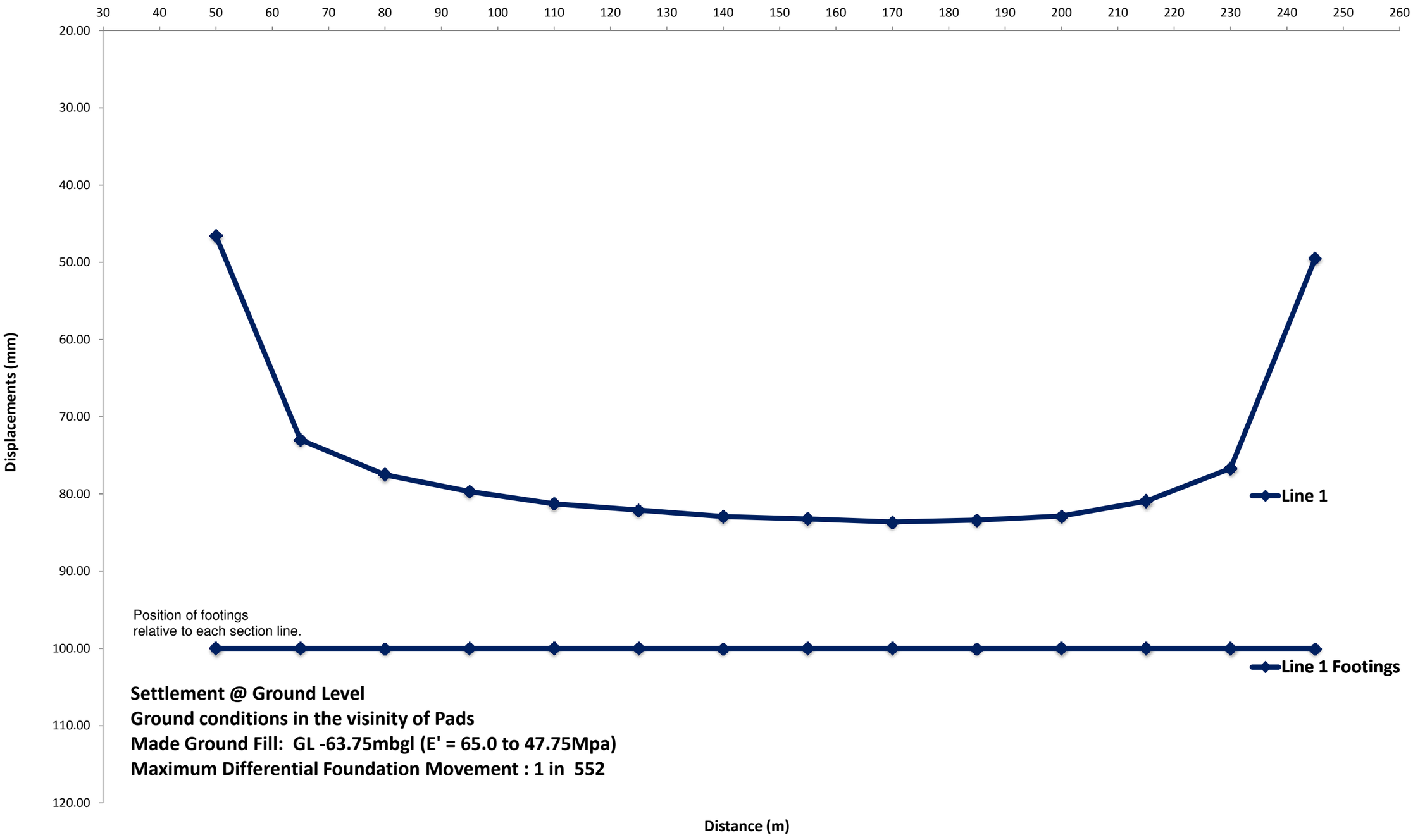


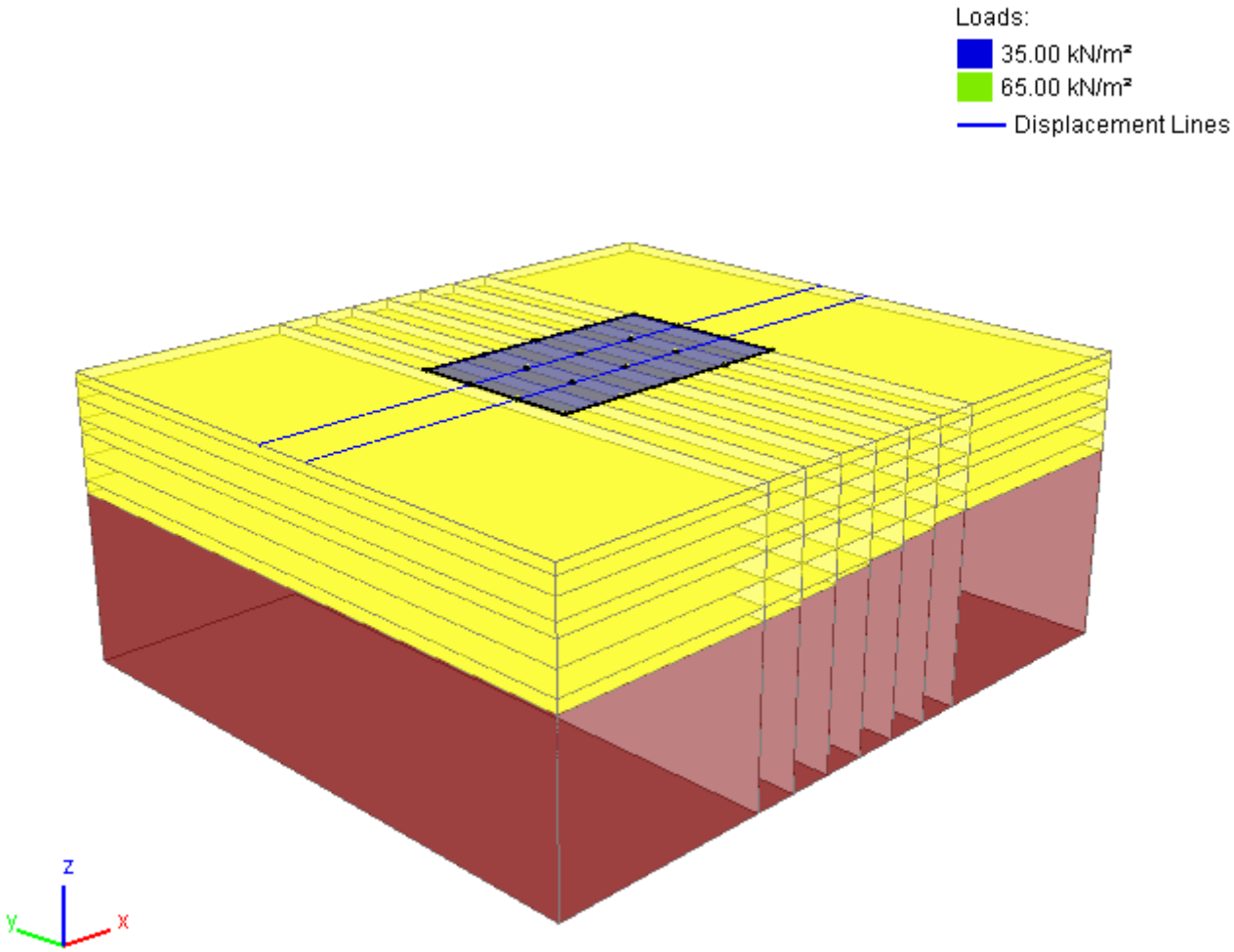
Displacement for L1



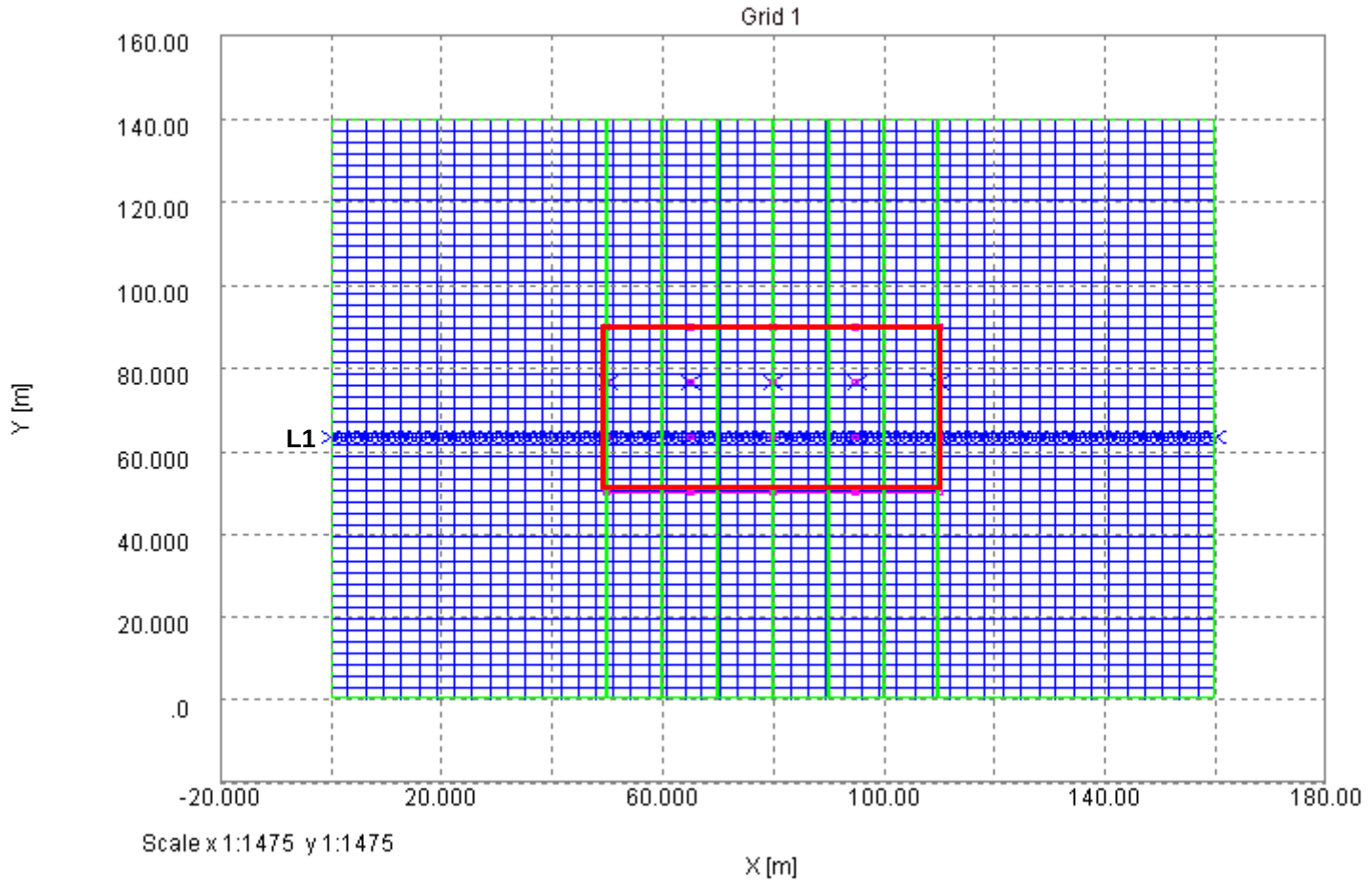
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 7 - Lines 1





RSK	**UNIT 8 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 8 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP

Oasys

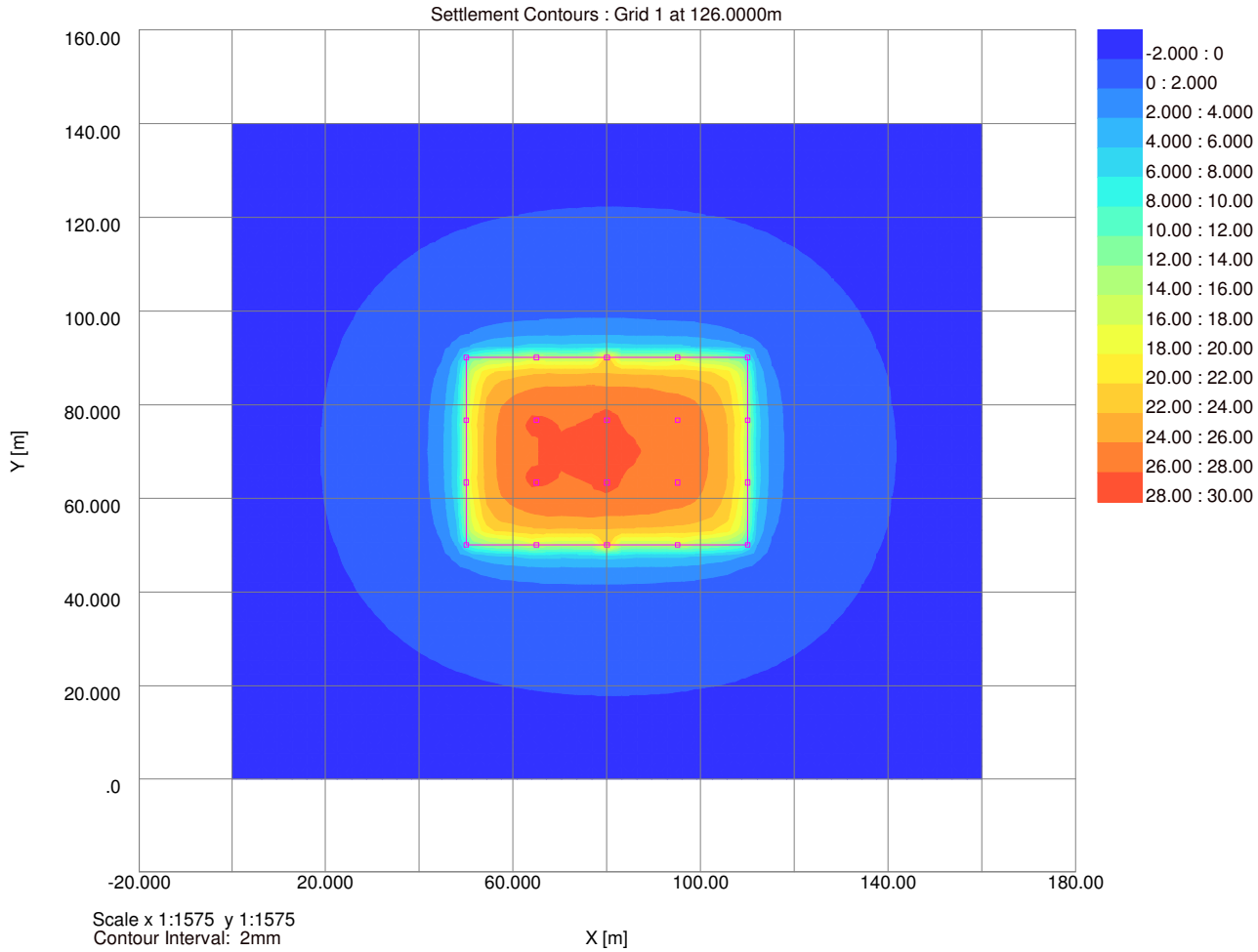
RSK ENVIRONMENT LIMITED

ROCKINGHAM 2-3
Unit 8

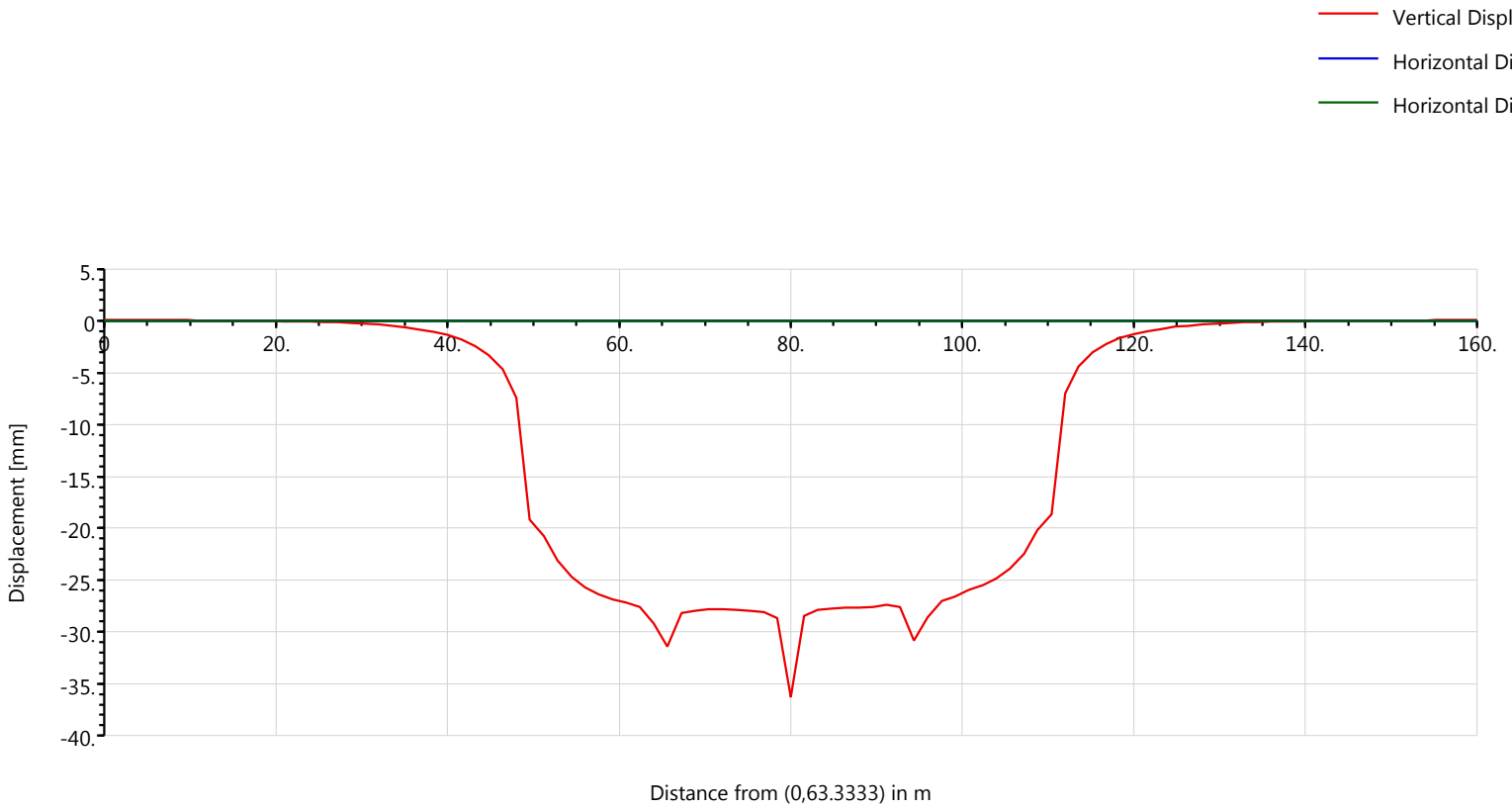
Job No.	Sheet No.	Rev.
372079		

Drg. Ref.

Made by	Date	Checked
GS		

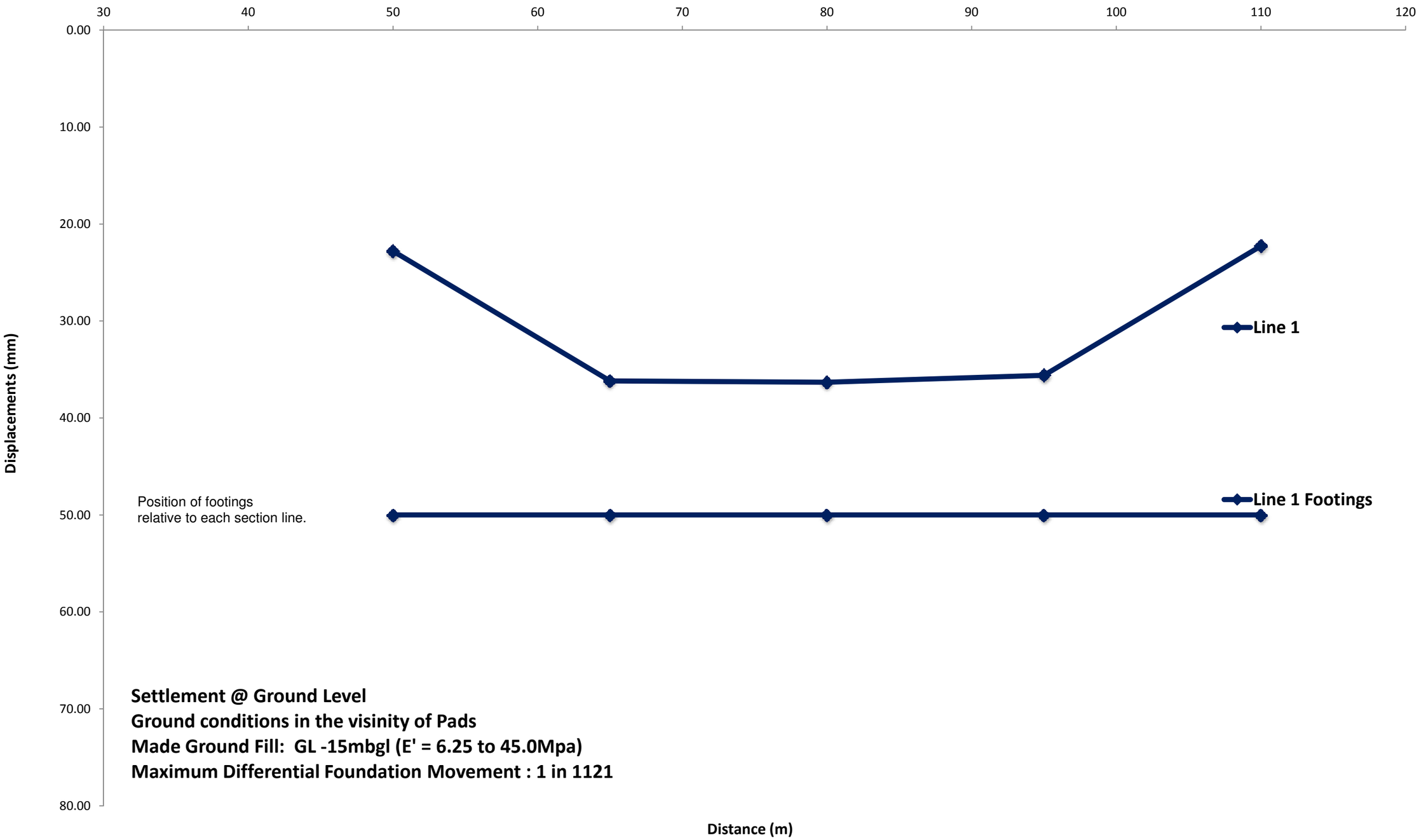


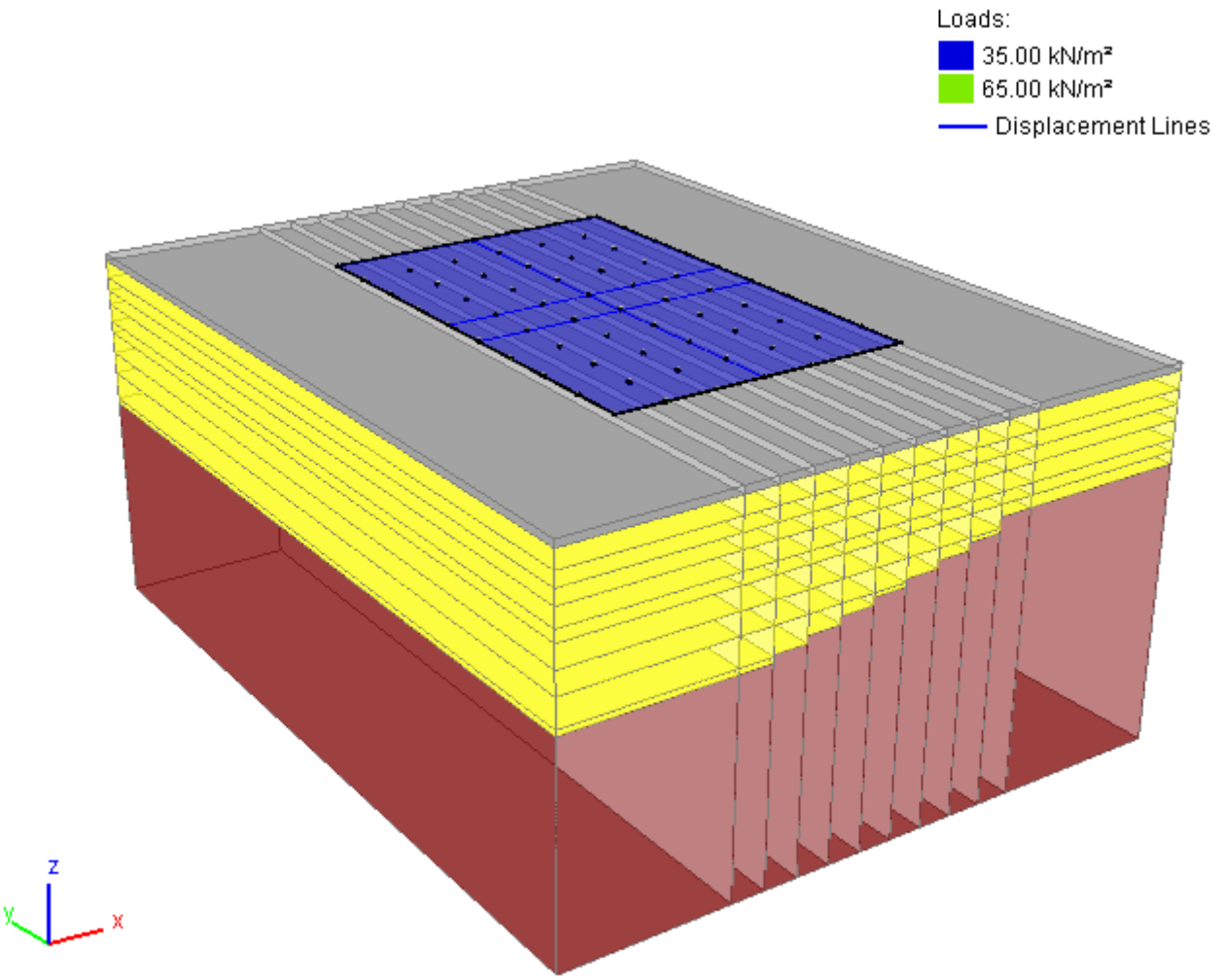
Displacement for L1



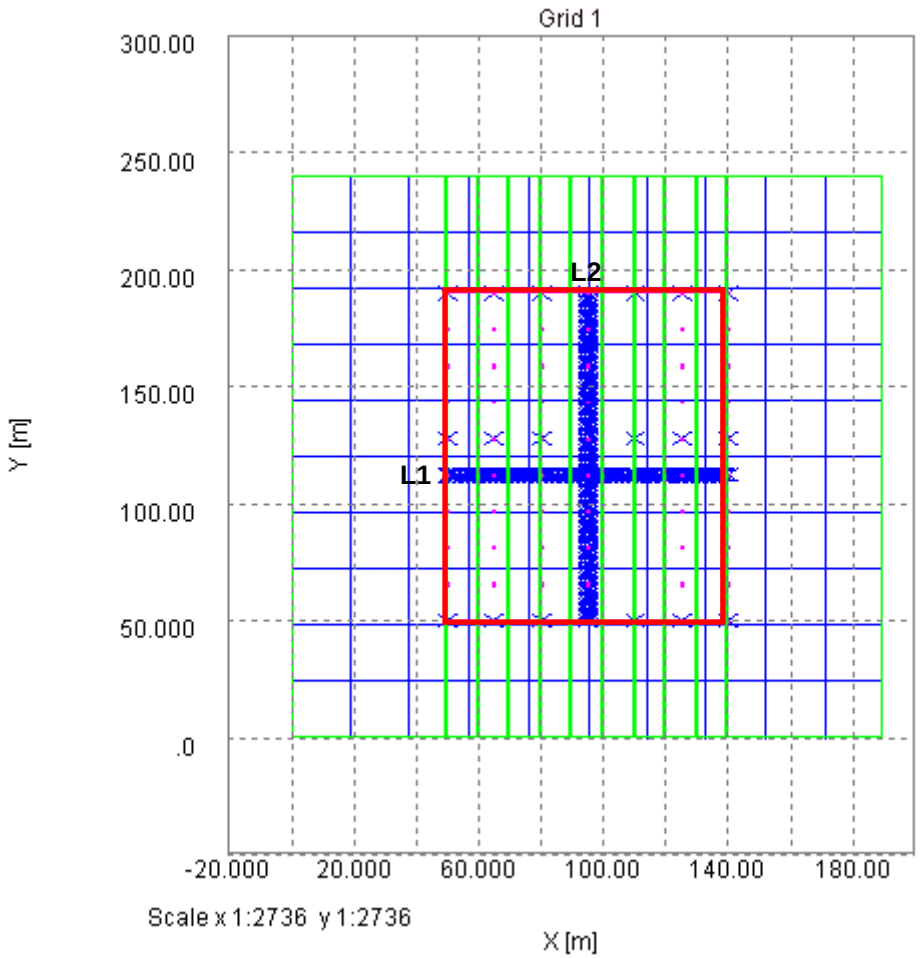
With Pads (100kPa) & Slab (35kPa) Loading

UNIT 8 - Lines 1

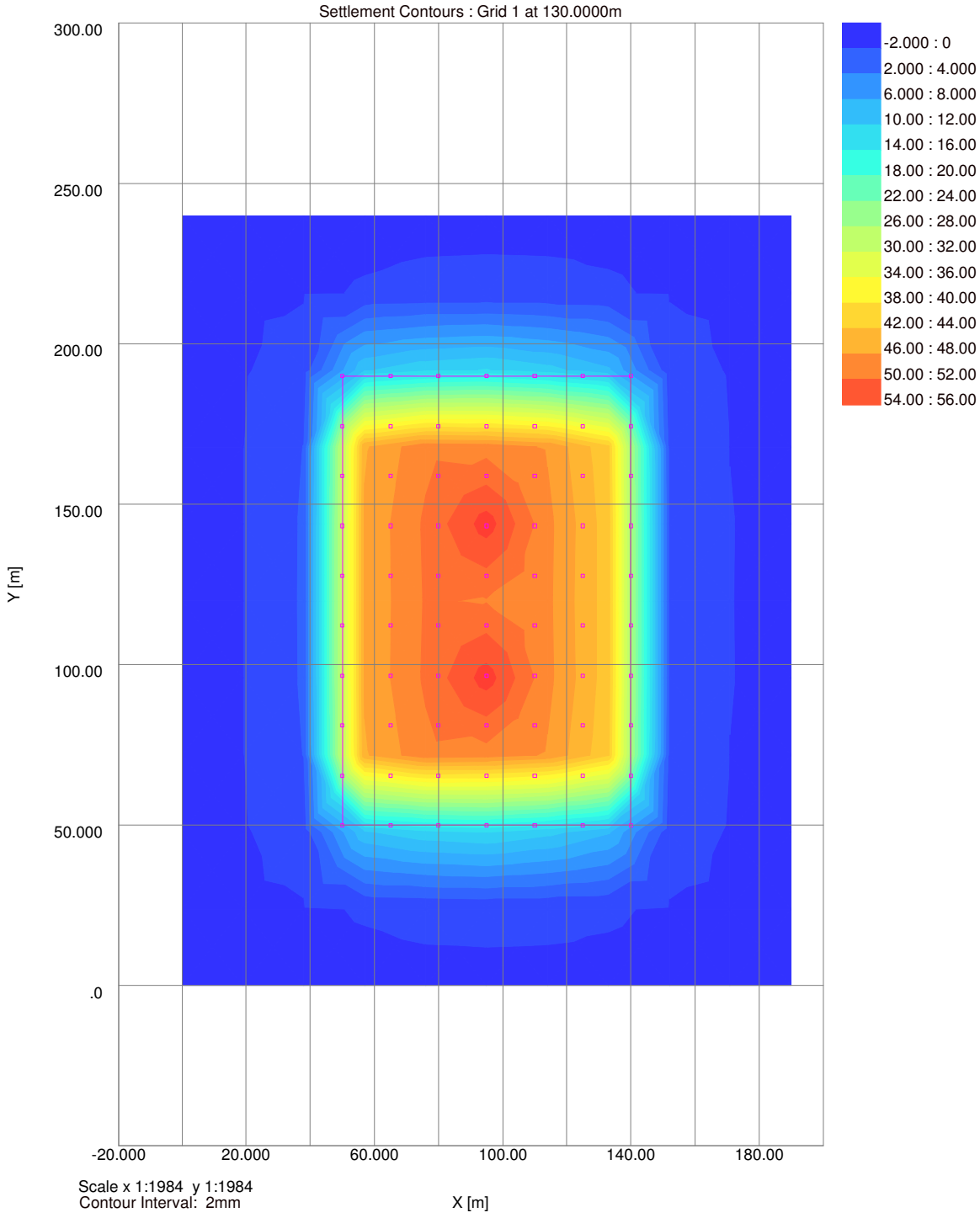




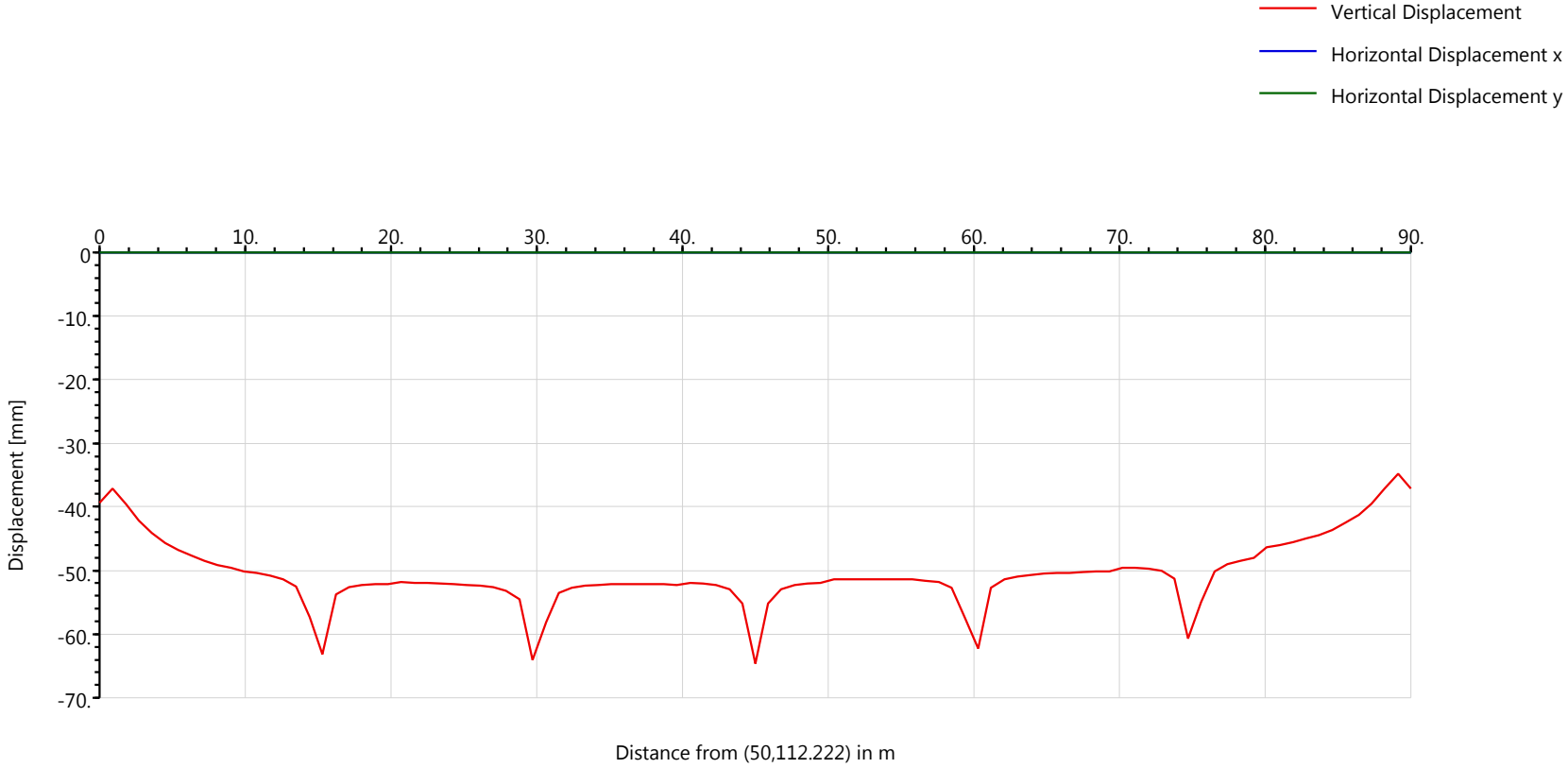
RSK	**UNIT 9 – PHASE 2** **3D MODEL – PDISP**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** **372079**
		Scale: NTS	**Source:** **PDISP**



RSK	**UNIT 9 PHASE 2 DISPLACEMENT LINES - PDISP INPUT**	**Client:** Harworth Estates	**Figure No:**
		Site: Rockingham 2-3	**Job No:** 372079
		Scale: NTS	**Source:** PDISP


Settlement Contours : Grid 1 at 130.0000m
300.00
250.00
200.00
150.00
100.00
50.000
.0
Y [m]
-20.000
20.000
60.000
100.00
140.00
180.00
X [m]
-2.000 : 0
2.000 : 4.000
6.000 : 8.000
10.00 : 12.00
14.00 : 16.00
18.00 : 20.00
22.00 : 24.00
26.00 : 28.00
30.00 : 32.00
34.00 : 36.00
38.00 : 40.00
42.00 : 44.00
46.00 : 48.00
50.00 : 52.00
54.00 : 56.00
Scale x 1:1984 y 1:1984
Contour Interval: 2mm

Displacement for L1



With Pads (100kPa) & Slab (35kPa) Loading

UNIT 9 - Lines 1

