AQUIND Limited

AQUIND INTERCONNECTOR

Applicant's Response to the Examining Authority's Further Written Questions (ExQ2) – Appendix 2 Infiltration Testing Results (MG2.1.1)

The Infrastructure Planning (Examination Procedure) Rules 2010, Rule 8(1)(b)

The Planning Act 2008

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AQUIND Limited

AQUIND INTERCONNECTOR

Applicant's Response to the Examining Authority's Further Written Questions (ExQ2) – Appendix 2 Infiltration Testing Results (MG2.1.1)

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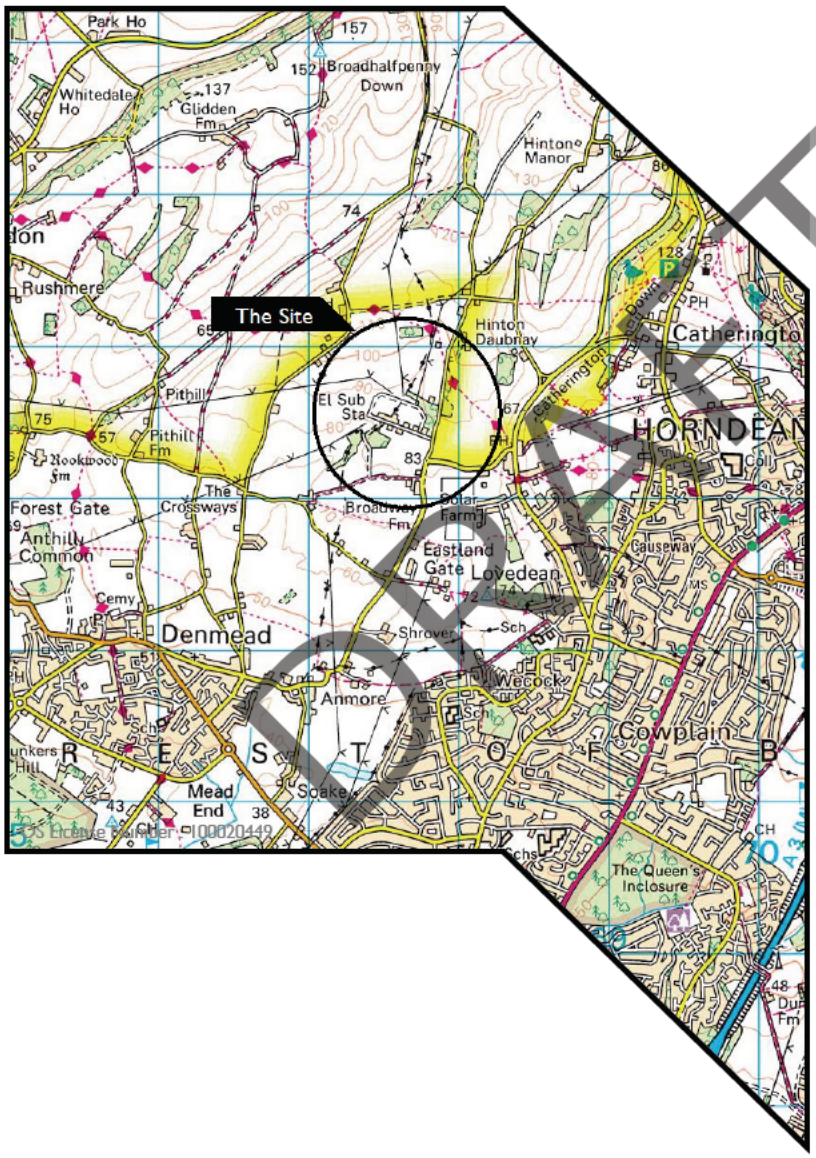

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Aquind Drainage Design Additional GI

Interim Factual Report

for

Aquind Limited

Engineer : WSP UK Limited

Project Number PE201667

December 2020

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Ground Investigation
at

Interim Factual Report

Aquind Drainage Design Additional GI

for
Aquind Limited

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Engineer :
WSP UK Limited

Project No:
PE201667
December 2020

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APPENDICES

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1.0 INTRODUCTION

A geotechnical investigation was undertaken by Geotechnics Limited to provide additional information for the Drainage Design at the proposed location of the UK Converter Station and ORS Building (landfall) for the Aquind Interconnector (part of the Aquind UK – France high voltage direct current (HVDC) cable interconnector project).

The investigation was carried out to the instructions of the Engineer, WSP UK Limited, on behalf of the Client, Aquind Limited. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain further information on the ground and groundwater conditions relating to the drainage and geotechnical design of the proposed works within the limitations posed by trial hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The Brief for the project is included in Appendix 1. The investigation comprised rotary and dynamic sample boreholes, machine-excavated trial pits with in-situ soakaway testing, in situ and laboratory testing and reporting.

In addition, two hand excavated trial pits were undertaken in the south of the site, within Fort Cumberland Car Park to locate a suspected water main pipe.

A Factual Report was also commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 2 to 9 of this Interim Report. Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 10 to aid an understanding of the procedures followed and the context in which the report should be read.

4.0 THE SITE

4.1 Location

The site is divided into two areas, Denmead Farm, Broadway Lane to the north of Portsmouth, and Fort Cumberland Car Park, Southsea.

4.1.1 Denmead Farm

The Denmead Farm section of the site is located outside the West and South perimeter of the Lovedean substation, Horndean, Waterlooville. The approximate Ordnance Survey National Grid Reference for the site is SU 671 135 and an extract from the relevant 1:50,000 Scale O.S. Map (Sheet No 196) is included as Appendix 2.

The site is approximately L shaped 'strip' measuring approximately 600m from the northern end to the south eastern end, and 150m at its widest point. The site's topography is generally 'u' shaped, with the south of the site, dipping gently northwards, and the north of the site dipping gently south.

The site is situated within agricultural farmland bounded by hedgerows with the Lovedean substation to the northeast. All fields are grass covered whilst the south eastern field has been ploughed with a crop recently planted. There are no known water courses in the site.

A gravel and dirt topped farmers' lane transects the site and is generally orientated East to West.

4.1.2 Fort Cumberland Car Park

Fort Cumberland Car Park is located approximately 5m the East of Fort Cumberland Road, Portsmouth, Southsea, and 200m to the Northwest of Fraser Range. The approximate Ordnance Survey National Grid Reference for the site is SZ 678 991 and an extract from the relevant 1:50,000 Scale O.S. Map (Sheet No 196) is included in Appendix 2.

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The site is triangular shaped and measures approximately 80m x 60m. The site is gravel topped and undulating with numerous 'potholes' across the site. The site is located within a residential and recreational area, with housing bounding the North, South and West are to the site. The east of the site is bounded by open grass land. At the time of the investigation the site was being used as a carpark. There are no known water courses in the site.

4.3 Site Geology

The British Geological Survey website, http://mapapps.bgs.ac.uk/geologyofbritain/home.html, accessed on the 26/11/2020, shows the Denmead Farm site to be underlain by the Cretaceous Tarrant Chalk Member (Bedrock), which is described as soft white chalk with relatively widely spaced large flint seams. Although not mapped, widespread Quaternary Head deposits are to be found throughout the area. These are described as poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep.

The Fort Cumberland Car Park is shown to be underlain by the Paleogene Wittering Formation (Bedrock), which is described as greyish brown laminated clay with interbedded sand and rare glauconitic sand. Quaternary Storm beach deposits (Superficial) described as rounded gravel cobbles and boulders.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a tender for work designed by the Engineer for ground investigation of the site in accordance with their requirements (see Appendix I).

5.2 General

The procedures followed in this site investigation are based on *BS 5930: 2015 and A1:2020 – Code of Practice for Site Investigations*. The soils and rocks encountered have been described in accordance with BS5930:2015 and BS EN ISO 14688-1:2018 and BS EN ISO 14689:2018. The Rotary Borehole, Dynamic Sample Borehole and Trial Pit Records are included in Appendices 4 to 7 and their approximate positions are shown on the Exploratory Hole Location Plan in Appendix 3.

The Exploratory Hole locations were specified by WSP UK Limited, however Trial Pit 21, 22 and 27 were moved to an alternative location which was agreed with the WSP Engineer. The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica GS08 GPS survey device.

At each exploratory hole location, with the exception of the trial pits, an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to check for the presence of underground services. Prior to and on completion of the excavation, the location was scanned using a cable avoidance tool (CAT) and magnetometer to check for the presence of UXO.

5.3 Combined Dynamic Sample and Rotary Boreholes

Four (4 No.), 150mm diameter boreholes (numbered BH40 to BH43) were sunk utilising a combination of dynamic sampling and rotary coring techniques to depths varying between 3.00 and 10.00m below ground level. The work was carried out between the 16th and 20th November 2020. The Dynamic Sample and Rotary Borehole Records are presented in Appendix 4.

The dynamic sample sections of the boreholes were carried out using a compressed air percussive apparatus fitted to the rotary drilling rig which drives lined steel tubes into the ground in 1.00m or 1.50m lengths. Samples are retrieved in the plastic liners. The liners are extruded from the sampler and placed into suitable core boxes.

Rotary coring (96mm diameter), commenced at a depth of between 6.00m and 6.10m below ground level in BH41 and BH42. The drilling equipment used in the rotary sections of the boreholes on this particular contract utilised air-mist as the flushing medium.

The strata descriptions in the open-hole sections of the Borehole Records are the Drilling Foreman's estimate based on sediment and also on chipping returns in the flushing medium placed into disturbed (D) samples. The rate of penetration is also used as an indicator of the type of material being drilled, particularly where there is loss of flush returns. Definitive classification in terms of geology or degree of disturbance is not usually possible from these sources.

Rock cores were extruded horizontally in transparent liners and placed into suitable core boxes. Photographs of the individual core boxes are included in Appendix 5.

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Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate. It should be noted that the addition of water to the borehole as part of the drilling process may have masked the presence of groundwater in the borehole. Where water was added it has been noted on the Borehole Records.

On completion, all the boreholes were backfilled with bentonite.

5.4 Trial Pits

Eight (8 No.) Machine Excavated Trial Pits (numbered TP21 to TP28) were excavated to depths varying between 0.5m and 2.5m below ground level using a 5-Tonne excavator between the 16th and 20th November 2020. This work was supervised on site by a geotechnical engineer.

Two (2 No) Hand Excavated Trial Pits (numbered HP01 to HP02) were excavated to depths between 1.00m and 1.10m below ground using a 2 Tonne mini-excavator and insulated hand tools on the 19th of November 2020.

The profiles of strata or other features were recorded as excavation proceeded and measurements taken from ground level. Representative samples were taken, where appropriate, for laboratory examination and analysis and in addition, Environmental samples (ES) were recovered at the depths indicated on the Trial Pit Records. Samples were taken directly from excavated materials deposited at the surface. Groundwater observations and trench stability notes are included on the Trial Pit Records. Photographs of the pits are presented in Appendix 7.

5.5 In Situ Permeability Tests

In Situ Falling Head Permeability tests were undertaken in all Boreholes at depths specified by the WSP engineer during a pause in the drilling operations in accordance with *BS EN ISO 22282-2:2012* at the following depth ranges:

Exploratory Hole	Test Section (m below ground level)
BH40	1.20m to 3.20m
BH41	4.50m to 5.50m
BH41	6.00m to 7.00m
BH42	3.20m to 4.20m
BH42	4.50m to 6.00m
BH43	2.60 to 2.65m

The test locations were specified by the Engineer.

An estimate only of the permeability has been provided as the boreholes were dry throughout the investigation. The test section is therefore above the groundwater level such that the test section is not fully saturated.

The test data is presented in Appendix 8 with two estimates given based firstly on an assumed groundwater depth of 15m bgl, and secondly assuming groundwater at the base of the borehole test. These examples are provided to allow a comparison of possible situations.

5.6 Soakaway Tests

Eight (8 No.) soakaway tests were carried out in all Trial Pits, TP21 and TP28 at the locations marked on the Exploratory Hole Location Plan (see Appendix 3) to depths of between 0.30 and 2.00m below ground level in accordance with the method given in *BRE Digest 365 "Soakaway Design", 2016*. Following the test procedures in the Digest the tests were repeated three times at each location. At TP28, due to ground collapse and unsafe conditions, only two repeated tests were undertaken. The results of the tests are presented in Appendix 9.

5.7 Explosive Ordnance Clearance

Historical information provided by the Client highlighted the potential risk of the presence of unexploded bombs/ordnance beneath the site. In order to reduce the risk of them being found during drilling or excavation, each exploratory hole location was cleared by a Specialist Company, EOD Contracts Limited before commencement of the ground investigation operations.

The clearance works for the borehole was carried out by an Explosive Ordnance Detection (EOD) Engineer working with magnetometer.

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6.0 LABORATORY TESTING

The laboratory testing will be reported in the full draft report.

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Principal Engineer

Reviewed by:

Hannah Dwane
Bsc (Hons), FGS
Regional Operations Manager

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APPENDIX I

The Brief

MEMO

TO	Hamid Mojtabavi	**FROM**	Joshua Kaufmann & Tristan Morgan
DATE	**17 April 2020**	**CONFIDENTIALITY**	**Confidential**
SUBJECT	**Aquind Additional Ground Investigation Specification for Drainage Design at the Converter Station and ORS Building (Phase 3)**		

INTRODUCTION

At the time of the original 2018 ground investigation the location of detention/retention ponds and drainage design for the project were unknown and so could not be investigated. Further to receipt of comments from key stakeholders and a preliminary drainage design it is considered that additional ground investigation is required to confirm/prove the drainage design assumptions.

This specification is to provide a preliminary scope of works for additional ground investigation, including in-situ testing and sampling to inform the drainage design for the UK Converter Station and ORS Building (landfall) for the Aquind Interconnector. This scope of works aims to outline a ground investigation that will prove ground conditions at key locations (ponds, swales, soakaways etc) and provide information on ground permeability and porosity to allow drainage design in addition to other geotechnical testing.

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SCHEDULE 2: DRAINAGE DESIGN

The following assumptions have been made during the preparation of the Schedule 2 for the drainage design, these should be reviewed, and revisions made as necessary.

Ground Investigation to be undertaken in accordance with UK Specification for Ground Investigation (SISG).

All in-situ and laboratory testing are to be confirmed by the Investigation Supervisor.

The ground investigation has been scoped with prior site knowledge from Phase 1 and 2 ground investigations. Positions shown on preliminary plans in Appendix A are approximate only and may require adjustment during the site works.

Abbreviations

- BH = Borehole
- TP = Trial pit
- CP = Cable Percussion
- Rot = Rotary Core
- WS = Window Sample
- CPBH, CPWS and CPTP = Cone Penetration Test with magnetometer

Note 1 - Please note that the scheduled exploratory hole depths and installation details are provisional and are to be confirmed by the Investigation Supervisor.

Note 2 - See drawing(s) in Appendix A for coordinates

Note 3 - Where UXO risks have been identified, the magnetometer cone CPT shall be carried out within less than 1.5m and prior to the borehole to provide UXO clearance.

For provisional exploratory hole locations see location plan, Appendix A, locations to be confirmed on site. Scheduled exploratory hole depths are also provisional and are to be confirmed by the investigating supervisor. Boreholes – combined cable percussive and rotary, or equivalent, boring to log ground conditions, obtain samples and undertake in-suit testing.

CPT – primarily to provide magnetometer probing for UXO clearance, but also obtaining data on ground and groundwater conditions.

Trial pits – mechanically excavated trial pits for logging ground conditions, carrying out in situ tests and obtaining samples for laboratory testing.

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CONVERTER STATION AND ACCESS TRACK

Table 1 Schedule 2 Converter Station and Access Track

HOLE NUMBER	UXO SEARCH	SCHEDULED DEPTH (M)	PURPOSE	TESTING	COMMENT
BH40	CPBH40	5m	Prove ground conditions to allow design of the infiltration pond and the converter station gravel infiltration zones. CPT twinned with boreholes holes with magnetometer probe and piezocone to prove absence or otherwise of UXO at borehole locations, as well as CPT results. To provide data on permeability, porosity as well as soil strength parameters. Waste acceptance criteria testing required (Suite H).	Every metre alternate SPT and Bulk sample (granular) or OS-T/W U100 (cohesive), sampling to occur before the metre interval if change in strata. Testing and sampling is to be to CIRIA C574 and BS 5930:2015. Environmental testing to be specified in the detailed specification. Two packer permeability tests per a hole, testing to be to CIRIA C574, BS EN ISO 22282 and BS 5930:2015.	As directed by Investigation Supervisor. A minimum of three suitable samples will need to be collected from BH41 and BH42 for laboratory permeability and porosity testing. Locations within SPZ1.
BH41 – BH42	CPBH41 – CPBH42	10m			
TP21-TP27	CPTP21-CPTP27	Assume 1.75m (1.0-2.5m) depth (machine dug).	Prove ground conditions to allow design of the Soakaways, infiltration pond and swale infiltration CPT twinned with trial pits with magnetometer probe and piezocone to prove absence or otherwise of UXO at borehole locations, as well as CPT results. Infiltration testing providing permeability, porosity as well as soil strength parameters. Waste acceptance criteria testing required (Suite H).	One soakaway per trial pit, testing to be to BRE 365. Testing and sampling is to be to CIRIA C574 and BS 5930:2015. Environmental testing to be specified in the detailed specification. One large bulk and one small tub every metre or change of strata.	As directed by Investigation Supervisor. Locations within SPZ1. Depths may vary dependent on location, to be confirmed by supervising engineer.

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ORS BUILDING

Table 2 Schedule 2 ORS Building

HOLE NUMBER	UXO SEARCH	SCHEDULED DEPTH (M)	PURPOSE	TESTING	COMMENT
BH44	CPBH43	5m	Prove ground conditions to allow design of the ORS Building infiltration drainage CPT twinned with boreholes holes with magnetometer probe and piezocone to prove absence or otherwise of UXO at borehole locations, as well as CPT results. Infiltration testing providing permeability, porosity as well as soil strength parameters. Ground/groundwater aggressivity testing for potential concrete structure (Suite C (Brownfield site – pyrite absent)). Waste acceptance criteria testing required (Suite H).	Every metre alternate SPT and Bulk sample (granular) or OS-T/W U100 (cohesive), sampling to occur before the metre interval if change in strata. Testing and sampling is to be to BS 5930:2015. Environmental testing to be specified in the detailed specification. Two falling head permeability tests per a hole (3 runs per a test), testing to be to BS EN ISO 22282 and BS 5930:2015.	As directed by Investigation Supervisor.
TP28	CPTP28	Assume 2.0m depth (machine dug).	Prove ground conditions to allow design of the ORS Building infiltration drainage CPT twinned with trial pits with magnetometer probe and piezocone to prove absence or otherwise of UXO at borehole locations, as well as CPT results. Infiltration testing providing permeability, porosity as well as soil strength parameters. Ground/groundwater aggressivity testing for potential concrete structure (Suite C (Brownfield site – pyrite absent)). Waste acceptance criteria testing required (Suite H).	One soakaway per trial pit, testing to be to BRE 365. Testing and sampling is to be to BS 5930:2015. Environmental testing to be specified in the detailed specification. One large bulk and one small tub every metre or change of strata.	As directed by Investigation Supervisor.

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OTHER REQUIREMENTS

PERSONNEL

WSP Engineer (Joshua Kaufmann or similar experience) to represent client and undertake role of Investigation Supervisor. Requirements for drilling crew, engineers and support staff to be confirmed by the Contractor.

HEALTH AND SAFETY

The Contractor is to produce suitable and approved health and safety documents including risk registers, safety controls and RAMS, these are to be reviewed by WSP. Detail of health and safety requirements will be included within the detailed specification

METHODOLOGIES

Suitable methodologies will need to be agreed with the local landowners and relevant statutory bodies.

STATUTORY BODIES CONSULTATION AND PERMITS

All works will need to be permitted by local landowners.
Works within the SPZ1 will require consultation and agreement with Portsmouth Water.
Portsmouth City Council will require consultations for any works within the city of Portsmouth.

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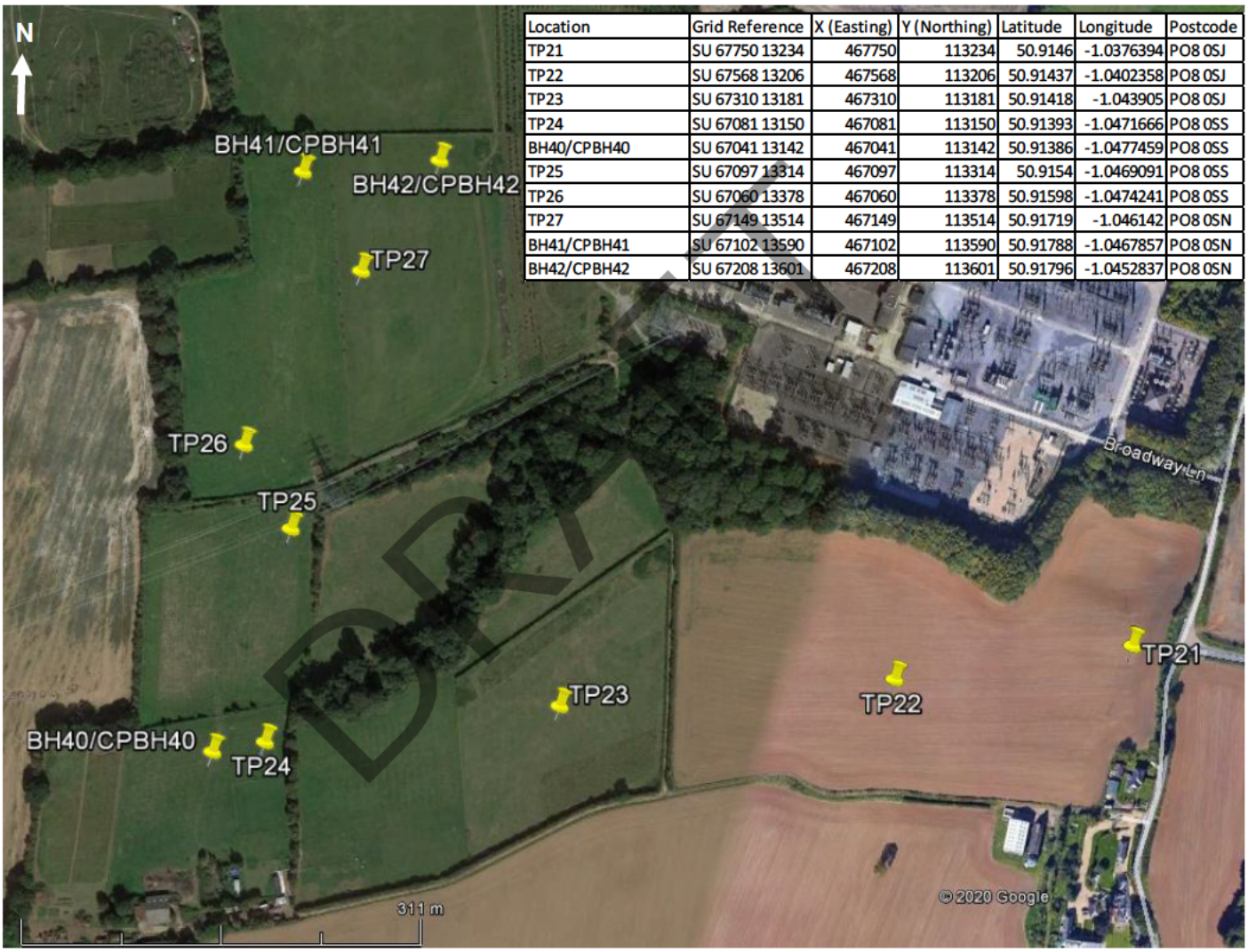
APPENDIX A

Figure 1 Converter Station Infiltration Testing Plan



Location	Grid Reference	X (Easting)	Y (Northing)	Latitude	Longitude	Postcode
TP21	SU 67750 13234	467750	113234	50.9146	-1.0376394	PO8 0SJ
TP22	SU 67568 13206	467568	113206	50.91437	-1.0402358	PO8 0SJ
TP23	SU 67310 13181	467310	113181	50.91418	-1.043905	PO8 0SJ
TP24	SU 67081 13150	467081	113150	50.91393	-1.0471666	PO8 0SS
BH40/CPBH40	SU 67041 13142	467041	113142	50.91386	-1.0477459	PO8 0SS
TP25	SU 67097 13314	467097	113314	50.9154	-1.0469091	PO8 0SS
TP26	SU 67060 13378	467060	113378	50.91598	-1.0474241	PO8 0SS
TP27	SU 67149 13514	467149	113514	50.91719	-1.046142	PO8 0SN
BH41/CPBH41	SU 67102 13590	467102	113590	50.91788	-1.0467857	PO8 0SN
BH42/CPBH42	SU 67208 13601	467208	113601	50.91796	-1.0452837	PO8 0SN

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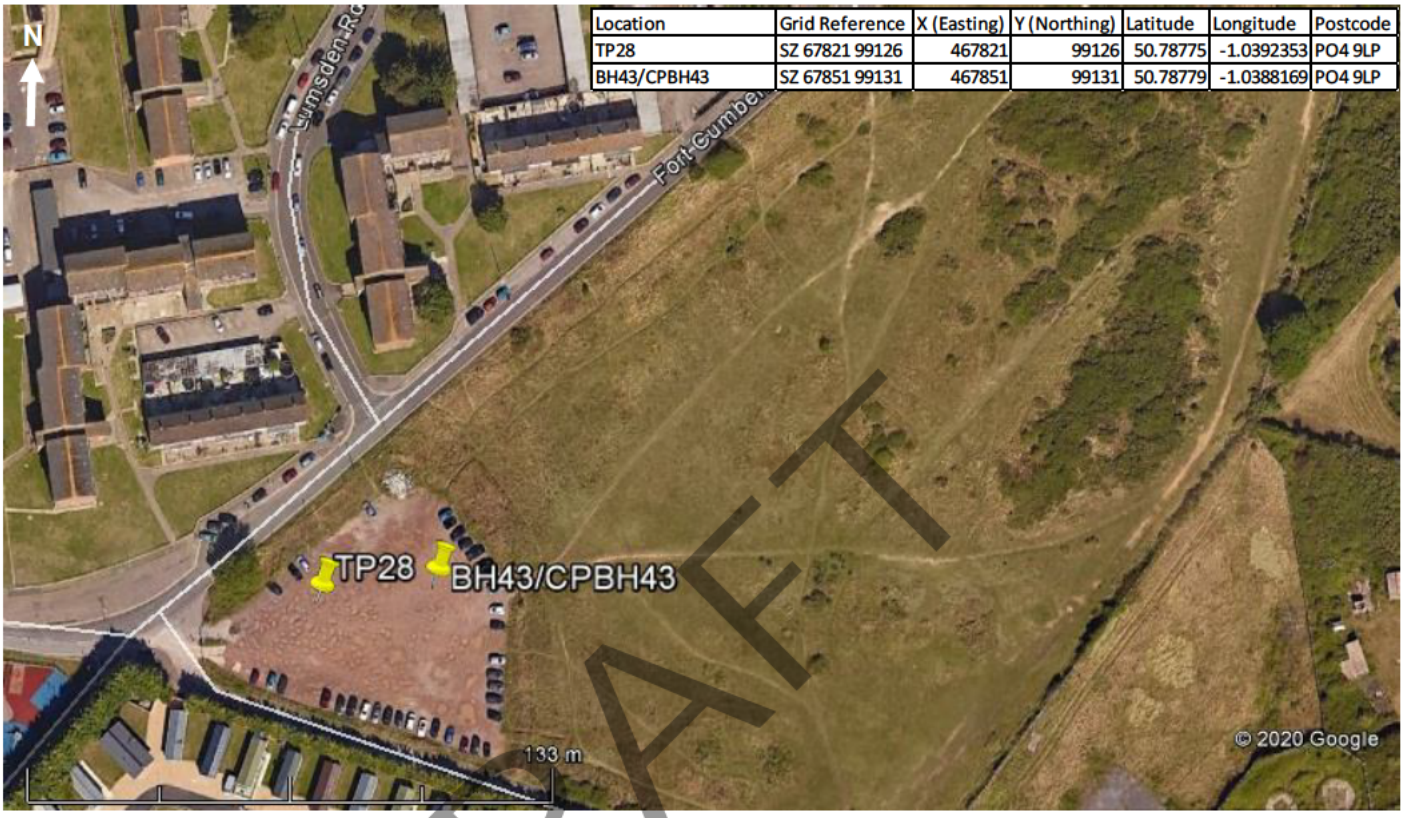
Figure 2 ORS Building Infiltration Testing Plan



Location	Grid Reference	X (Easting)	Y (Northing)	Latitude	Longitude	Postcode
TP28	SZ 67821 99126	467821	99126	50.78775	-1.0392353	PO4 9LP
BH43/CPBH43	SZ 67851 99131	467851	99131	50.78779	-1.0388169	PO4 9LP

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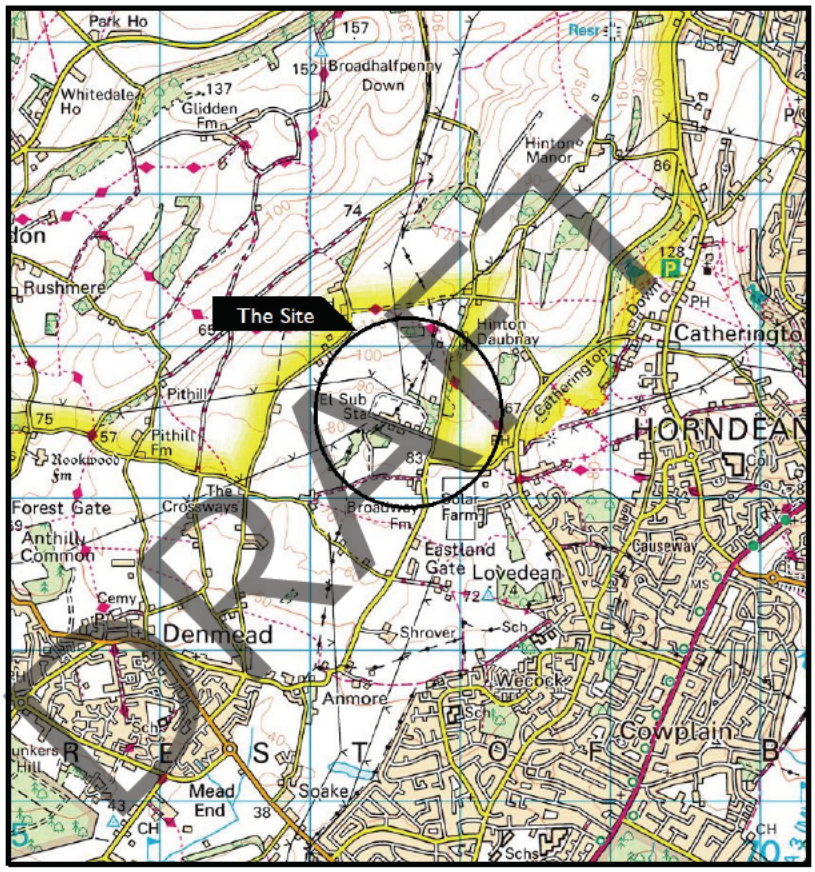
APPENDIX 2

Site Location Plan

SITE LOCATION PLAN



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APPENDIX 3

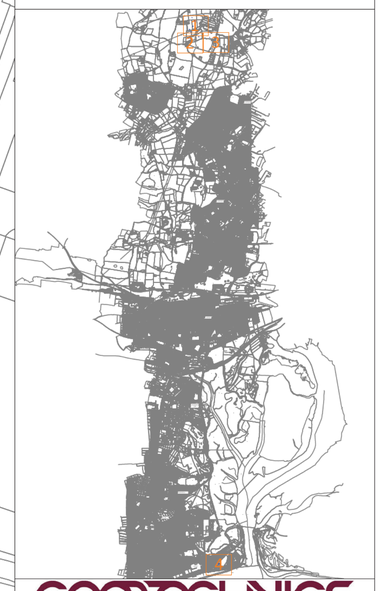
Exploratory Hole Location Plan

Key

- Borehole
- Trial Pit
- Hand-Dug Pit

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH41	667061.0	113142.0	87.18
BH41	667029.4	113095.4	90.97
BH42	667288.7	113021.0	88.13
BH43	667345.3	990130.0	3.46
HP01	667350.5	990127.3	3.43
TP21	667462.0	990127.3	3.44
TP22	667716.8	113189.0	87.90
TP23	667778.3	113189.0	90.00
TP24	667939.3	113161.4	77.92
TP25	667979.7	113147.2	68.92
TP26	667997.3	113011.1	73.02
TP27	668107.8	113048.8	80.75
TP28	667128.4	113048.8	90.75
TP29	667950.4	990127.3	3.46

TP22 and TP23 as undertaken and heights approximate.



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Engineer:
WSP UK Limited

Client:
Aquind Limited

Project:
UK-France HVDC Interconnector - Additional Ground Investigation for Drainage Design

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN
Drawing 1 of 4

Scale: 1:1000@A1

Date:
November 2020

Project No:
PE201667

File Name:
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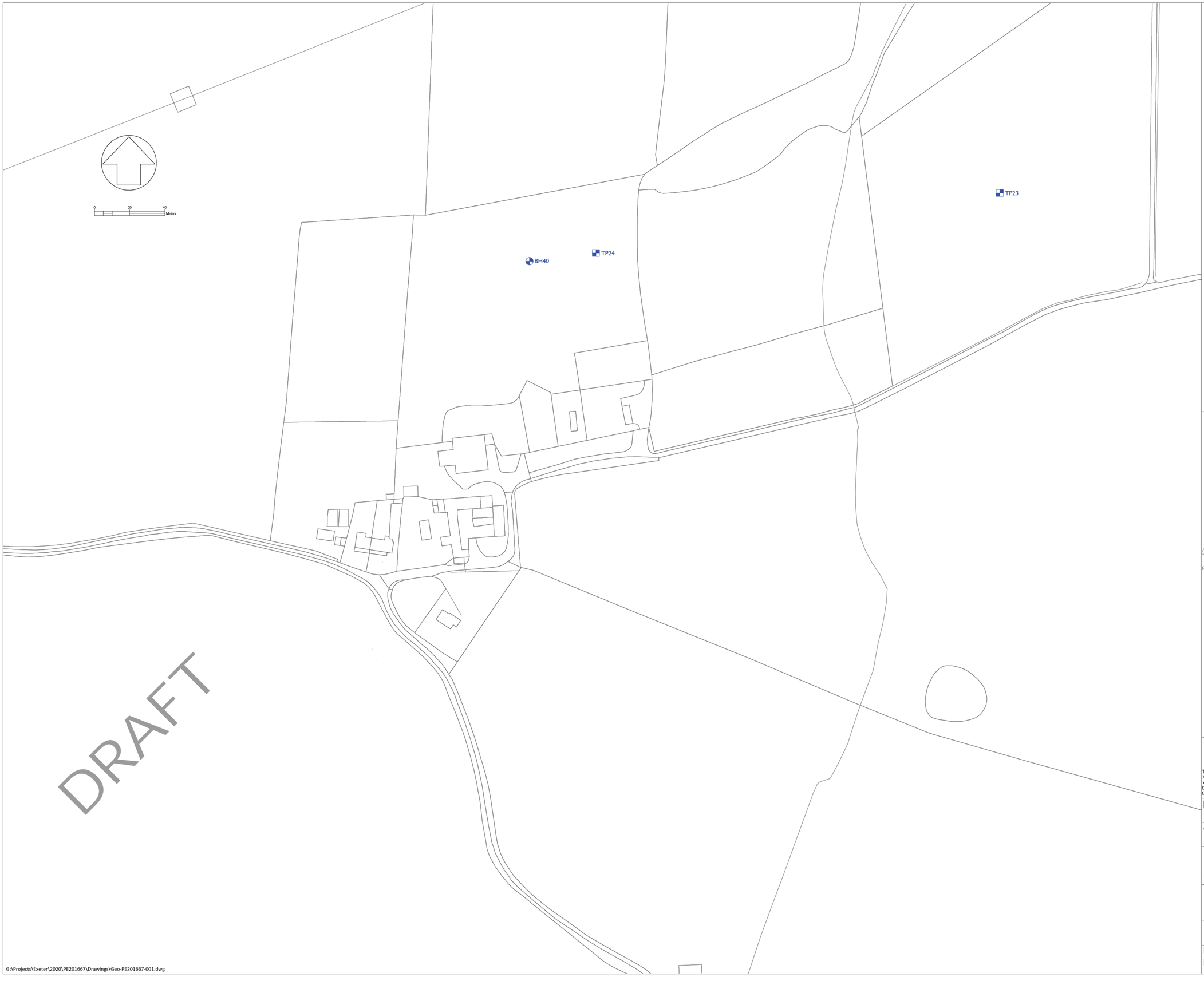

Key

- Borehole
- Trial Pit
- Hand-Dug Pit

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH40	447061.0	113142.0	87.18
BH41	447125.4	112995.4	90.97
BH42	447288.7	113021.9	98.13
BH43	447349.3	99130.0	3.46
HP01	447350.6	99127.3	3.45
TP21	447442.0	112989.2	74.40
TP22	447716.3	113149.0	87.90
TP23	447878.3	113182.4	90.00
TP24	447779.3	113147.2	88.92
TP25	447397.2	113011.1	73.22
TP26	447258.3	112966.8	70.10
TP27	447149.4	112918.8	80.75
TP28	447950.4	99137.3	3.46

TP22 and TP23 as-drilled levels and heights approximate.

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Engineer:
WSP UK Limited

Client:
Aquind Limited

Project:
UK-France HVDC Interconnector - Additional Ground Investigation for Drainage Design

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN
Drawing 2 of 4

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Project No: PE201667	File Name: Geo-PE201667-001(2)

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0 20 40 Meters

TP21

TP22

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Key

- Borehole
- Trial Pit
- Hand-Dug Pit

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH01	667061.0	113142.0	87.18
BH01	667029.4	113499.4	90.97
BH02	667288.7	113601.9	86.13
BH03	667685.3	99138.0	3.46
HP01	667850.6	99127.3	3.45
TP20	667462.8	99128.3	3.44
TP21	667744.0	113189.0	77.90
TP22	667756.6	113189.0	80.00
TP23	667698.3	113182.4	77.92
TP24	667378.9	113147.2	68.92
TP25	667087.2	113211.1	73.02
TP26	667128.4	113437.8	80.75
TP27	667128.4	113438.8	80.75
TP28	667850.6	99127.3	3.46

TP22 and TP23 as-drilled levels and heights approximate.

GEOTECHNICS
geotechnical and geoenvironmental specialists

The Geotechnical Centre,
7 Pinbrook Units,
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EX4 8JQ

Phone: (01392) 463110
Fax: (01392) 463111
E-mail mail@exeter.geotechnics.co.uk

www.geotechnics.co.uk

Engineer:
WSP UK Limited

Client:
Aquind Limited

Project:
UK-France HVDC Interconnector - Additional Ground Investigation for Drainage Design

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN
Drawing 3 of 4

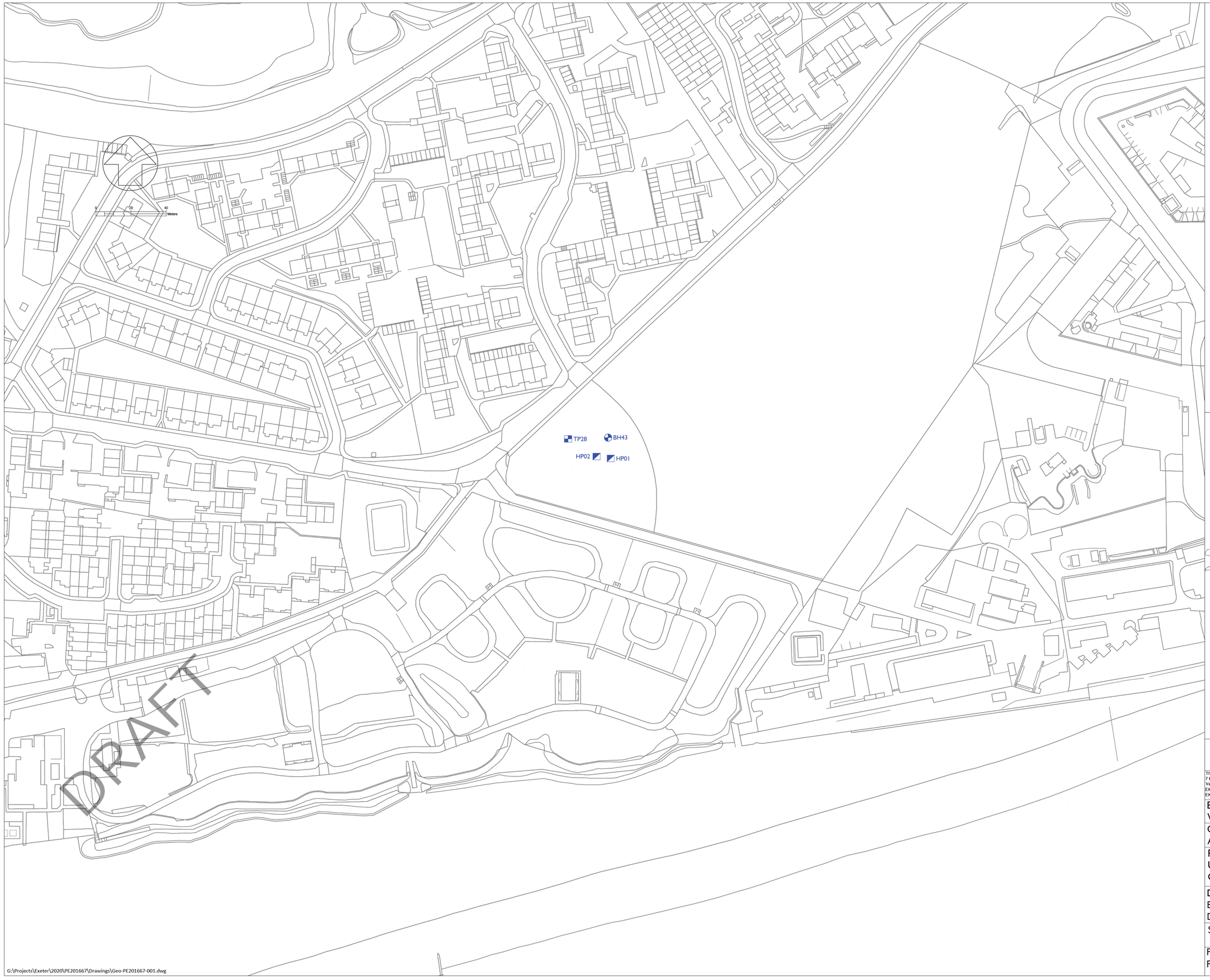
Scale: 1:1000@A1

Date:
November 2020

Project No:
PE201667

File Name:
Geo-PE201667-001(3)

G:\Projects\Exeter\2020\PE201667\Drawings\Geo-PE201667-001.dwg



Key

- Borehole
- Trial Pit
- Hand-Dug Pit

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
BH40	667992.0	113142.8	87.18
BH41	667529.4	113495.4	90.97
BH42	667288.7	113621.9	96.13
BH43	667685.3	99130.0	3.46
HP01	667883.6	99127.3	3.43
HP02	667862.3	99127.3	3.44
TP21	667662.0	113189.2	77.90
TP22	667756.6	113189.9	80.00
TP23	667939.3	113182.4	77.92
TP24	667779.5	113147.2	68.92
TP25	667997.3	113211.1	73.22
TP26	667997.3	113211.1	73.22
TP27	667148.4	113418.8	90.75
TP28	667950.6	99127.3	3.46

TP22 and TP23 co-ordinates and heights approximate.

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EXPLORATORY HOLE LOCATION PLAN
Drawing 4 of 4

Scale: 1:1000@A1

Date:
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File Name:
Geo-PE201667-001(4)

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DRAFT

APPENDIX 4

Dynamic Sample and Rotary Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

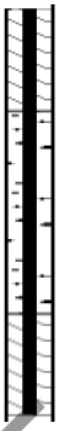
CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PID	Photo Ionisation Detection (ppm)
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content
(All other strengths from undrained triaxial testing)	
S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

Water Strike

Depth Water Rose To

Instrumentation



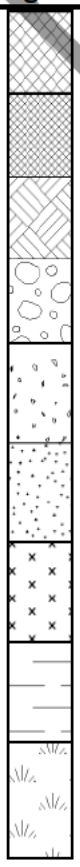
Seal

Filter

Seal

Strata

Legend



Made Ground Granular

Made Ground Cohesive

Topsoil

Cobbles and Boulders

Gravel

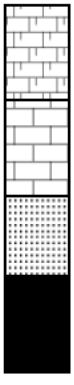
Sand

Silt

Clay

Peat

Note: Composite soil types shown by combined symbols



Chalk

Limestone

Sandstone

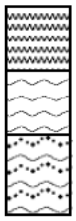
Coal

Strata, Continued

Mudstone

Siltstone

Metamorphic Rock

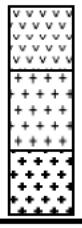


Fine Grained

Medium Grained

Coarse Grained

Igneous Rock



Fine Grained

Medium Grained

Coarse Grained

Backfill Materials

Arisings

Bentonite Seal

Concrete

Fine Gravel Filter

General Fill

Gravel Filter

Grout

Sand Filter

Tarmacadam

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

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BOREHOLE RECORD - Dynamic Sampler

Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer WSP UK LIMITED
Borehole BH40
Project No PE201667
Client AQUIND LIMITED
National Grid Coordinates 467040.984E 113142.590N
Ground Level 67.18 m OD
Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		67.18
0.00- 0.20	B					Soft dark brown slightly sandy CLAY.			
0.20- 0.60	B						0.25		66.93
0.20	ES					Firm reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint.			
0.50	D								
0.50	ES						0.60		66.58
0.60- 1.00	B					Firm brown slightly sandy slightly gravelly CLAY with a low cobble content. Gravel (and cobbles) are angular to subrounded fine to coarse flint.			
1.00	D								
1.00	ES								
1.20- 1.65	D	Nil (Dry)			S12				
1.20 2.20			TR=	100%			1.50		65.68
1.50- 3.00	B					Structureless CHALK. Recovered as cream slightly sandy gravelly SILT. Gravel is weak, low density white chalk and flint.			
1.80	D								
2.20- 2.65	D	Nil (Dry)			S16				
2.20 3.20			TR=	100%					
2.50	D								
						End of Borehole	3.20		63.98

DRAFT

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.30	Inspection Pit	CJ
3.20	0.12	Dynamic Sampler	CJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			19/11/20	08:00
3.20	Nil	Dry	19/11/20	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Groundwater was not encountered during drilling.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
A Falling Head Permeability Test was carried out during boring at a depth of 3.20m. Borehole collapsed during the second test and the borehole was backfilled.
Backfill details from base of hole: bentonite seal up to 1.00m, arisings up to ground level.

Logged by HL
Figure 1 of 1
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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BOREHOLE RECORD - Dynamic Sampler and Rotary

Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer WSP UK LIMITED
Borehole BH41
Project No PE201667
Client AQUIND LIMITED
National Grid Coordinates 467129.596E 113695.378N
Ground Level 90.27 m OD
Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		90.27
0.20- 0.30	B					TOPSOIL: Brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse chert.			
0.20- 0.30	ES						0.30		89.97
0.50- 0.60	D								
0.50- 0.60	ES					Firm reddish brown gravelly CLAY. Gravel is angular to subrounded fine to coarse chert.			
1.00- 1.20	B						1.00		89.27
1.00- 1.20	ES					Structureless CHALK. Recovered as cream and brown slightly gravelly SILT and slightly gravelly CLAY. Gravel is very weak, low density occasionally stained orange, black speckled angular to subrounded chalk and angular to subangular fine to coarse chert.			
1.20- 1.65	D	Nil			S13		1.20		89.07
1.20- 1.40	ES	(Dry)							
1.40- 2.00	B								
2.00- 2.20	D					Structureless CHALK. Recovered as cream slightly gravelly SILT. Gravel is very weak, low density occasionally stained orange, rare black speckles angular to subrounded chalk and angular to subangular fine to coarse chert.			
2.20- 4.50	B								
2.20- 2.65	D	Nil (Dry)			S45				
2.80- 3.00	D								
3.20- 3.80	D								
3.20- 3.65	D	3.20			S14				
3.20- 3.80	UT42	(Dry)							
4.50- 5.50	B					Structureless CHALK. Recovered as slightly sandy gravelly SILT. Gravel is weak, low density, white with occasional black speckling.	4.50		85.77
5.50- 5.95	D	4.50 (Dry)			S19				
6.00-10.00	B								

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	Continued by Rotary techniques General	Detail
6.00- 7.00	6.00 (Dry)	100 0		0		
6.50		D				
7.00- 8.50	6.00 (Dry)	66 0		0		
7.00- 7.45	6.00 (Dry)	D			S16	
7.50		D				
8.50-10.00	6.00 (Dry)	60 0		0		
8.50- 8.50		D				
9.00		D				
10.00-10.45		D			S31	End of Borehole

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Boring

Depth	Hole Dia	Technique	Crew
1.20	0.30	Inspection Pit	CJ
10.00	0.14	Dynamic Sampler and Rotary	CJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			18/11/20	08:00
7.00	6.00	Dry	18/11/20	18:00
7.00	6.00	6.80	19/11/20	08:00
10.00	6.00	Dry	19/11/20	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Groundwater was not encountered during drilling.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Falling Head Permeability Tests were carried out during drilling at depths of 5.50m and 7.00m.
Dynamic sample recovery: 1.20-2.20m,100%; 2.20-3.20m,100%; 3.80-4.50m,100%; 4.50-5.50m,100%.
Backfill details from base of hole: bentonite seal up to 1.00m, arisings up to ground level.

Logged by JW
Figure 1 of 2
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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BOREHOLE RECORD – Dynamic Sampler and Rotary

Draft

Project **AQUIND DRAINAGE DESIGN ADDITIONAL GI**

Engineer **WSP UK LIMITED**

Borehole **BH41**
Project No **PE201667**

Client **AQUIND LIMITED**

National Grid Coordinates **467129.596**E **113695.378**N

Ground Level **90.27** m OD

Drilling | Properties/Sampling | Strata — Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N	Description General	Description Detail	Depth	Legend	Level m OD
	6.00 (Dry)							**10.00**		**80.27**

DRAFT

Drilling | Progress | Groundwater

Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by **JW**

Figure **2 of 2**
02/12/2020

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BOREHOLE RECORD - Dynamic Sampler and Rotary

Draft

Project: AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer: WSP UK LIMITED
Borehole: BH42
Project No: PE201667
Client: AQUIND LIMITED
National Grid Coordinates: 467208.715E 113600.970N
Ground Level: 86.13 m OD
Scale: 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		86.13
0.20- 0.30	B					TOPSOIL: Brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse chert.	0.30		85.83
0.20- 0.30	ES								
0.50- 0.60	B								
0.50- 0.60	ES					Firm orangish brown gravelly CLAY. Gravel is angular to subrounded fine to coarse chert. From 0.70m, Very gravelly.			
1.00- 1.20	B								
1.00- 4.20	D								
1.00- 1.20	ES								
1.20- 1.65	D	Nil			S10				
1.48- 2.20	B	(Dry)					1.48		84.65
1.48- 1.60	D					Structureless CHALK. Recovered as cream frequently stained orangish brown slightly gravelly CLAY. Gravel is very weak, low density, cream, subangular to subrounded chalk and angular to subrounded fine to coarse chert (Grade Dm).			
2.20- 2.65	D	Nil (Dry)			S17	Between 1.48 and 1.95m, Surface stained with orange clay.			
2.50- 2.70	D					From 2.30m, Frequent black speckling.			
2.70- 4.00	B								
3.20- 3.65	D	3.20 (Dry)			S12				
4.20- 5.90	B								
4.30- 5.10	UT								
4.50- 5.10	B								
4.50- 5.10	D								
4.50- 5.10	UT37	0.60							
5.10- 5.55	D	4.50 (Dry)			S29				
5.90- 6.10	D					Between 6.10 and 6.60m, No Recovery.			
6.10- 7.00	B								
6.10- 6.55	D	6.10 (Dry)			S15				

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	Continued by Rotary techniques General	Detail	Depth	Legend	Level m OD
6.10- 7.50 (96mm)	6.10 (Dry)	71 11		11			7.00		79.13
7.30- 7.95		C			Structureless CHALK. Recovered as cream very rarely stained orange frequently speckled black very clayey GRAVEL. Gravel is very weak, low density, cream, subangular to subrounded chalk and angular fine to coarse chert (Grade Dc).				
7.50- 9.00 (96mm)	6.10 (Dry)	47 0		0					
7.50- 8.60		B							
8.60- 8.80		B							
9.00- 9.45	6.10 (Dry)	D			S19	End of Borehole	9.00		77.13

DRAFT

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.30	Inspection Pit	CJ
9.00	0.12	Dynamic Sampler and Rotary	CJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			16/11/20	08:00
4.20	3.20	Dry	16/11/20	18:00
4.20	3.20	Dry	17/11/20	08:00
9.00	6.10	Dry	17/11/20	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Groundwater was not encountered during drilling.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
A Falling Head Permeability Test was carried out during drilling at a depth of 6.00m.
Dynamic sample recovery: 1.20-2.20m,100%; 2.20-3.20m,100%; 3.20-4.20m,100%; 4.20-4.50m,100%; 5.10-6.10m,100%.
Backfill details from base of hole: bentonite seal up to 0.50m, arisings up to ground level.

Logged by: JW
Figure: 1 of 1
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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BOREHOLE RECORD - Dynamic Sampler

Draft

Project	AQUIND DRAINAGE DESIGN ADDITIONAL GI	Engineer	WSP UK LIMITED	Borehole	BH43
				Project No	PE201667
Client	AQUIND LIMITED	National Grid Coordinates	467849.335 E 99138.006 N	Ground Level	3.46 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		3.46
0.00- 0.20	B					MADE GROUND: Greyish brown sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone, chert, glass and brick.			
0.00- 0.20	ES						0.25		3.21
0.30- 0.40	B					MADE GROUND: Orange sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse bricks and brick fragments.	0.30		3.16
0.30- 0.40	ES						0.40		3.06
0.40- 1.00	B					MADE GROUND: Grey occasionally orange and black slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint and clinker. Hydrocarbon odour present.			
0.40- 1.00	ES								
1.20- 3.00	B					Medium dense light brown gravelly fine to coarse SAND. Gravel is angular to subrounded flint. Between 1.00 and 1.20m, Sand Blown out by installation of casing.			
1.20 2.20			TR=	100%					
1.20- 1.65		2.20 (Dry)			S24				
2.20 3.00			TR=	80%					
2.20- 2.65		1.20 (Dry)			S13				
						End of Borehole	3.00		0.46

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Boring

Depth	Hole Dia	Technique	Crew
1.20	0.30	Inspection Pit	CJ
3.00	0.12	Dynamic Sampler	CJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			20/11/20	08:00
3.00	2.50	Dry	20/11/20	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					Groundwater was not encountered during drilling.

Remarks

Inspection pit hand excavated to 1.00m depth and no services were found.
A Falling Head Permeability Test was carried out during drilling at a depth of 2.65m.
Backfill details from base of hole: bentonite seal up to 1.20m, arisings up to ground level.

Logged by JW

Figure 1 of 1

02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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Fieldwork Results - SPT Results Summary

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI **Project No** PE201667

Client Aquind Limited

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
BH40	1.20	65.98	S	-	2	3	3	3	3	3	12	*
BH40	2.20	64.98	S	-	3	3	3	4	4	5	16	*

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Driller	Clyne Jones
Hammer No.	AB.01
Energy Ratio, Er (%)	62.00
Calibration Date	06/03/2020

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI **Project No** PE201667

Client Aquind Limited

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
BH41	1.20	89.07	S	-	2	2	2	3	3	5	13	
BH41	2.20	88.07	S	-	5	4	6	17	10	12	45	
BH41	3.20	87.07	S	-	2	3	2	3	5	4	14	
BH41	5.50	84.77	S	-	2	2	2	5	5	7	19	
BH41	7.00	83.27	S	-	3	2	2	4	6	4	16	
BH41	10.00	80.27	S	-	2	7	6	7	8	10	31	

DRAFT

Driller	Clyne Jones
Hammer No.	AB.01
Energy Ratio, Er (%)	62.00
Calibration Date	06/03/2020

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI **Project No** PE201667

Client Aquind Limited

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
BH42	1.20	84.93	S	-	1	1	2	2	3	3	10	
BH42	2.20	83.93	S	-	3	3	4	5	4	4	17	
BH42	3.20	82.93	S	-	1	3	4	3	3	2	12	
BH42	5.10	81.03	S	-	4	5	6	6	10	7	29	
BH42	6.10	80.03	S	-	5	5	4	4	5	2	15	
BH42	9.00	77.13	S	-	4	4	5	5	4	5	19	

DRAFT

Driller	Clyne Jones
Hammer No.	AB.01
Energy Ratio, Er (%)	62.00
Calibration Date	06/03/2020

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - SPT Results Summary

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI **Project No** PE201667

Client Aquind Limited

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
BH43	1.20	2.26	S	-	4	5	7	7	5	5	24	*
BH43	2.20	1.26	S	-	1	1	2	4	3	4	13	*

DRAFT

Driller	Clyne Jones
Hammer No.	AB.01
Energy Ratio, Er (%)	62.00
Calibration Date	06/03/2020

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

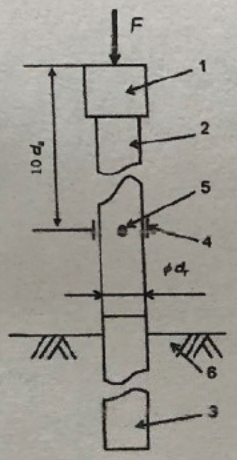
SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer	SPT HAMMER
Test No	EQU2550
Client	AB-OVO
Test Depth (m)	12.70
Mass of hammer	m = 63.5kg
Falling height	h = 0.76m
E_{theor} =	$m \times g \times h$ = 473J

Characteristics of the instrumented rod

Diameter	d_r = 0.052 m
Length of instrumented rod	0.558 m
Area	A = 11.61 cm²
Modulus	E_a = 206843 MPa



Key

1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

F Force
d_r Diameter of rod

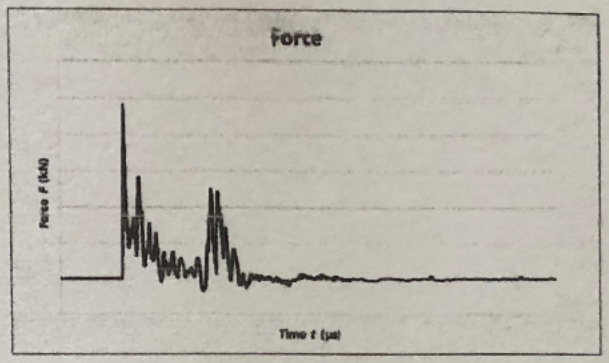
Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

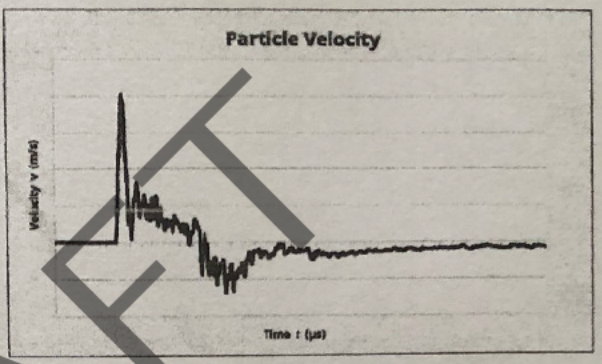
DATE OF TEST	VALID UNTIL	HAMMER ID
05/03/2020	[redacted]	AB01

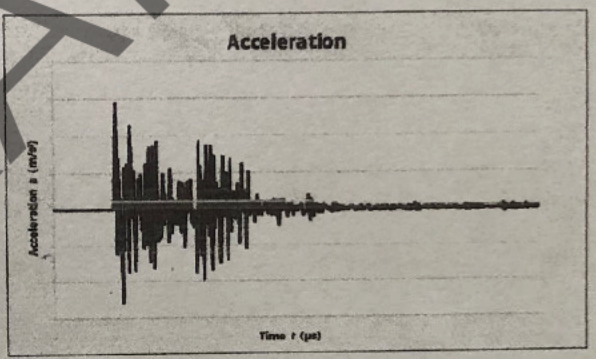
E_{meas} = **0.293** kN-m

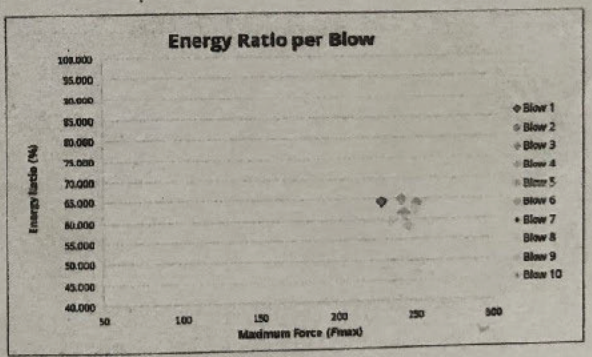
E_{theor} = **0.473** kN-m

Comments









Energy Ratio (ER) = E_{meas} / E_{theor}	**62.00%**

Equipe SPT Analyzer Operator	Certificate prepared by	Certificate checked by	Certificate date
JML	[redacted]	[redacted]	06/03/2020

DRAFT

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APPENDIX 5

Dynamic Sample and Rotary Photographs

PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

BH41 1.20 - 4.50m

BH41 6.00-10.00

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PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

BH42 4.20 - 6.10m

BH42 6.10 - 9.00m

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APPENDIX 6

Trial Pit Records

TRIAL PIT RECORD

Trial Pit

Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI

Engineer WSP UK LIMITED

Trial Pit HP01

Project No PE201667

Client AQUIND LIMITED

National Grid Coordinates 467850.842 E 99126.187 N

Ground Level 3.49 m OD

Scale 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		3.49
				MADE GROUND: Greyish brown occasionally pinkish grey sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone, chert, rare brick and glass fragments, clinker and bitmac.	0.30	1	
					0.40	2	3.19
				Brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse chert.	1.00	3	3.09
				Light brown slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse chert.	1.10	4	2.49
				Brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse chert.			2.39
				End of Excavation			

DRAFT

Excavation

Plant 2 Tonne Mini-Excavator

Date 19/11/2020

Shoring None.

Stability Stable during excavation.

Width (B) 0.60

Length (C) 1.50

Date Backfilled 19/11/2020

Groundwater

Depth Observed	Depth of Pit	Details

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by JW

Figure 1 of 1

02/12/2020

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TRIAL PIT RECORD

Trial Pit

Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI

Engineer WSP UK LIMITED

Trial Pit HP02

Project No PE201667

Client AQUIND LIMITED

National Grid Coordinates 467842.829E 99127.273 N

Ground Level 3.44 m OD

Samples and Tests

Strata

Scale 1:50

Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		3.44
				MADE GROUND: Greyish brown occasionally pinkish grey sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded sandstone, chert, rare brick fragments, glass and clinker.	0.30		3.14
					0.35		3.09
				MADE GROUND: Black sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to medium clinker.	0.70		2.74
				Light brown slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse chert.	1.10		2.34
				Brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse chert.			
				End of Excavation			

DRAFT

Excavation

Plant 2 Tonne Mini-Excavator

Date 19/11/2020

Shoring None.

Stability Stable during excavation.

Width (B) 0.60

Length (C) 1.20

Date Backfilled 19/11/2020

Groundwater

Depth Observed	Depth of Pit	Details

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by JW

Figure 1 of 1

02/12/2020

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TRIAL PIT RECORD — Trial Pit — Draft

Project: AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer: WSP UK LIMITED
Trial Pit: TP21
Project No: PE201667
Client: AQUIND LIMITED
National Grid Coordinates: 467601.0 E, 113169.0 N
Ground Level: 79.00 m OD
Scale: 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		79.00
0.30	ES			TOPSOIL: Dark brown slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to coarse chalk.	0.25	1	78.75
0.50	D						
0.50	ES			Firm dark brown slightly sandy slightly gravelly CLAY with a low cobble content of angular to subangular flint. Gravel is subangular to subrounded fine to coarse flint.		2	
0.50- 1.00	LB				1.00		78.00
				End of Excavation			

DRAFT

Excavation

Plant: 5 Tonne Excavator
Date: 16/11/2020
Shoring: None.
Stability: Stable during excavation.
Width (B): 0.60
Length (C): 2.00
Date Backfilled: 16/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks AGS
A Soakaway Test was carried out on completion of the trial pit and the results are presented separately.
Approximate co-ordinates: 467734, 113169 at 80m AOD.

Logged by: PS
Figure: 1 of 1
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.
All dimensions are in metres.
Logged in accordance with BS5930:2015

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TRIAL PIT RECORD

Trial Pit

Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI

Engineer WSP UK LIMITED

Trial Pit TP22

Project No PE201667

Client AQUIND LIMITED

National Grid Coordinates 467734.0 E 113169.0 N

Ground Level 80.00 m OD

Scale 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		80.00
0.20	ES			TOPSOIL: Brown slightly sandy clay with occasional rootlets.		1	
0.30- 0.50	LB				0.30		79.70
0.50	D			Firm dark yellowish brown slightly sandy slightly gravelly CLAY with low cobble content of angular to subangular flint. Gravel is subangular to subrounded fine to coarse flint.		2	
0.50	ES				1.20		78.80
1.50	D			Structureless CHALK. Recovered as cream slightly gravelly sandy SILT. Gravel is weak, low density and white.		3	
					1.70		78.30
				End of Excavation			

DRAFT

Excavation

Plant 5 Tonne Excavator

Date 16/11/2020

Shoring None.

Stability Stable during excavation.

Width (B) 0.60

Length (C) 2.00

Date Backfilled 16/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks A Soakaway Test was carried out on completion of the trial pit and the results are presented separately.
Approximate co-ordinates: 467601, 113173 at 79m AOD.

Logged by PS

Figure 1 of 1

02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

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TRIAL PIT RECORD — Trial Pit — Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer WSP UK LIMITED
Trial Pit TP23
Project No PE201667
Client AQUIND LIMITED
National Grid Coordinates 467309.219E 113181.444N
Ground Level 77.92 m OD

Samples and Tests

Depth	Type	Stratum No	Results
0.20- 0.80	B		
0.30	ES		
0.50	D		
0.50	ES		
0.90	D		

Strata

Scale 1:50

Description	Depth	Legend	Level m OD
	G.L.		77.92
TOPSOIL: Grass over dark brown slightly sandy clay.	0.20	1	77.72
Firm orangish brown slightly sandy slightly gravelly CLAY with a moderate cobble content of angular to subangular flint. Gravel is subangular to subrounded fine to coarse flint.	0.50	2	77.42
Structureless CHALK. Recovered as cream slightly sandy gravelly SILT. Gravel is weak, low density and white.	1.00	3	76.92
End of Excavation			

DRAFT

Excavation

Plant 5 Tonne Excavator
Date 18/11/2020
Shoring None.
Stability Stable during excavation.
Width (B) 0.60
Length (C) 2.00
Date Backfilled 18/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by PS
Figure 1 of 1
02/12/2020

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TRIAL PIT RECORD — Trial Pit — Draft

Project: AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer: WSP UK LIMITED
Trial Pit: TP24
Project No: PE201667
Client: AQUIND LIMITED
National Grid Coordinates: 467078.882E 113147.248N
Ground Level: 68.92 m OD
Scale: 1:50

Samples and Tests

Depth	Type	Stratum No	Results
0.30	D		
0.30	ES		
0.45- 1.60	LB		
0.50	D		
0.50	ES		
1.50	D		

Strata

Description	Depth	Legend	Level m OD
	G.L.		68.92
TOPSOIL: Grass over soft dark brown slightly sandy clay.	0.20	1	68.72
Soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint.	0.45	2	68.47
Structureless CHALK. Recovered as brownish cream slightly sandy gravelly SILT. Gravel is weak, low density, white with occasional flint.		3	
End of Excavation	1.60		67.32

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Excavation

Plant: 5 Tonne Excavator
Date: 18/11/2020
Shoring: None.
Stability: Stable during excavation.
Width (B): 0.60
Length (C): 2.00
Date Backfilled: 18/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by: PS
Figure: 1 of 1
02/12/2020

geotechnics

TRIAL PIT RECORD — Trial Pit — Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI | Engineer WSP UK LIMITED | Trial Pit TP25 | Project No PE201667

Client AQUIND LIMITED | National Grid Coordinates 467097.161E 113311.099N | Ground Level 73.10 m OD

Scale 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		73.10
0.20- 1.00	LB			TOPSOIL: Grass over dark brown slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint.	0.20	1	72.90
0.30	ES						
0.50	D						
0.50	ES			Firm reddish brown slightly sandy slightly gravelly CLAY with an occasional cobble content of angular to subangular flint. Gravel is subangular to subrounded fine to coarse flint.		2	
					1.00		72.10
				End of Excavation			

DRAFT

Excavation

Plant 5 Tonne Excavator
Date 18/11/2020
Shoring None.
Stability Stable during excavation.
Width (B) 0.60
Length (C) 2.00
Date Backfilled 18/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by PS

Figure 1 of 1

02/12/2020

geotechnics

TRIAL PIT RECORD — Trial Pit — Draft

Project: AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer: WSP UK LIMITED
Trial Pit: TP26
Project No: PE201667
Client: AQUIND LIMITED
National Grid Coordinates: 467060.847E 113378.632N
Ground Level: 77.31 m OD
Scale: 1:50

Samples and Tests				Strata			
Depth	Type	Stratum No	Results	Description	Depth	Legend	Level m OD
					G.L.		77.31
0.20- 0.80	LB			TOPSOIL: Grass over brown slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint with frequent rootlets.	0.20	1	77.11
0.30	ES						
0.50	D						
0.50	ES			Firm orangish brown slightly sandy slightly gravelly CLAY with a medium cobble content of angular to subangular flint. Gravel is subangular to subrounded fine to coarse flint and chalk.	0.80	2	76.51
1.00- 1.50	B			Structureless CHALK. Recovered as slightly sandy silty subangular to subrounded GRAVEL and COBBLES. Clasts are weak, low density, white with rare black speckling. Matrix is cream.		3	
1.50	D						
2.00- 2.50	D						
2.30	D						
				End of Excavation	2.50		74.81

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Excavation

Plant: 5 Tonne Excavator
Date: 17/11/2020
Shoring: None.
Stability: Stable during excavation.
Width (B): 2.00
Length (C): 0.60
Date Backfilled: 17/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks: A Soakaway Test was carried out on completion of the trial pit and the results are presented separately.

Logged by: PS

Figure: 1 of 1
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

TRIAL PIT RECORD — Trial Pit — Draft

Project AQUIND DRAINAGE DESIGN ADDITIONAL GI
Engineer WSP UK LIMITED
Trial Pit TP27
Project No PE201667
Client AQUIND LIMITED
National Grid Coordinates 467149.383E 113463.773N
Ground Level 80.75 m OD

Samples and Tests

Depth	Type	Stratum No	Results
0.30	ES		
0.30- 0.60	LB		
0.50	D		
0.50	ES		
1.00- 1.50	B		
1.30	D		

Strata

Scale 1:50

Description	Depth	Legend	Level m OD
	G.L.		80.75
TOPSOIL: Grass over dark brown slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint with frequent roots.	0.20	1	80.55
Soft to firm orangish brown slightly sandy slightly gravelly CLAY with a medium cobble content of flint. Gravel is subangular to subrounded fine to coarse flint. From 0.80m, Gravelly.	1.00	2	79.75
Structureless CHALK. Recovered as slightly sandy silty subangular to subrounded GRAVEL and COBBLES. Clasts are weak, low density and white. Matrix is brownish cream.	1.50	3	79.25
End of Excavation			

DRAFT

Excavation

Plant 5 Tonne Excavator
Date 16/11/2020
Shoring None.
Stability Stable during excavation.
Width (B) 0.60
Length (C) 2.00
Date Backfilled 16/11/2020

Groundwater

Depth Observed	Depth of Pit	Details
		Groundwater not encountered during pitting.

Remarks A Soakaway Test was carried out on completion of the trial pit and the results are presented separately.

Logged by PS

Figure 1 of 1
02/12/2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

geotechnics

TRIAL PIT RECORD

Trial Pit

Draft

Project	AQUIND DRAINAGE DESIGN ADDITIONAL GI	Engineer	WSP UK LIMITED	Trial Pit	TP28
				Project No	PE201667
Client	AQUIND LIMITED	National Grid Coordinates	467826.580 E 99137.284 N	Ground Level	3.46 m OD

Samples and Tests

Depth	Type	Stratum No	Results
0.20- 0.30	B		
0.20- 0.30	ES		
0.30- 1.00	B		
0.30- 1.00	ES		
1.00- 1.70	B		
1.00- 1.70	ES		

Strata

Scale 1:50

Description	Depth	Legend	Level m OD
	G.L.		3.46
MADE GROUND: Brown sandy gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse sandstone, limestone and chert. At 0.29m, Geotextile membrane separating made ground from central soils.	0.30	1	3.16
Brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse chert and sandstone.	1.00	2	2.46
Light brown gravelly SAND. Gravel is angular to subrounded fine to coarse chert and sandstone.		3	
End of Excavation	1.70		1.76

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Excavation

Plant	5 Tonne Excavator	Width (B)	0.60
Date	19/11/2020	Length (C)	2.20
Shoring	None.	Date Backfilled	19/11/2020
Stability	Stable during excavation.		

Groundwater

Depth Observed	Depth of Pit	Details

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015

Logged by JW

Figure 1 of 1

02/12/2020

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APPENDIX 7

Trial Pit Photographs

PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

HP01 (1)

HP01 (2)

PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

HP01 (3)

HP02 (1)

DRAFT

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

HP02 (2)

TP21 GL-1.00

DRAFT

PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP21 spoil

TP22 GL-1.70

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP22 spoil

TP23 GL-1.00

DRAFT

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP23 spoil

TP24 GL-1.60

DRAFT

PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP24 spoil

TP25 GL-1.00

DRAFT

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Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP25 spoil

TP26 GL-2.50

DRAFT

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

TP26 spoil

TP27 GL-1.50

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PHOTOGRAPHS

Project Number : PE201667

Project : Aquind Additional Ground Investigation, Drainage Design

DRAFT

TP27 spoil

TP28 (1)

DRAFT

APPENDIX 8

Borehole Permeability Test Results

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	19/11/2020

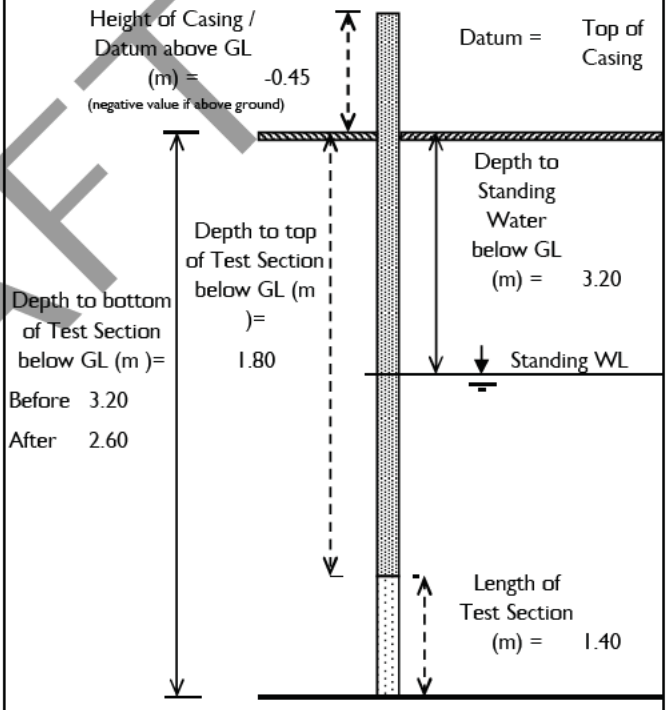
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467041.0
	N 113142.6
Level (m OD)	67.18

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	1.20		
0.5	1.80		
1.0	2.16		
1.5	2.32		
2.0	2.36		
2.5	2.42		
3.0	2.47		
3.5	2.47		
4.0	2.49		
4.5	2.52		
5.0	2.60		
6.0	2.60		
7.0	2.60		
8.0	2.60		
9.0	2.60		
10.0	2.60		
15.0	2.63		
20.0	2.66		
30.0	2.70		



Depth to Standing Water Level below Datum	3.65 m
Depth to Induced Water Level below Datum	1.20 m
Differential head at start of Test (H_o)	2.45 m
Differential Head at end of Test (H_f)	0.75 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	19/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	1.20	0.75	2.45	0.00					
0.5	1.80	1.35	1.85	0.76					
1.0	2.16	1.71	1.49	0.61					
1.5	2.32	1.87	1.33	0.54					
2.0	2.36	1.91	1.29	0.53					
2.5	2.42	1.97	1.23	0.50					
3.0	2.47	2.02	1.18	0.48					
3.5	2.47	2.02	1.18	0.48					
4.0	2.49	2.04	1.16	0.47					
4.5	2.52	2.07	1.13	0.46					
5.0	2.60	2.15	1.05	0.43					
6.0	2.60	2.15	1.05	0.43					
7.0	2.60	2.15	1.05	0.43					
8.0	2.60	2.15	1.05	0.43					
9.0	2.60	2.15	1.05	0.43					
10.0	2.60	2.15	1.05	0.43					
15.0	2.63	2.18	1.02	0.42					
20.0	2.66	2.21	0.99	0.40					
30.0	2.70	2.25	0.95	0.39					

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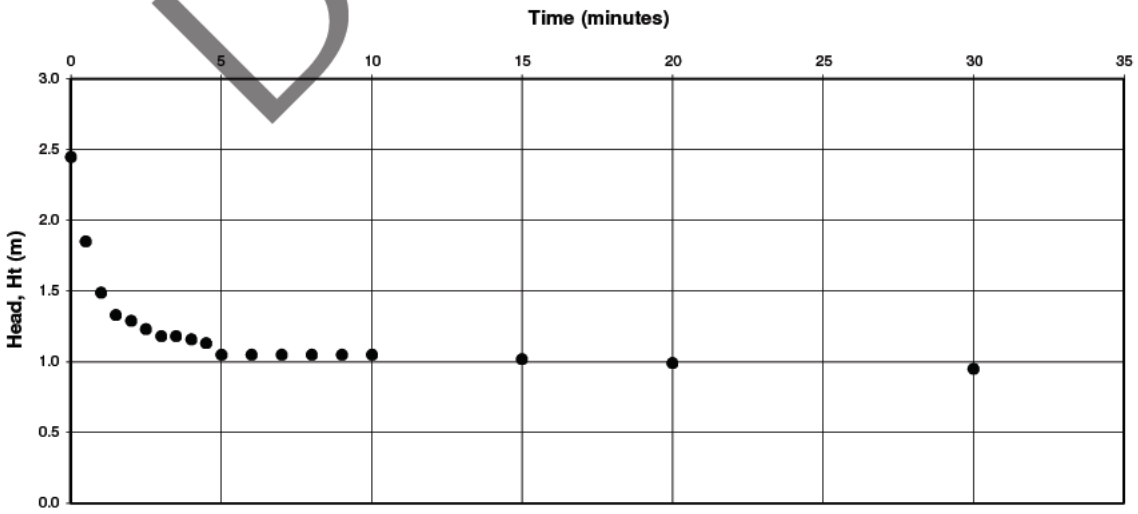


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

Water assumed at base of hole.

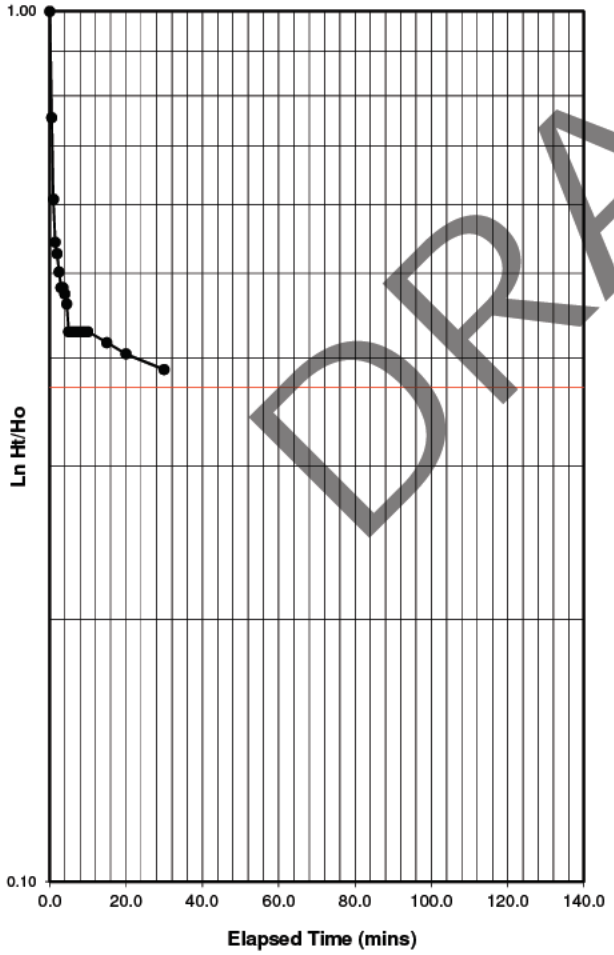
NB. Borehole collapsed from 3.20m back to 2.60m during the test.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	19/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.45	1.00	9.0	1.05	0.43			
0.5	1.85	0.76	10.0	1.05	0.43			
1.0	1.49	0.61	15.0	1.02	0.42			
1.5	1.33	0.54	20.0	0.99	0.40			
2.0	1.29	0.53	30.0	0.95	0.39			
2.5	1.23	0.50						
3.0	1.18	0.48						
3.5	1.18	0.48						
4.0	1.16	0.47						
4.5	1.13	0.46						
5.0	1.05	0.43						
6.0	1.05	0.43						
7.0	1.05	0.43						
8.0	1.05	0.43						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	3.65	m
Depth to Induced Water Level	1.20	m
Differential head at start (H_o)	2.45	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.40	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.791	
Time (t1)	1.50	mins
Time (t2)	5.00	mins
Head at Time t1 (H1)	13.130	m
Head at Time t2 (H2)	1.050	m
Permeability (k) = A/(F[t2-	**4.87E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	18/11/2020

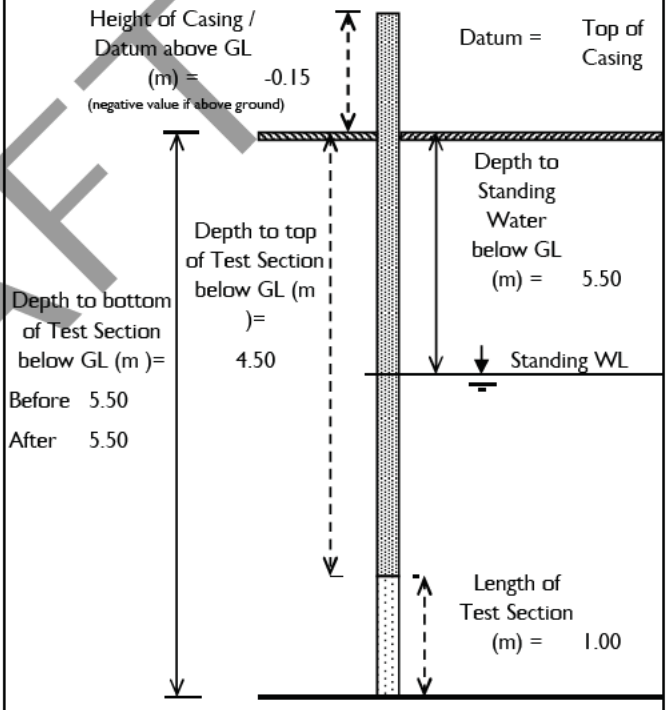
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.56		
0.5	3.85		
1.0	3.99		
1.5	4.04		
2.0	4.14		
2.5	4.17		
3.0	4.17		
3.5	4.20		
4.0	4.24		
5.0	4.28		
6.0	4.34		
7.0	4.37		
8.0	4.40		
9.0	4.46		
10.0	4.48		
15.0	4.59		
20.0	4.68		
30.0	4.85		



Depth to Standing Water Level below Datum	5.65 m
Depth to Induced Water Level below Datum	3.56 m
Differential head at start of Test (H_o)	2.09 m
Differential Head at end of Test (H_f)	0.80 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.56	3.41	2.09	0.00
0.5	3.85	3.70	1.80	0.86
1.0	3.99	3.84	1.66	0.79
1.5	4.04	3.89	1.61	0.77
2.0	4.14	3.99	1.51	0.72
2.5	4.17	4.02	1.48	0.71
3.0	4.17	4.02	1.48	0.71
3.5	4.20	4.05	1.45	0.69
4.0	4.24	4.09	1.41	0.67
5.0	4.28	4.13	1.37	0.66
6.0	4.34	4.19	1.31	0.63
7.0	4.37	4.22	1.28	0.61
8.0	4.40	4.25	1.25	0.60
9.0	4.46	4.31	1.19	0.57
10.0	4.48	4.33	1.17	0.56
15.0	4.59	4.44	1.06	0.51
20.0	4.68	4.53	0.97	0.46
30.0	4.85	4.70	0.80	0.38

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)

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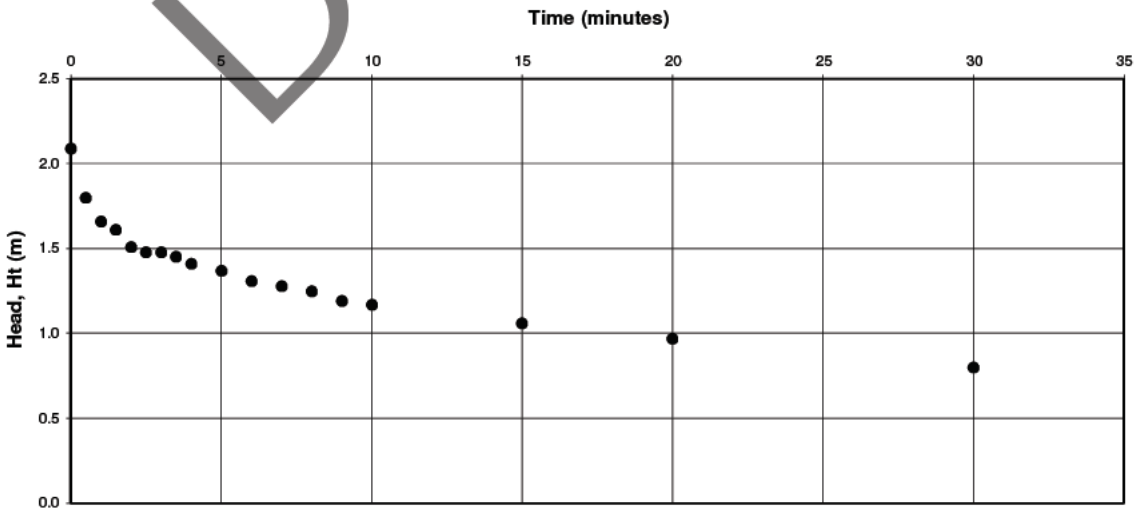


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

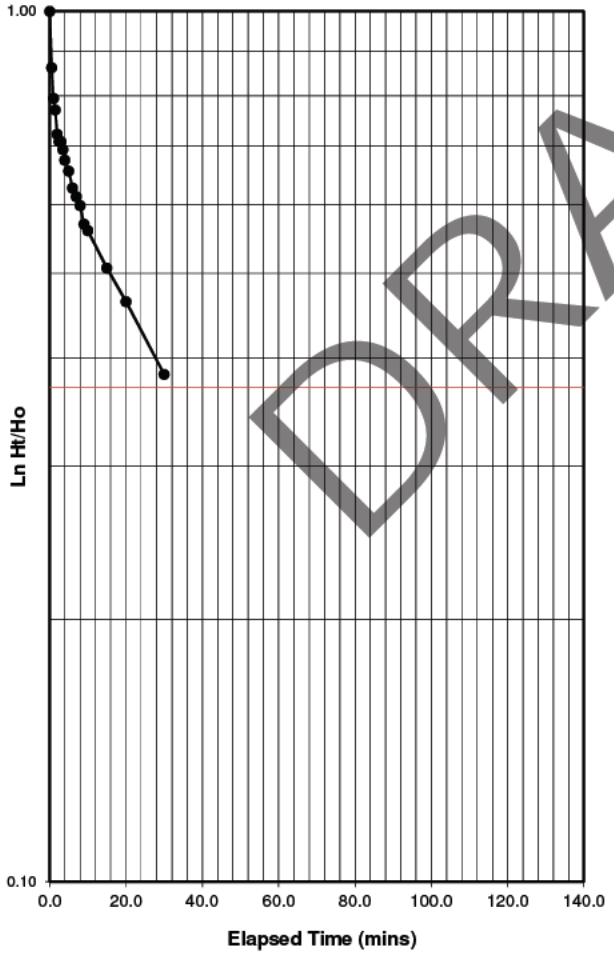
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.09	1.00	10.0	1.17	0.56			
0.5	1.80	0.86	15.0	1.06	0.51			
1.0	1.66	0.79	20.0	0.97	0.46			
1.5	1.61	0.77	30.0	0.80	0.38			
2.0	1.51	0.72						
2.5	1.48	0.71						
3.0	1.48	0.71						
3.5	1.45	0.69						
4.0	1.41	0.67						
5.0	1.37	0.66						
6.0	1.31	0.63						
7.0	1.28	0.61						
8.0	1.25	0.60						
9.0	1.19	0.57						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	5.65	m
Depth to Induced Water Level	3.56	m
Differential head at start (H_o)	2.09	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	3.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	1.480	m
Head at Time t2 (H2)	0.800	m
Permeability (k) = A/(F[t2-	**1.93E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	18/11/2020

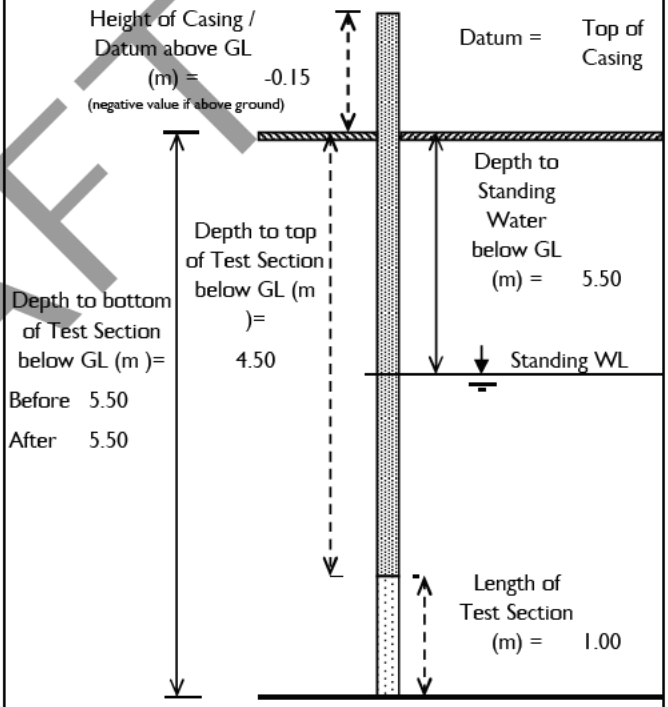
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.30		
0.5	3.80		
1.0	3.94		
1.5	3.96		
2.0	4.08		
2.5	4.14		
3.0	4.18		
3.5	4.23		
4.0	4.26		
5.0	4.32		
6.0	4.40		
7.0	4.46		
8.0	4.51		
9.0	4.54		
10.0	4.55		
15.0	4.63		
20.0	4.73		
30.0	4.97		
40.0	5.14		
50.0	5.27		



Depth to Standing Water Level below Datum	5.65 m
Depth to Induced Water Level below Datum	3.30 m
Differential head at start of Test (H_o)	2.35 m
Differential Head at end of Test (H_f)	0.38 m
Time Elapsed at end of test (t_f)	50.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.30	3.15	2.35	0.00					
0.5	3.80	3.65	1.85	0.79					
1.0	3.94	3.79	1.71	0.73					
1.5	3.96	3.81	1.69	0.72					
2.0	4.08	3.93	1.57	0.67					
2.5	4.14	3.99	1.51	0.64					
3.0	4.18	4.03	1.47	0.63					
3.5	4.23	4.08	1.42	0.60					
4.0	4.26	4.11	1.39	0.59					
5.0	4.32	4.17	1.33	0.57					
6.0	4.40	4.25	1.25	0.53					
7.0	4.46	4.31	1.19	0.51					
8.0	4.51	4.36	1.14	0.49					
9.0	4.54	4.39	1.11	0.47					
10.0	4.55	4.40	1.10	0.47					
15.0	4.63	4.48	1.02	0.43					
20.0	4.73	4.58	0.92	0.39					
30.0	4.97	4.82	0.68	0.29					
40.0	5.14	4.99	0.51	0.22					
50.0	5.27	5.12	0.38	0.16					

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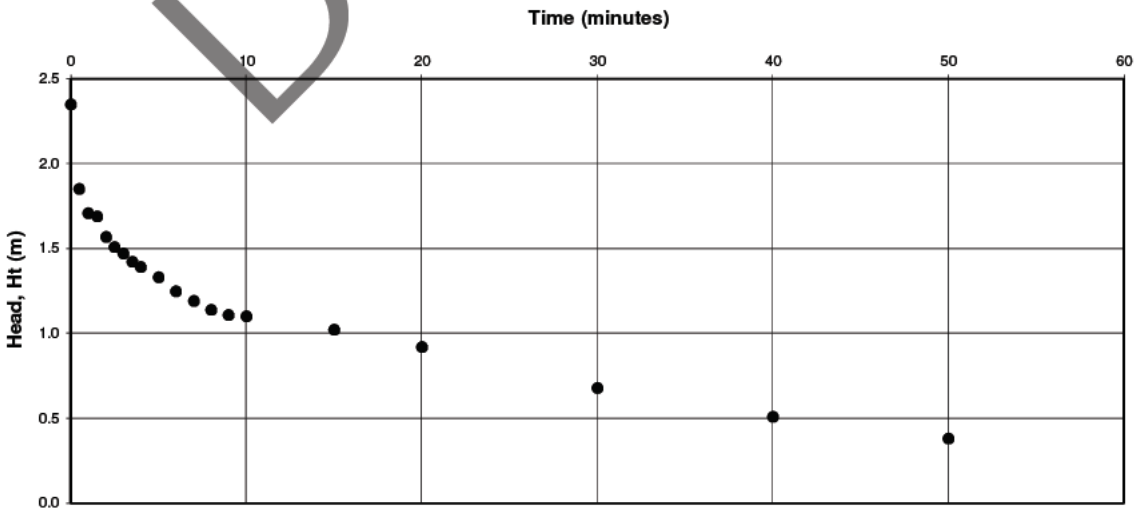


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

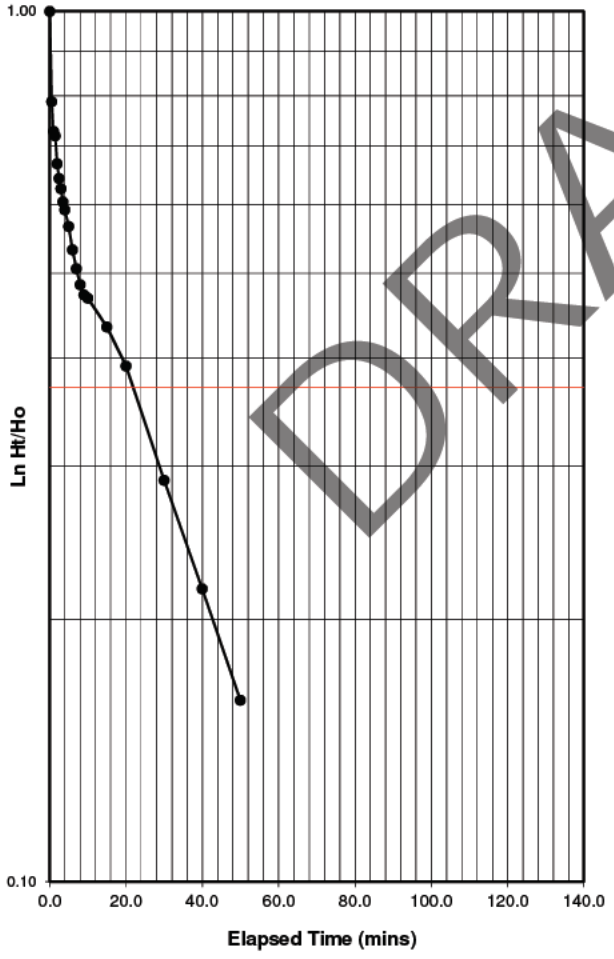
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.35	1.00	10.0	1.10	0.47			
0.5	1.85	0.79	15.0	1.02	0.43			
1.0	1.71	0.73	20.0	0.92	0.39			
1.5	1.69	0.72	30.0	0.68	0.29			
2.0	1.57	0.67	40.0	0.51	0.22			
2.5	1.51	0.64	50.0	0.38	0.16			
3.0	1.47	0.63						
3.5	1.42	0.60						
4.0	1.39	0.59						
5.0	1.33	0.57						
6.0	1.25	0.53						
7.0	1.19	0.51						
8.0	1.14	0.49						
9.0	1.11	0.47						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	5.65	m
Depth to Induced Water Level	3.30	m
Differential head at start (H_o)	2.35	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	7.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	1.190	m
Head at Time t2 (H2)	0.680	m
Permeability (k) = A/(F[t2-	**2.06E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	18/11/2020

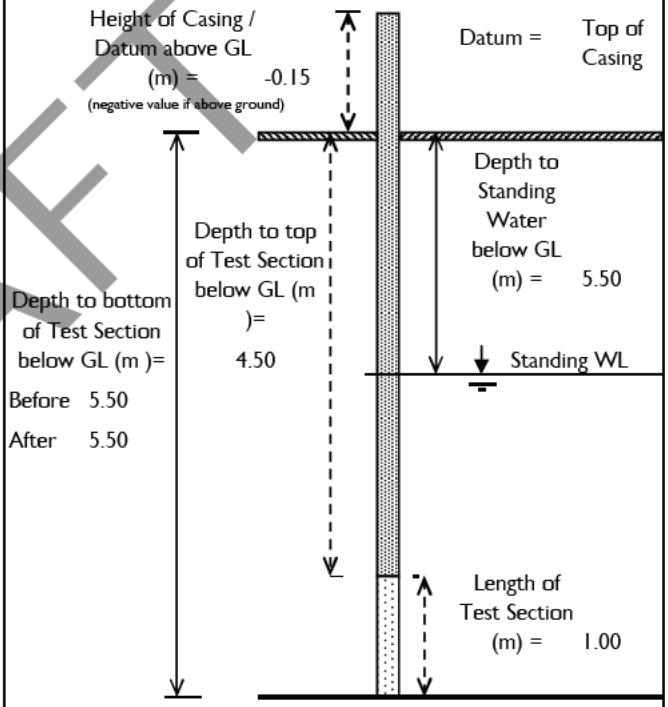
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.40		
0.5	3.77		
1.0	3.87		
1.5	3.98		
2.0	4.09		
2.5	4.10		
3.0	4.17		
3.5	4.23		
4.0	4.26		
5.0	4.30		
6.0	4.36		
7.0	4.40		
8.0	4.44		
9.0	4.49		
10.0	4.50		
15.0	4.59		
20.0	4.69		
30.0	4.88		



Depth to Standing Water Level below Datum	5.65 m
Depth to Induced Water Level below Datum	3.40 m
Differential head at start of Test (H_o)	2.25 m
Differential Head at end of Test (H_f)	0.77 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless Chalk

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.40	3.25	2.25	0.00					
0.5	3.77	3.62	1.88	0.84					
1.0	3.87	3.72	1.78	0.79					
1.5	3.98	3.83	1.67	0.74					
2.0	4.09	3.94	1.56	0.69					
2.5	4.10	3.95	1.55	0.69					
3.0	4.17	4.02	1.48	0.66					
3.5	4.23	4.08	1.42	0.63					
4.0	4.26	4.11	1.39	0.62					
5.0	4.30	4.15	1.35	0.60					
6.0	4.36	4.21	1.29	0.57					
7.0	4.40	4.25	1.25	0.56					
8.0	4.44	4.29	1.21	0.54					
9.0	4.49	4.34	1.16	0.52					
10.0	4.50	4.35	1.15	0.51					
15.0	4.59	4.44	1.06	0.47					
20.0	4.69	4.54	0.96	0.43					
30.0	4.88	4.73	0.77	0.34					

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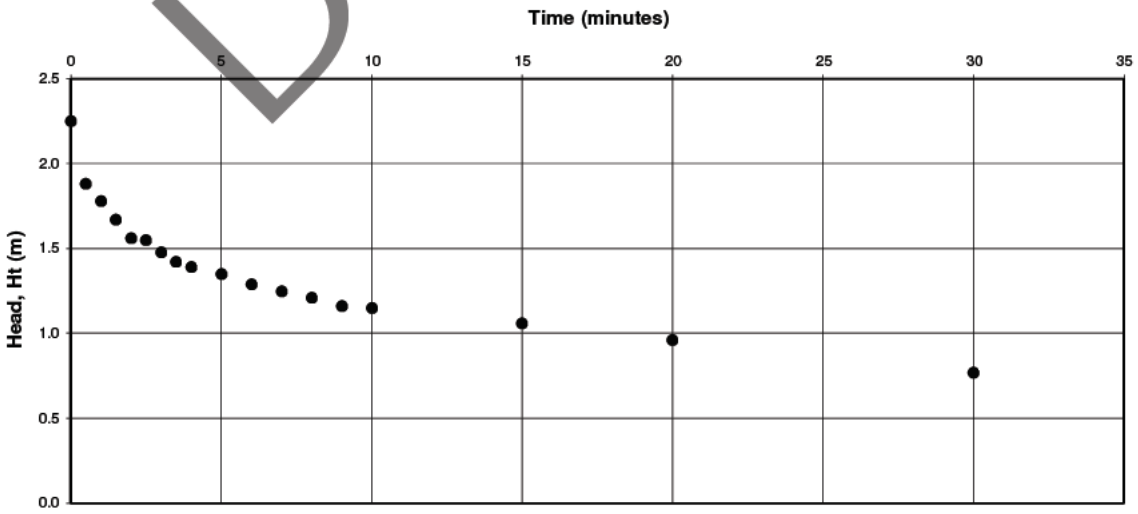


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

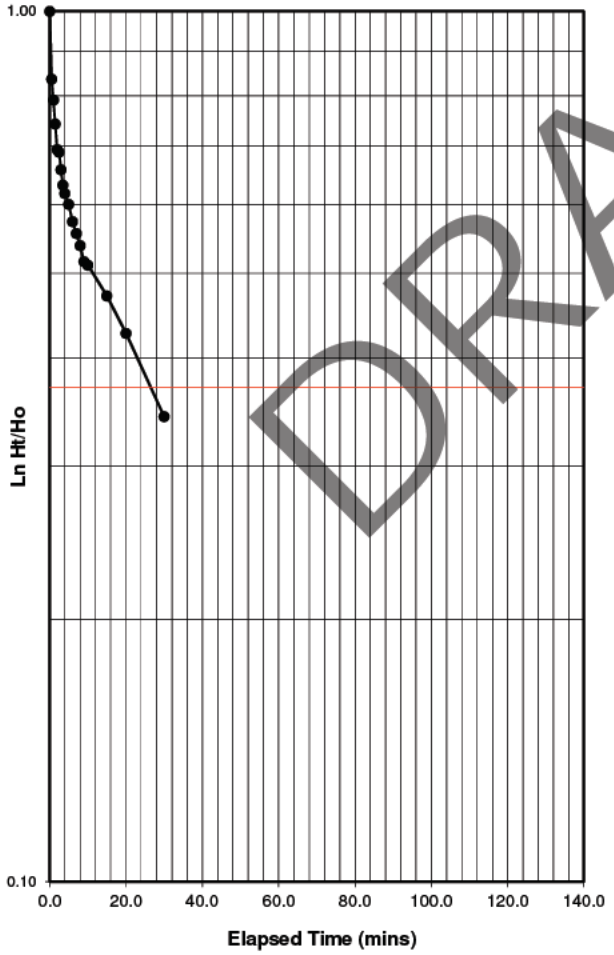
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.25	1.00	10.0	1.15	0.51			
0.5	1.88	0.84	15.0	1.06	0.47			
1.0	1.78	0.79	20.0	0.96	0.43			
1.5	1.67	0.74	30.0	0.77	0.34			
2.0	1.56	0.69						
2.5	1.55	0.69						
3.0	1.48	0.66						
3.5	1.42	0.63						
4.0	1.39	0.62						
5.0	1.35	0.60						
6.0	1.29	0.57						
7.0	1.25	0.56						
8.0	1.21	0.54						
9.0	1.16	0.52						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	5.65	m
Depth to Induced Water Level	3.40	m
Differential head at start (H_o)	2.25	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	4.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	1.390	m
Head at Time t2 (H2)	0.770	m
Permeability (k) = A/(F[t2-	**1.92E-06**	**m/sec**

DRAFT

Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

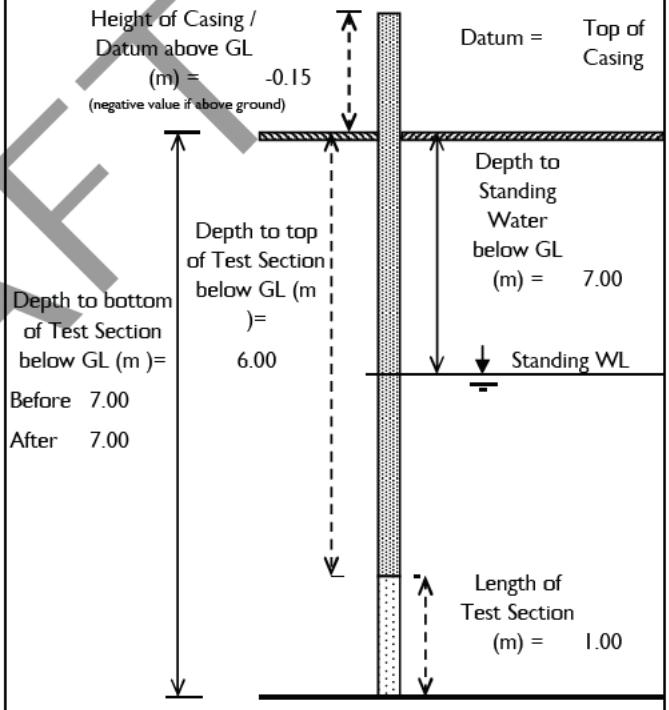
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	2.30		
1.0	3.33		
1.5	3.68		
2.0	3.85		
2.5	3.99		
3.0	4.18		
3.5	4.28		
4.0	4.45		
4.5	4.55		
5.0	4.59		
6.0	4.78		
7.0	4.82		
8.0	4.94		
9.0	5.07		
10.0	5.16		
15.0	5.29		
20.0	5.37		
30.0	5.46		



Depth to Standing Water Level below Datum	7.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	5.15 m
Differential Head at end of Test (H_f)	9.69 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structural CHALK

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	5.15	0.00					
0.5	2.30	2.15	4.85	0.94					
1.0	3.33	3.18	3.82	0.74					
1.5	3.68	3.53	3.47	0.67					
2.0	3.85	3.70	3.30	0.64					
2.5	3.99	3.84	3.16	0.61					
3.0	4.18	4.03	2.97	0.58					
3.5	4.28	4.13	2.87	0.56					
4.0	4.45	4.30	2.70	0.52					
4.5	4.55	4.40	2.60	0.50					
5.0	4.59	4.44	2.56	0.50					
6.0	4.78	4.63	2.37	0.46					
7.0	4.82	4.67	2.33	0.45					
8.0	4.94	4.79	2.21	0.43					
9.0	5.07	4.92	2.08	0.40					
10.0	5.16	5.01	1.99	0.39					
15.0	5.29	5.14	1.86	0.36					
20.0	5.37	5.22	1.78	0.35					
30.0	5.46	5.31	1.69	0.33					

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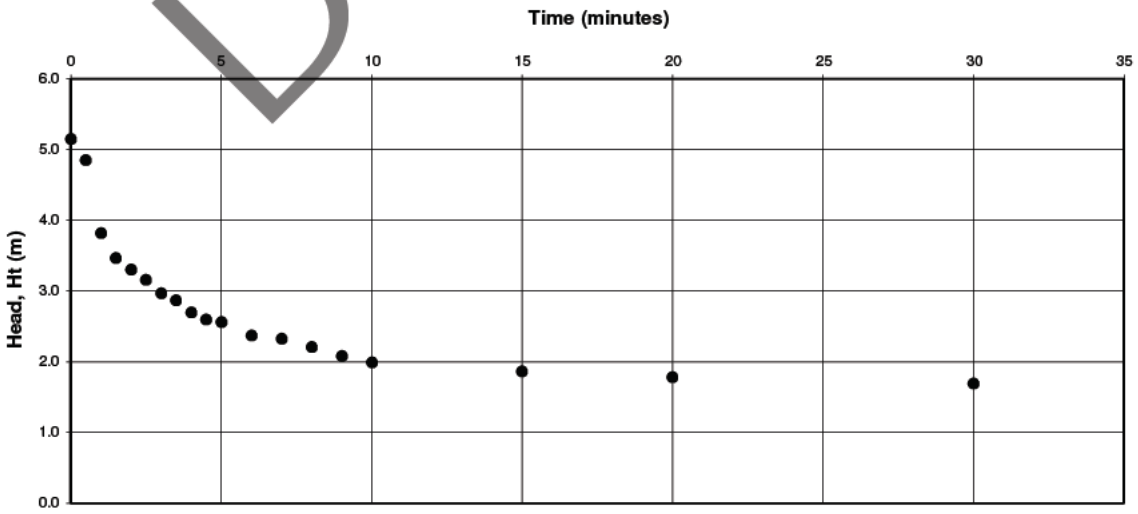


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

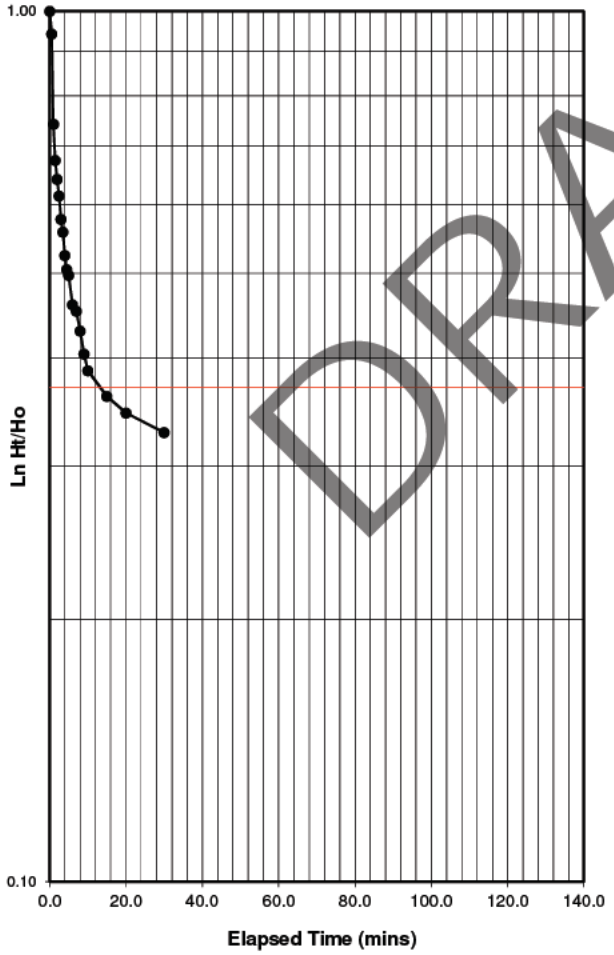
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	5.15	1.00	9.0	2.08	0.40			
0.5	4.85	0.94	10.0	1.99	0.39			
1.0	3.82	0.74	15.0	1.86	0.36			
1.5	3.47	0.67	20.0	1.78	0.35			
2.0	3.30	0.64	30.0	1.69	0.33			
2.5	3.16	0.61						
3.0	2.97	0.58						
3.5	2.87	0.56						
4.0	2.70	0.52						
4.5	2.60	0.50						
5.0	2.56	0.50						
6.0	2.37	0.46						
7.0	2.33	0.45						
8.0	2.21	0.43						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	7.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	5.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	1.50	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	3.470	m
Head at Time t2 (H2)	1.990	m
Permeability (k) = A/(F[t2-	**5.53E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

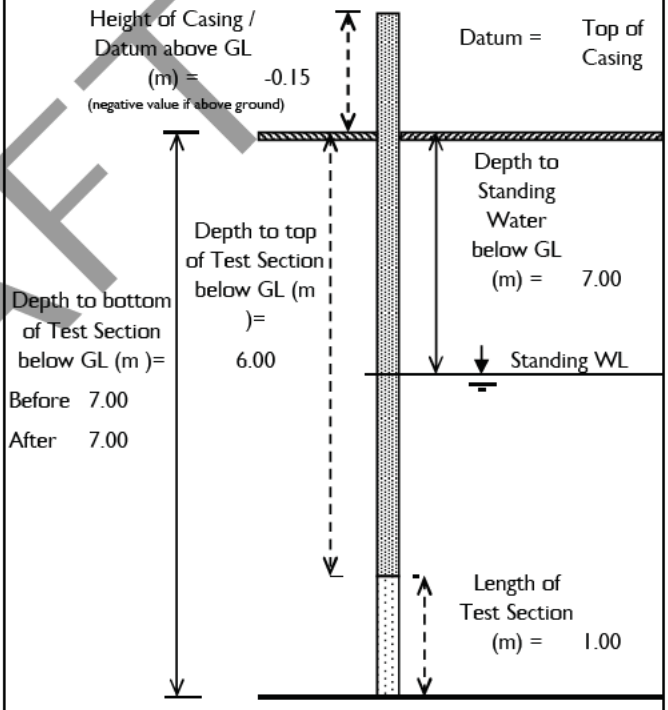
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	2.57		
1.0	3.39		
1.5	3.72		
2.0	3.80		
2.5	4.02		
3.0	4.07		
3.5	4.17		
4.0	4.32		
4.5	4.42		
5.0	4.49		
6.0	4.63		
7.0	4.74		
8.0	4.87		
9.0	4.99		
10.0	5.05		
15.0	5.37		
20.0	5.40		
30.0	5.58		



Depth to Standing Water Level below Datum	7.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	5.15 m
Differential Head at end of Test (H_f)	9.57 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	5.15	0.00					
0.5	2.57	2.42	4.58	0.89					
1.0	3.39	3.24	3.76	0.73					
1.5	3.72	3.57	3.43	0.67					
2.0	3.80	3.65	3.35	0.65					
2.5	4.02	3.87	3.13	0.61					
3.0	4.07	3.92	3.08	0.60					
3.5	4.17	4.02	2.98	0.58					
4.0	4.32	4.17	2.83	0.55					
4.5	4.42	4.27	2.73	0.53					
5.0	4.49	4.34	2.66	0.52					
6.0	4.63	4.48	2.52	0.49					
7.0	4.74	4.59	2.41	0.47					
8.0	4.87	4.72	2.28	0.44					
9.0	4.99	4.84	2.16	0.42					
10.0	5.05	4.90	2.10	0.41					
15.0	5.37	5.22	1.78	0.35					
20.0	5.40	5.25	1.75	0.34					
30.0	5.58	5.43	1.57	0.30					

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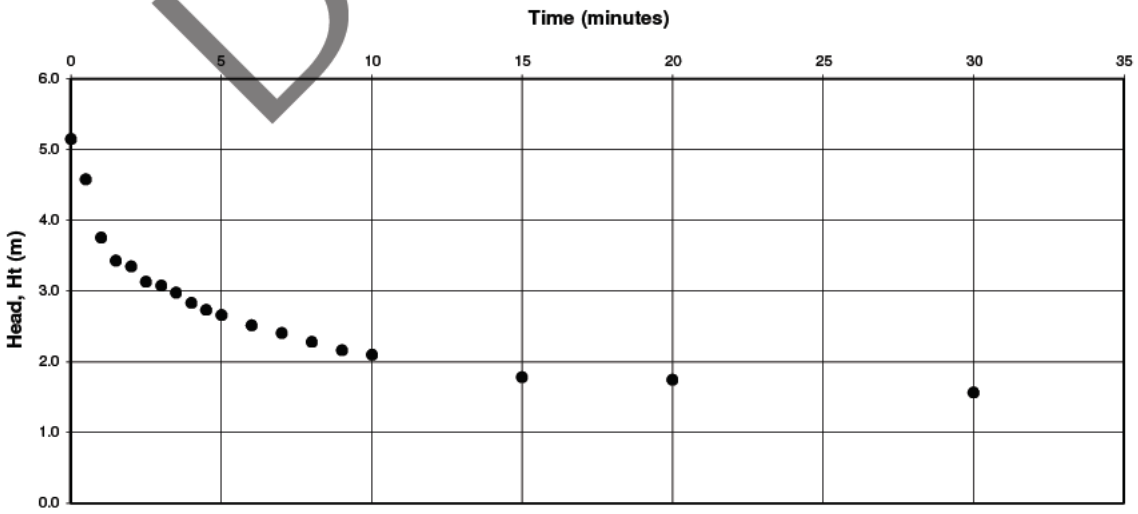


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

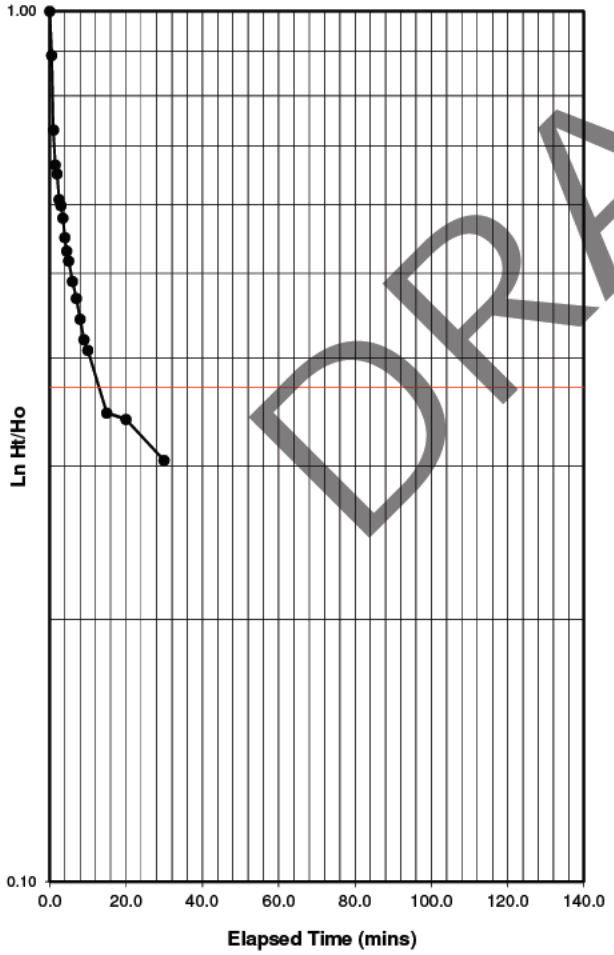
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	5.15	1.00	9.0	2.16	0.42			
0.5	4.58	0.89	10.0	2.10	0.41			
1.0	3.76	0.73	15.0	1.78	0.35			
1.5	3.43	0.67	20.0	1.75	0.34			
2.0	3.35	0.65	30.0	1.57	0.30			
2.5	3.13	0.61						
3.0	3.08	0.60						
3.5	2.98	0.58						
4.0	2.83	0.55						
4.5	2.73	0.53						
5.0	2.66	0.52						
6.0	2.52	0.49						
7.0	2.41	0.47						
8.0	2.28	0.44						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	7.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	5.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	1.50	mins
Time (t2)	15.00	mins
Head at Time t1 (H1)	3.430	m
Head at Time t2 (H2)	1.780	m
Permeability (k) = A/(F[t2-	**4.11E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

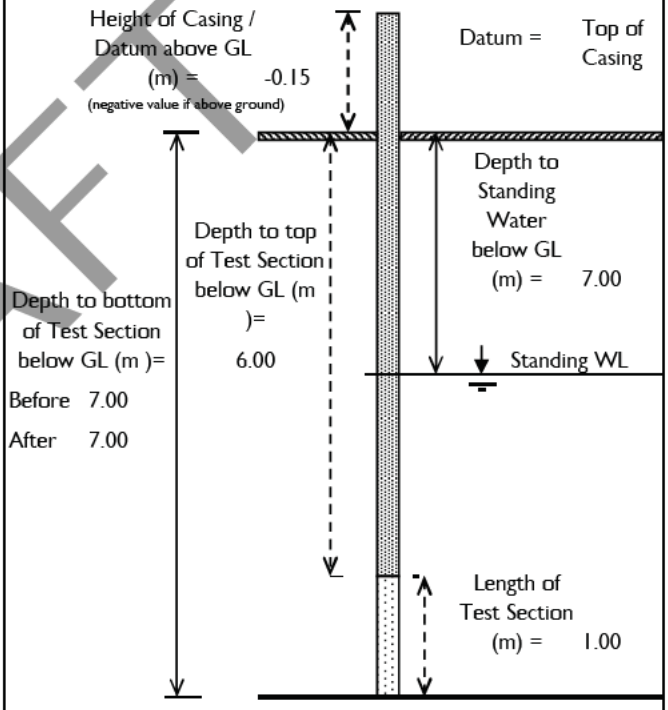
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	3.10		
1.0	3.56		
1.5	3.86		
2.0	4.04		
2.5	4.28		
3.0	4.43		
3.5	4.55		
4.0	4.71		
4.5	4.82		
5.0	4.91		
6.0	5.10		
7.0	5.16		
8.0	5.27		
9.0	5.37		
10.0	5.42		
15.0	5.57		
20.0	5.73		
30.0	5.96		
40.0	6.19		
50.0	6.26		



Depth to Standing Water Level below Datum	7.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	5.15 m
Differential Head at end of Test (H_f)	8.96 m
Time Elapsed at end of test (t_f)	50.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	5.15	0.00	50.0	6.26	6.11	0.89	0.17
0.5	3.10	2.95	4.05	0.79					
1.0	3.56	3.41	3.59	0.70					
1.5	3.86	3.71	3.29	0.64					
2.0	4.04	3.89	3.11	0.60					
2.5	4.28	4.13	2.87	0.56					
3.0	4.43	4.28	2.72	0.53					
3.5	4.55	4.40	2.60	0.50					
4.0	4.71	4.56	2.44	0.47					
4.5	4.82	4.67	2.33	0.45					
5.0	4.91	4.76	2.24	0.43					
6.0	5.10	4.95	2.05	0.40					
7.0	5.16	5.01	1.99	0.39					
8.0	5.27	5.12	1.88	0.37					
9.0	5.37	5.22	1.78	0.35					
10.0	5.42	5.27	1.73	0.34					
15.0	5.57	5.42	1.58	0.31					
20.0	5.73	5.58	1.42	0.28					
30.0	5.96	5.81	1.19	0.23					
40.0	6.19	6.04	0.96	0.19					

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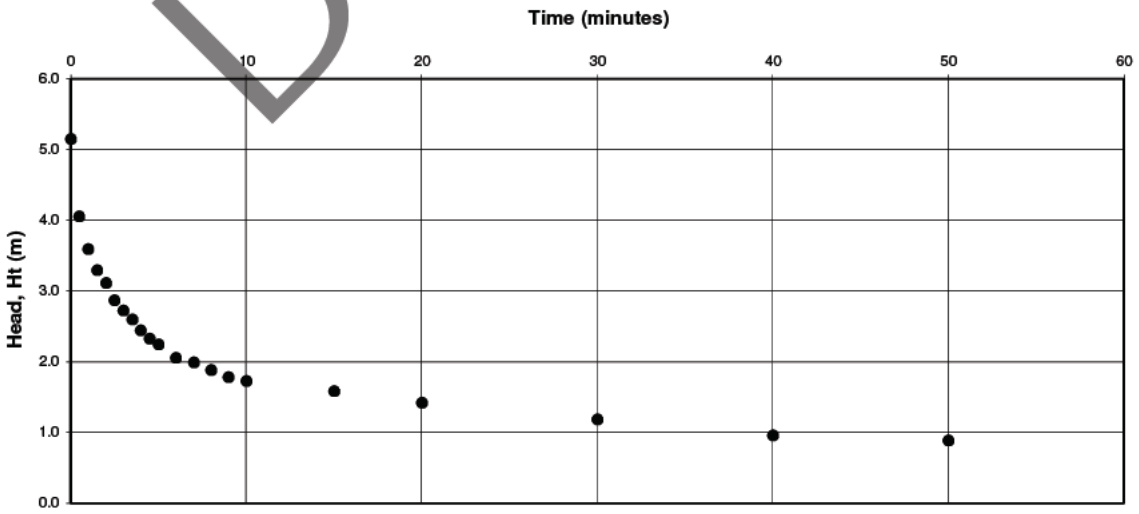


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

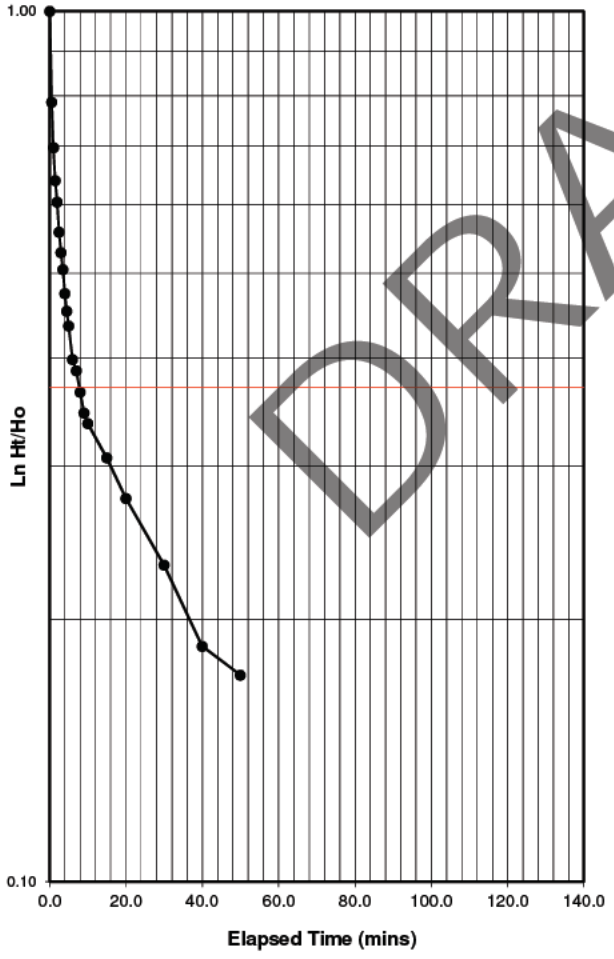
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	5.15	1.00	9.0	1.78	0.35			
0.5	4.05	0.79	10.0	1.73	0.34			
1.0	3.59	0.70	15.0	1.58	0.31			
1.5	3.29	0.64	20.0	1.42	0.28			
2.0	3.11	0.60	30.0	1.19	0.23			
2.5	2.87	0.56	40.0	0.96	0.19			
3.0	2.72	0.53	50.0	0.89	0.17			
3.5	2.60	0.50						
4.0	2.44	0.47						
4.5	2.33	0.45						
5.0	2.24	0.43						
6.0	2.05	0.40						
7.0	1.99	0.39						
8.0	1.88	0.37						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	7.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	5.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.233	
Time (t1)	5.00	mins
Time (t2)	50.00	mins
Head at Time t1 (H1)	2.240	m
Head at Time t2 (H2)	0.890	m
Permeability (k) = A/(F[t2-	**1.73E-06**	**m/sec**

DRAFT

Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

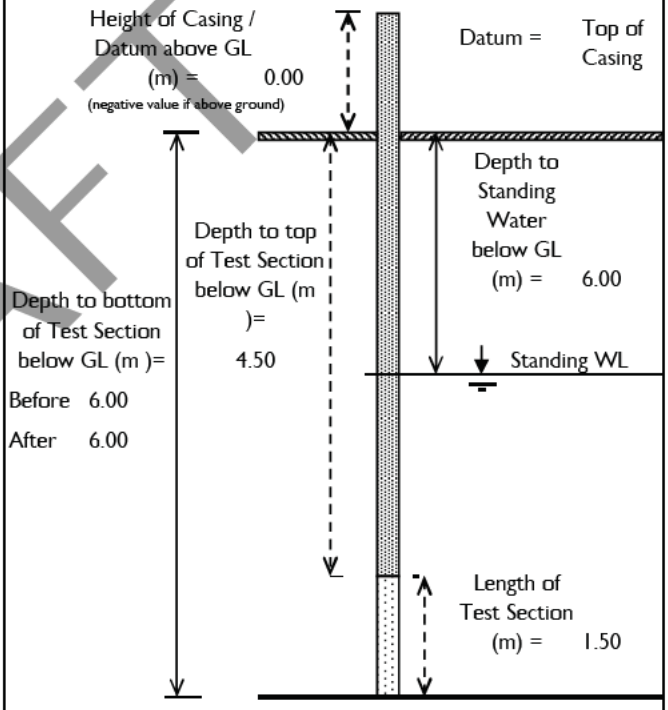
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.37		
0.3	2.64		
0.5	2.80		
0.8	2.93		
1.0	3.10		
1.3	3.25		
1.5	3.40		
1.8	3.52		
2.0	3.62		
2.3	3.70		
2.5	3.79		
2.8	3.87		
3.0	3.93		



Depth to Standing Water Level below Datum	6.00 m
Depth to Induced Water Level below Datum	2.37 m
Differential head at start of Test (H_o)	3.63 m
Differential Head at end of Test (H_f)	1.92 m
Time Elapsed at end of test (t_f)	3.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.37	2.37	3.63	0.00					
0.3	2.64	2.64	3.36	0.93					
0.5	2.80	2.80	3.20	0.88					
0.8	2.93	2.93	3.07	0.85					
1.0	3.10	3.10	2.90	0.80					
1.3	3.25	3.25	2.75	0.76					
1.5	3.40	3.40	2.60	0.72					
1.8	3.52	3.52	2.48	0.68					
2.0	3.62	3.62	2.38	0.66					
2.3	3.70	3.70	2.30	0.63					
2.5	3.79	3.79	2.21	0.61					
2.8	3.87	3.87	2.13	0.59					
3.0	3.93	3.93	2.07	0.57					

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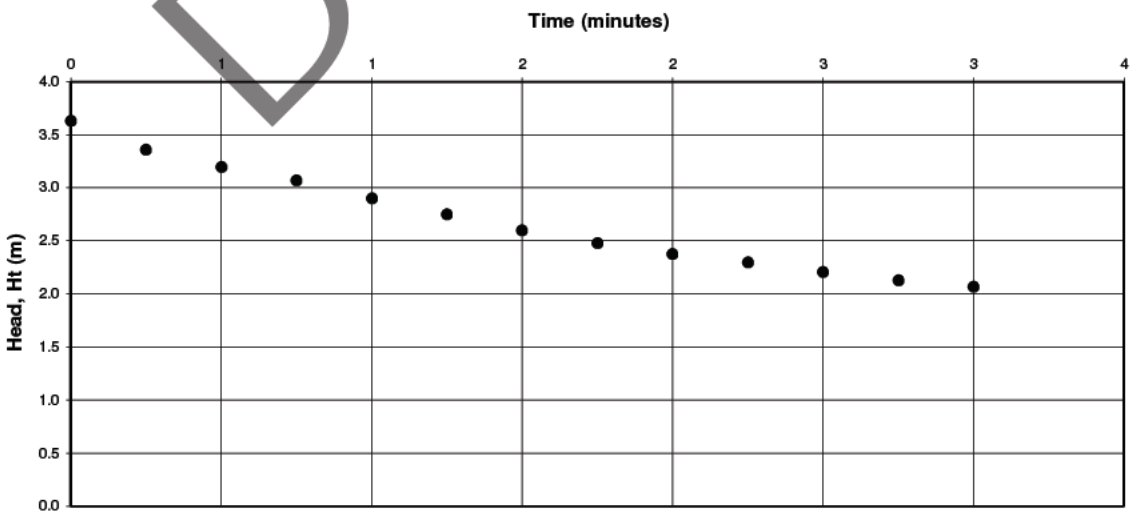


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

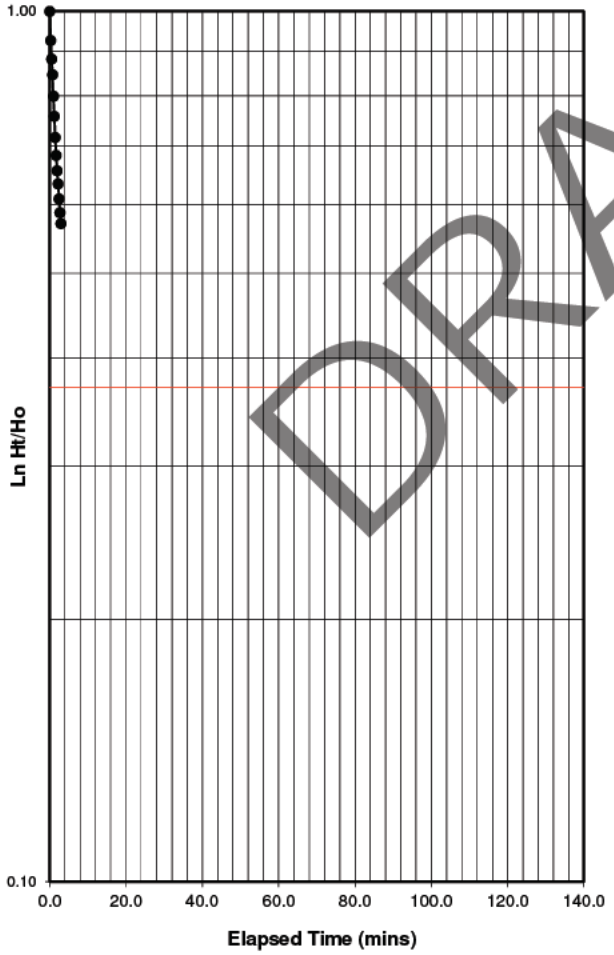
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	3.63	1.00						
0.3	3.36	0.93						
0.5	3.20	0.88						
0.8	3.07	0.85						
1.0	2.90	0.80						
1.3	2.75	0.76						
1.5	2.60	0.72						
1.8	2.48	0.68						
2.0	2.38	0.66						
2.3	2.30	0.63						
2.5	2.21	0.61						
2.8	2.13	0.59						
3.0	2.07	0.57						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	6.00	m
Depth to Induced Water Level	2.37	m
Differential head at start (H_o)	3.63	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	0.00	mins
Time (t2)	3.00	mins
Head at Time t1 (H1)	3.630	m
Head at Time t2 (H2)	2.070	m
Permeability (k) = A/(F[t2-	**1.21E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

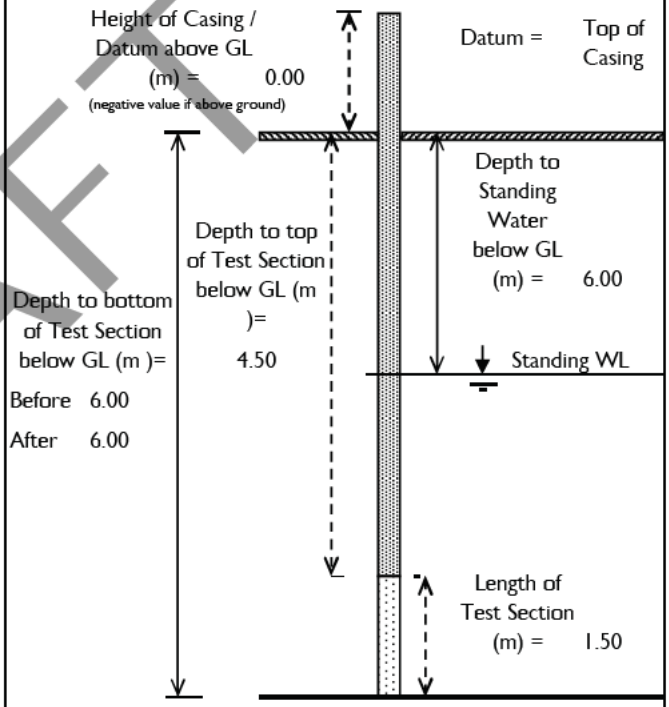
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.25		
0.3	2.72		
0.5	2.95		
0.8	3.10		
1.0	3.25		
1.3	3.38		
1.5	3.47		
1.8	3.65		
2.0	3.77		
2.3	3.80		



Depth to Standing Water Level below Datum	6.00 m
Depth to Induced Water Level below Datum	2.25 m
Differential head at start of Test (H_o)	3.75 m
Differential Head at end of Test (H_f)	11.20 m
Time Elapsed at end of test (t_f)	2.3 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.25	2.25	3.75	0.00					
0.3	2.72	2.72	3.28	0.87					
0.5	2.95	2.95	3.05	0.81					
0.8	3.10	3.10	2.90	0.77					
1.0	3.25	3.25	2.75	0.73					
1.3	3.38	3.38	2.62	0.70					
1.5	3.47	3.47	2.53	0.67					
1.8	3.65	3.65	2.35	0.63					
2.0	3.77	3.77	2.23	0.59					
2.3	3.80	3.80	2.20	0.59					

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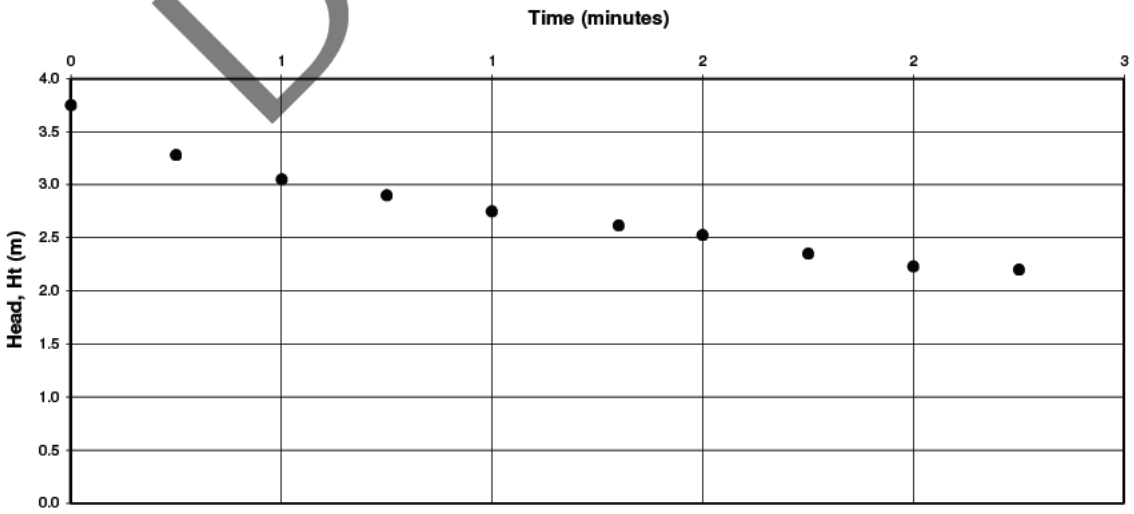


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

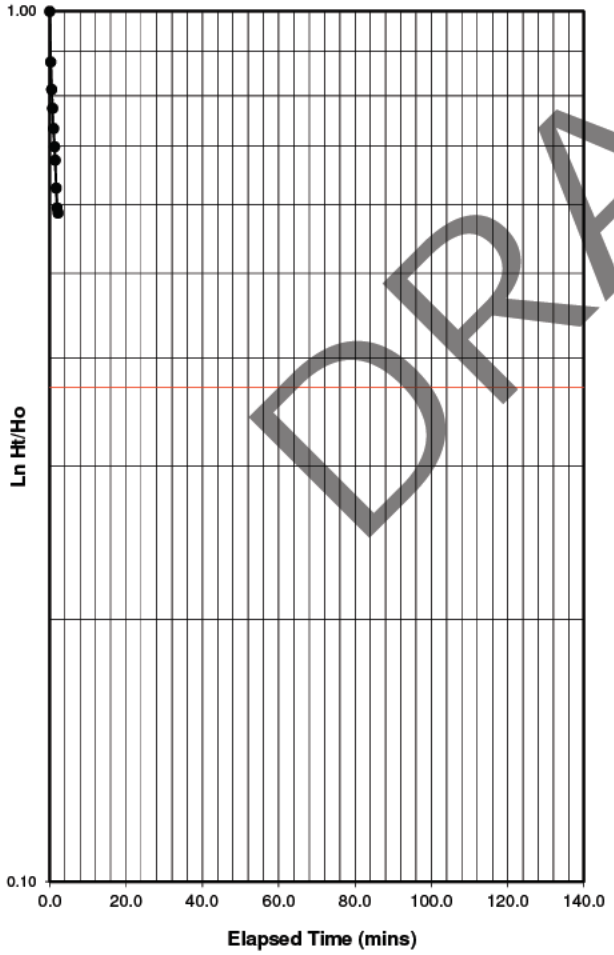
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	3.75	1.00						
0.3	3.28	0.87						
0.5	3.05	0.81						
0.8	2.90	0.77						
1.0	2.75	0.73						
1.3	2.62	0.70						
1.5	2.53	0.67						
1.8	2.35	0.63						
2.0	2.23	0.59						
2.3	2.20	0.59						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	6.00	m
Depth to Induced Water Level	2.25	m
Differential head at start (H_o)	3.75	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :	mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	0.50	mins
Time (t2)	2.00	mins
Head at Time t1 (H1)	3.050	m
Head at Time t2 (H2)	2.230	m
Permeability (k) = A/(F[t2-	**1.34E-05**	**m/sec**

DRAFT

Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

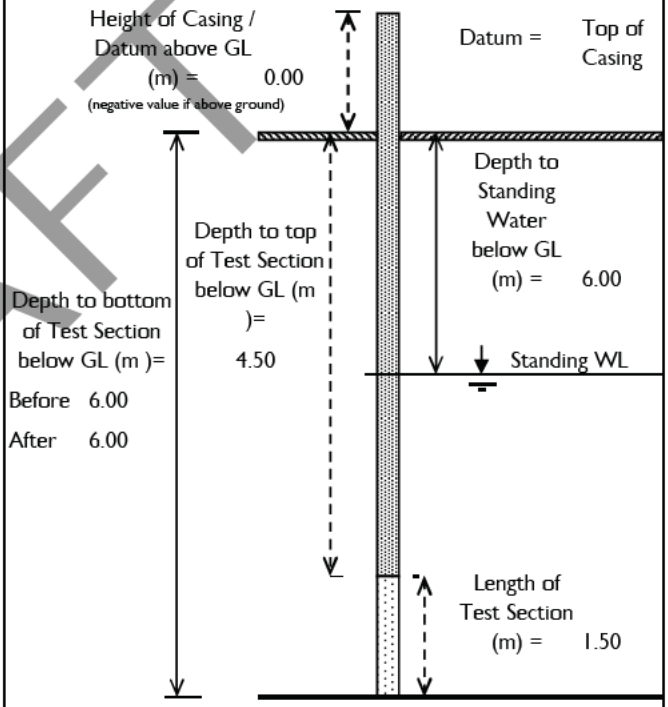
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.35		
0.3	2.77		
0.5	2.92		
0.8	3.12		
1.0	3.25		
1.3	3.38		
1.5	3.51		
1.8	3.61		
2.0	3.67		
2.5	3.88		
3.0	3.99		
3.5	4.13		
4.0	4.26		
4.5	4.38		
5.0	4.52		
6.0	4.68		
7.0	4.97		
8.0	5.14		
9.0	5.23		
10.0	5.42		
15.0	5.73		
20.0	5.73		
25.0	5.73		
30.0	5.73		



Depth to Standing Water Level below Datum	6.00 m
Depth to Induced Water Level below Datum	2.35 m
Differential head at start of Test (H_o)	3.65 m
Differential Head at end of Test (H_f)	9.27 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.35	2.35	3.65	0.00	15.0	5.73	5.73	0.27	0.07
0.3	2.77	2.77	3.23	0.88	20.0	5.73	5.73	0.27	0.07
0.5	2.92	2.92	3.08	0.84	25.0	5.73	5.73	0.27	0.07
0.8	3.12	3.12	2.88	0.79	30.0	5.73	5.73	0.27	0.07
1.0	3.25	3.25	2.75	0.75					
1.3	3.38	3.38	2.62	0.72					
1.5	3.51	3.51	2.49	0.68					
1.8	3.61	3.61	2.39	0.65					
2.0	3.67	3.67	2.33	0.64					
2.5	3.88	3.88	2.12	0.58					
3.0	3.99	3.99	2.01	0.55					
3.5	4.13	4.13	1.87	0.51					
4.0	4.26	4.26	1.74	0.48					
4.5	4.38	4.38	1.62	0.44					
5.0	4.52	4.52	1.48	0.41					
6.0	4.68	4.68	1.32	0.36					
7.0	4.97	4.97	1.03	0.28					
8.0	5.14	5.14	0.86	0.24					
9.0	5.23	5.23	0.77	0.21					
10.0	5.42	5.42	0.58	0.16					

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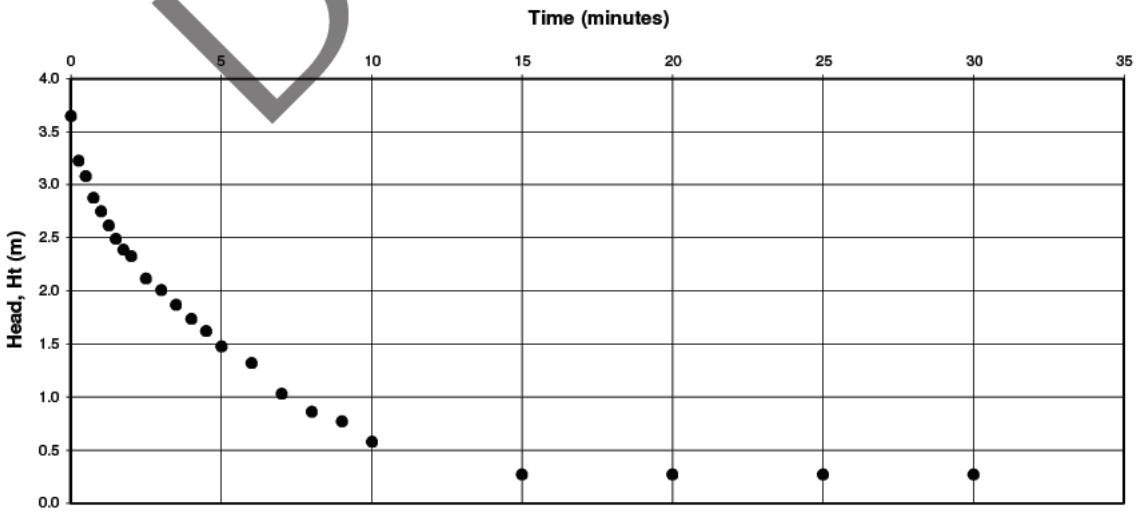


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

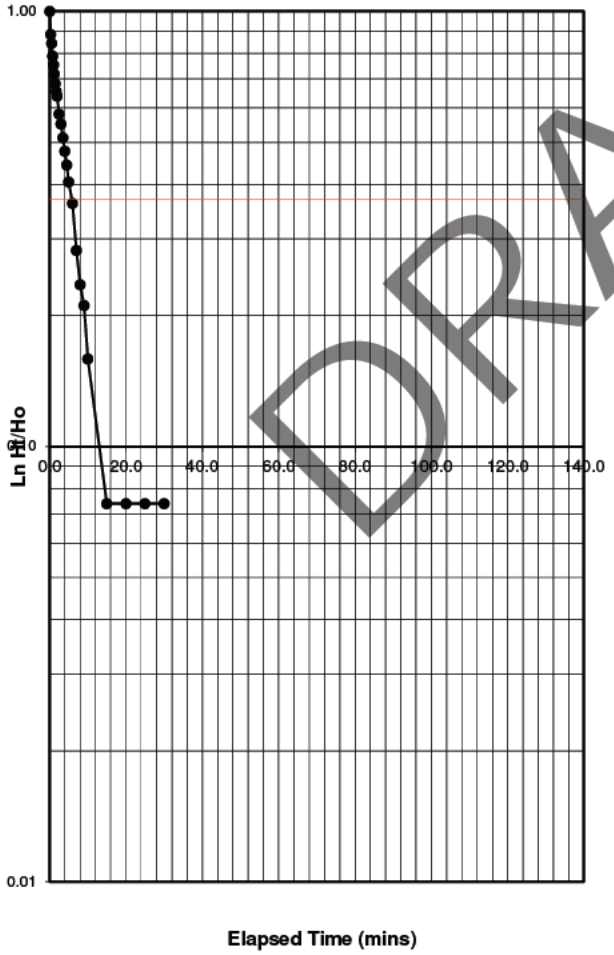
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	3.65	1.00	5.0	1.48	0.41			
0.3	3.23	0.88	6.0	1.32	0.36			
0.5	3.08	0.84	7.0	1.03	0.28			
0.8	2.88	0.79	8.0	0.86	0.24			
1.0	2.75	0.75	9.0	0.77	0.21			
1.3	2.62	0.72	10.0	0.58	0.16			
1.5	2.49	0.68	15.0	0.27	0.07			
1.8	2.39	0.65	20.0	0.27	0.07			
2.0	2.33	0.64	25.0	0.27	0.07			
2.5	2.12	0.58	30.0	0.27	0.07			
3.0	2.01	0.55						
3.5	1.87	0.51						
4.0	1.74	0.48						
4.5	1.62	0.44						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	6.00	m
Depth to Induced Water Level	2.35	m
Differential head at start (H_o)	3.65	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :	mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	2.50	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	2.120	m
Head at Time t2 (H2)	0.580	m
Permeability (k) = A/(F[t2-	**1.11E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

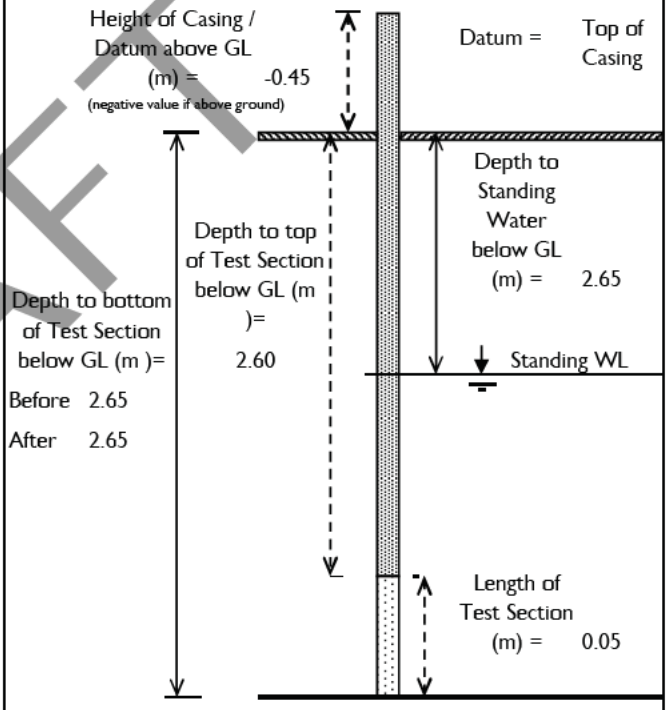
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.77		
0.5	1.23		
1.0	1.52		
1.5	1.62		
2.0	1.78		
2.5	1.90		
3.0	2.00		
3.5	2.10		
4.0	2.16		
4.5	2.23		
5.0	2.37		
6.0	2.43		
7.0	2.51		
8.0	2.57		
9.0	2.62		
14.0	2.73		



Depth to Standing Water Level below Datum	3.10 m
Depth to Induced Water Level below Datum	0.77 m
Differential head at start of Test (H_o)	2.33 m
Differential Head at end of Test (H_f)	12.72 m
Time Elapsed at end of test (t_f)	14.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.77	0.32	2.33	0.00					
0.5	1.23	0.78	1.87	0.80					
1.0	1.52	1.07	1.58	0.68					
1.5	1.62	1.17	1.48	0.64					
2.0	1.78	1.33	1.32	0.57					
2.5	1.90	1.45	1.20	0.52					
3.0	2.00	1.55	1.10	0.47					
3.5	2.10	1.65	1.00	0.43					
4.0	2.16	1.71	0.94	0.40					
4.5	2.23	1.78	0.87	0.37					
5.0	2.37	1.92	0.73	0.31					
6.0	2.43	1.98	0.67	0.29					
7.0	2.51	2.06	0.59	0.25					
8.0	2.57	2.12	0.53	0.23					
9.0	2.62	2.17	0.48	0.21					
14.0	2.73	2.28	0.37	0.16					

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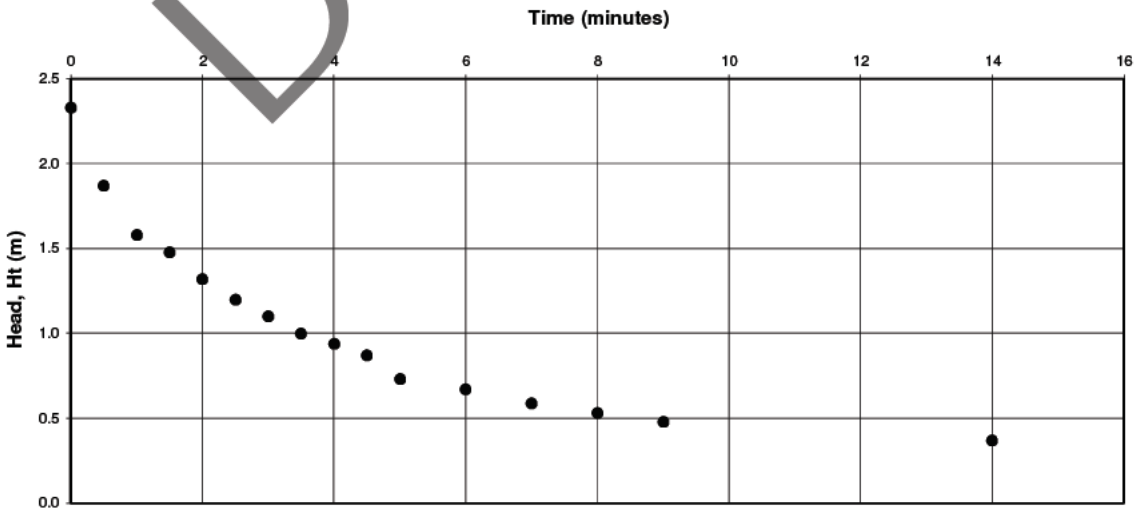


Remarks and Additional Information

Results is an approximation only and is not a true permeability as no water was encountered during drilling.

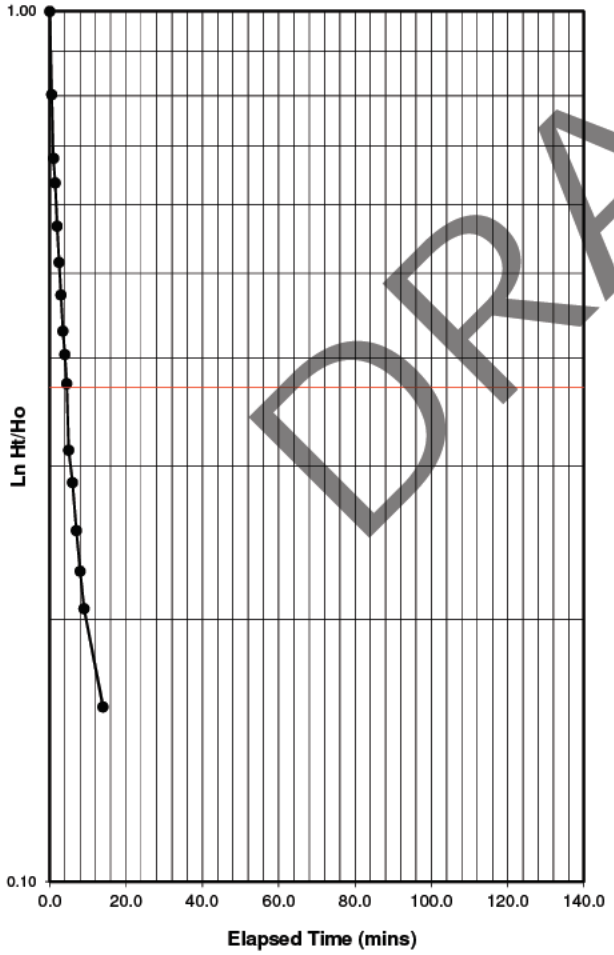
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.33	1.00	9.0	0.48	0.21			
0.5	1.87	0.80	14.0	0.37	0.16			
1.0	1.58	0.68						
1.5	1.48	0.64						
2.0	1.32	0.57						
2.5	1.20	0.52						
3.0	1.10	0.47						
3.5	1.00	0.43						
4.0	0.94	0.40						
4.5	0.87	0.37						
5.0	0.73	0.31						
6.0	0.67	0.29						
7.0	0.59	0.25						
8.0	0.53	0.23						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	3.10	m
Depth to Induced Water Level	0.77	m
Differential head at start (H_o)	2.33	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	1.00	mins
Time (t2)	8.00	mins
Head at Time t1 (H1)	1.580	m
Head at Time t2 (H2)	0.530	m
Permeability (k) = A/(F[t2-	**8.91E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

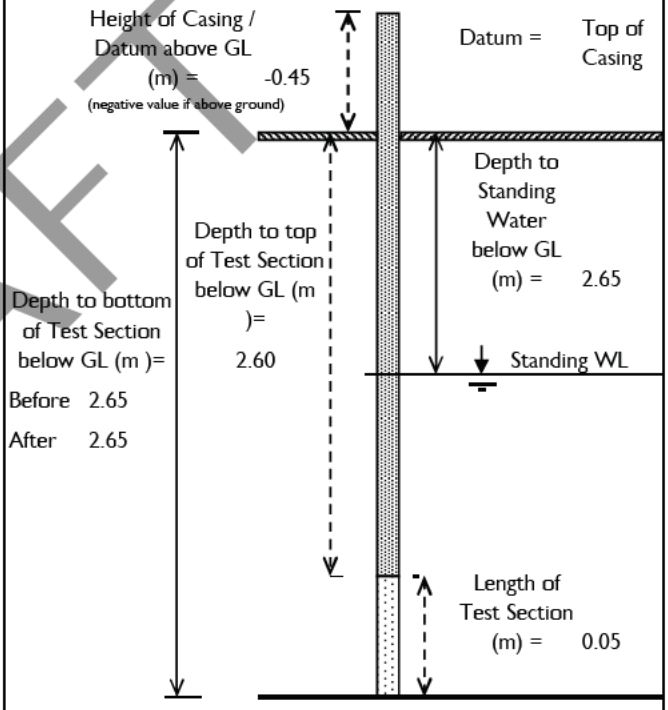
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.51		
0.5	0.67		
1.0	0.86		
1.5	1.00		
2.0	1.14		
2.5	1.26		
3.0	1.39		
3.5	1.50		
4.0	1.67		
4.5	1.72		
5.0	1.78		
6.0	1.92		
7.0	2.07		
8.0	2.19		
9.0	2.24		
10.0	2.34		
11.0	2.45		
12.0	2.50		
13.0	2.58		
14.0	2.59		
15.0	2.65		
16.0	2.70		



Depth to Standing Water Level below Datum	3.10 m
Depth to Induced Water Level below Datum	0.51 m
Differential head at start of Test (H_o)	2.59 m
Differential Head at end of Test (H_f)	12.75 m
Time Elapsed at end of test (t_f)	16.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.51	0.06	2.59	0.00	15.0	2.65	2.20	0.45	0.17
0.5	0.67	0.22	2.43	0.94	16.0	2.70	2.25	0.40	0.15
1.0	0.86	0.41	2.24	0.86					
1.5	1.00	0.55	2.10	0.81					
2.0	1.14	0.69	1.96	0.76					
2.5	1.26	0.81	1.84	0.71					
3.0	1.39	0.94	1.71	0.66					
3.5	1.50	1.05	1.60	0.62					
4.0	1.67	1.22	1.43	0.55					
4.5	1.72	1.27	1.38	0.53					
5.0	1.78	1.33	1.32	0.51					
6.0	1.92	1.47	1.18	0.46					
7.0	2.07	1.62	1.03	0.40					
8.0	2.19	1.74	0.91	0.35					
9.0	2.24	1.79	0.86	0.33					
10.0	2.34	1.89	0.76	0.29					
11.0	2.45	2.00	0.65	0.25					
12.0	2.50	2.05	0.60	0.23					
13.0	2.58	2.13	0.52	0.20					
14.0	2.59	2.14	0.51	0.20					

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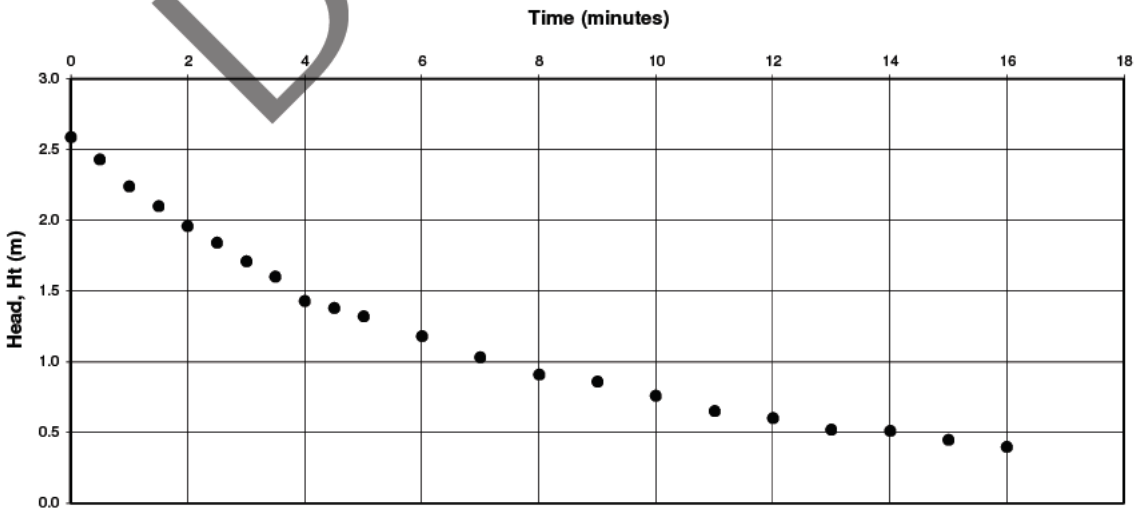


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

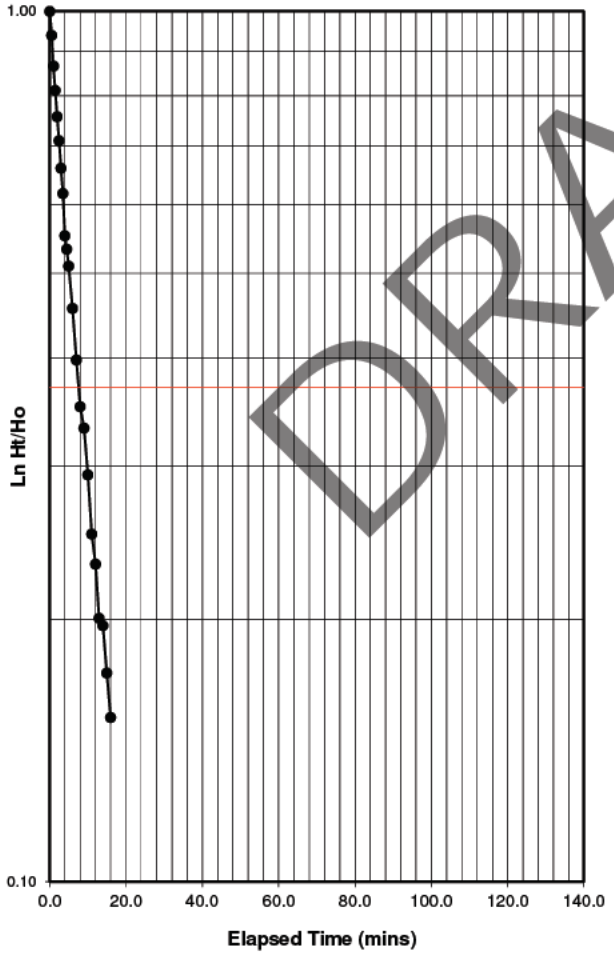
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.59	1.00	9.0	0.86	0.33			
0.5	2.43	0.94	10.0	0.76	0.29			
1.0	2.24	0.86	11.0	0.65	0.25			
1.5	2.10	0.81	12.0	0.60	0.23			
2.0	1.96	0.76	13.0	0.52	0.20			
2.5	1.84	0.71	14.0	0.51	0.20			
3.0	1.71	0.66	15.0	0.45	0.17			
3.5	1.60	0.62	16.0	0.40	0.15			
4.0	1.43	0.55						
4.5	1.38	0.53						
5.0	1.32	0.51						
6.0	1.18	0.46						
7.0	1.03	0.40						
8.0	0.91	0.35						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	3.10	m
Depth to Induced Water Level	0.51	m
Differential head at start (H_o)	2.59	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	0.00	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	2.590	m
Head at Time t2 (H2)	0.760	m
Permeability (k) = A/(F[t2-	**7.00E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

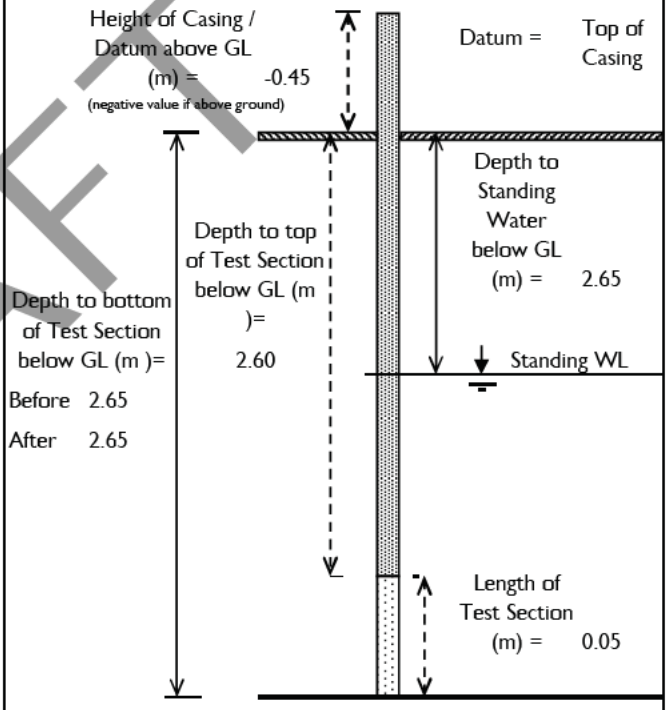
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.60		
0.5	0.77		
1.0	0.83		
1.5	0.97		
2.0	1.09		
2.5	1.21		
3.0	1.34		
3.5	1.44		
4.0	1.61		
4.5	1.70		
5.0	1.80		
6.0	1.90		
7.0	2.03		
8.0	2.21		
9.0	2.26		
10.0	2.35		
11.0	2.47		
12.0	2.54		
13.0	2.59		
14.0	2.63		
15.0	2.68		
16.0	2.70		



Depth to Standing Water Level below Datum	3.10 m
Depth to Induced Water Level below Datum	0.60 m
Differential head at start of Test (H_o)	2.50 m
Differential Head at end of Test (H_f)	12.75 m
Time Elapsed at end of test (t_f)	16.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.60	0.15	2.50	0.00	15.0	2.68	2.23	0.42	0.17
0.5	0.77	0.32	2.33	0.93	16.0	2.70	2.25	0.40	0.16
1.0	0.83	0.38	2.27	0.91					
1.5	0.97	0.52	2.13	0.85					
2.0	1.09	0.64	2.01	0.80					
2.5	1.21	0.76	1.89	0.76					
3.0	1.34	0.89	1.76	0.70					
3.5	1.44	0.99	1.66	0.66					
4.0	1.61	1.16	1.49	0.60					
4.5	1.70	1.25	1.40	0.56					
5.0	1.80	1.35	1.30	0.52					
6.0	1.90	1.45	1.20	0.48					
7.0	2.03	1.58	1.07	0.43					
8.0	2.21	1.76	0.89	0.36					
9.0	2.26	1.81	0.84	0.34					
10.0	2.35	1.90	0.75	0.30					
11.0	2.47	2.02	0.63	0.25					
12.0	2.54	2.09	0.56	0.22					
13.0	2.59	2.14	0.51	0.20					
14.0	2.63	2.18	0.47	0.19					

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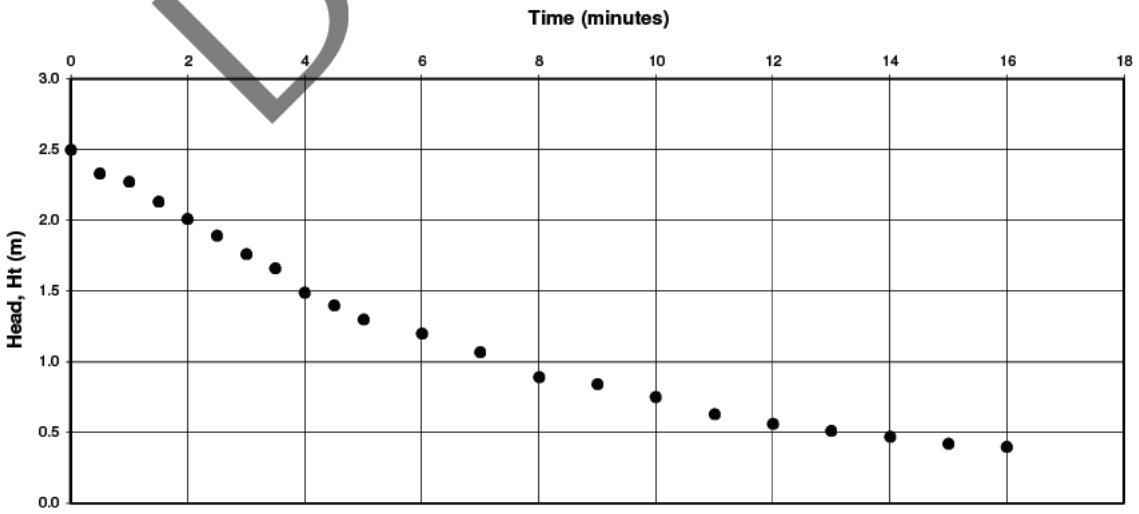


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

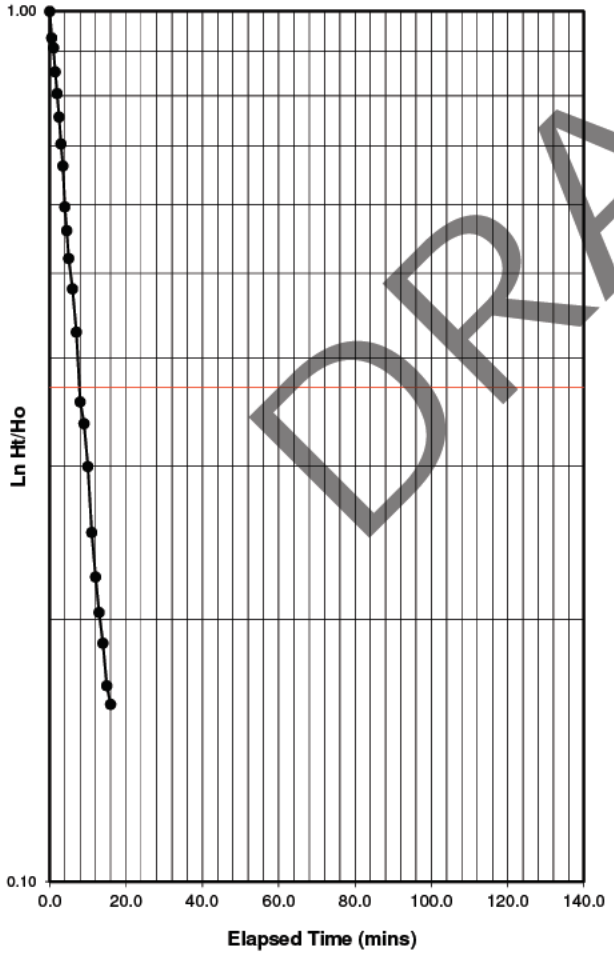
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	2.50	1.00	9.0	0.84	0.34			
0.5	2.33	0.93	10.0	0.75	0.30			
1.0	2.27	0.91	11.0	0.63	0.25			
1.5	2.13	0.85	12.0	0.56	0.22			
2.0	2.01	0.80	13.0	0.51	0.20			
2.5	1.89	0.76	14.0	0.47	0.19			
3.0	1.76	0.70	15.0	0.42	0.17			
3.5	1.66	0.66	16.0	0.40	0.16			
4.0	1.49	0.60						
4.5	1.40	0.56						
5.0	1.30	0.52						
6.0	1.20	0.48						
7.0	1.07	0.43						
8.0	0.89	0.36						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	3.10	m
Depth to Induced Water Level	0.60	m
Differential head at start (H_o)	2.50	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	0.00	mins
Time (t2)	8.00	mins
Head at Time t1 (H1)	2.500	m
Head at Time t2 (H2)	0.890	m
Permeability (k) = A/(F[t2-	**7.37E-05**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at base of hole.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	19/11/2020

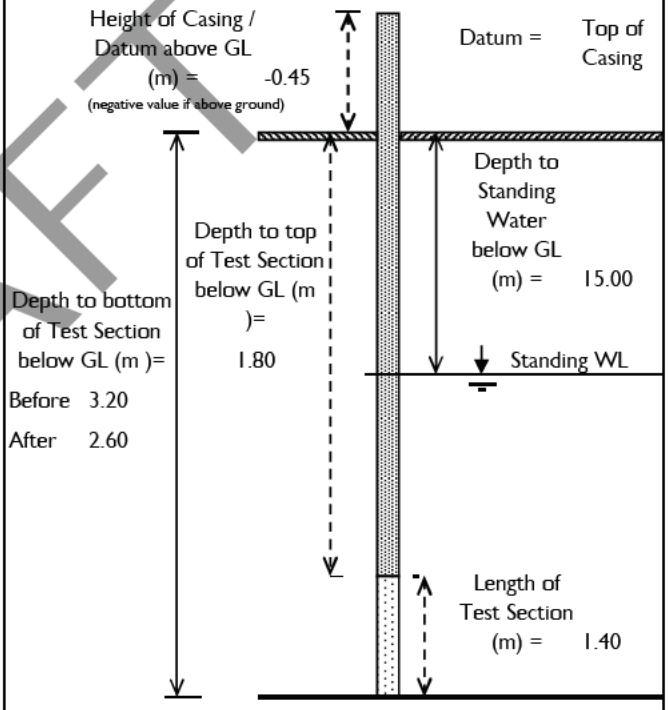
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467041.0
	N 113142.6
Level (m OD)	67.18

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	1.20		
0.5	1.80		
1.0	2.16		
1.5	2.32		
2.0	2.36		
2.5	2.42		
3.0	2.47		
3.5	2.47		
4.0	2.49		
4.5	2.52		
5.0	2.60		
6.0	2.60		
7.0	2.60		
8.0	2.60		
9.0	2.60		
10.0	2.60		
15.0	2.63		
20.0	2.66		
30.0	2.70		



Depth to Standing Water Level below Datum	15.45 m
Depth to Induced Water Level below Datum	1.20 m
Differential head at start of Test (H_o)	14.25 m
Differential Head at end of Test (H_f)	0.75 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	19/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	1.20	0.75	14.25	0.00					
0.5	1.80	1.35	13.65	0.96					
1.0	2.16	1.71	13.29	0.93					
1.5	2.32	1.87	13.13	0.92					
2.0	2.36	1.91	13.09	0.92					
2.5	2.42	1.97	13.03	0.91					
3.0	2.47	2.02	12.98	0.91					
3.5	2.47	2.02	12.98	0.91					
4.0	2.49	2.04	12.96	0.91					
4.5	2.52	2.07	12.93	0.91					
5.0	2.60	2.15	12.85	0.90					
6.0	2.60	2.15	12.85	0.90					
7.0	2.60	2.15	12.85	0.90					
8.0	2.60	2.15	12.85	0.90					
9.0	2.60	2.15	12.85	0.90					
10.0	2.60	2.15	12.85	0.90					
15.0	2.63	2.18	12.82	0.90					
20.0	2.66	2.21	12.79	0.90					
30.0	2.70	2.25	12.75	0.89					

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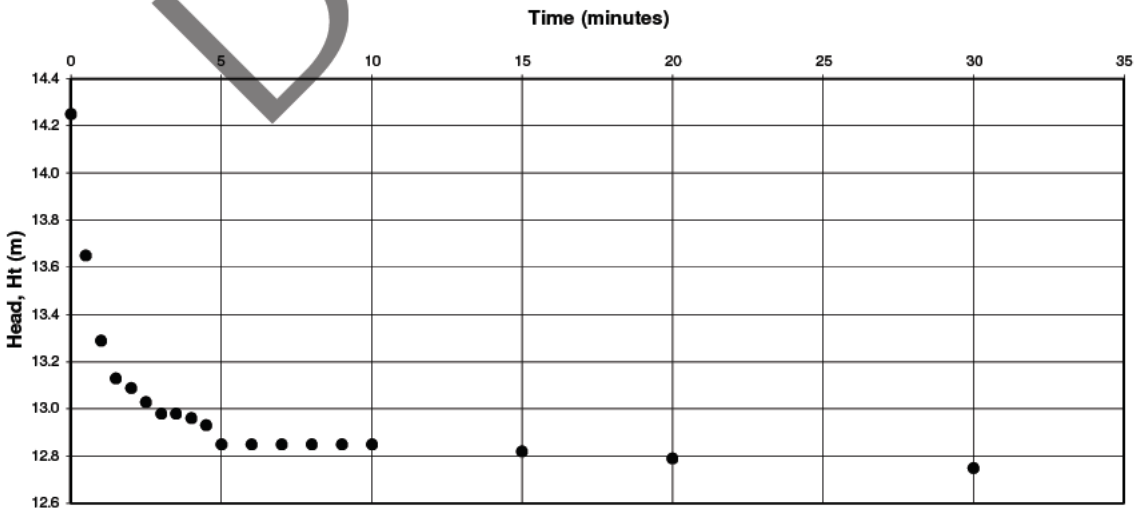


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

Water assumed at 15m bgl.

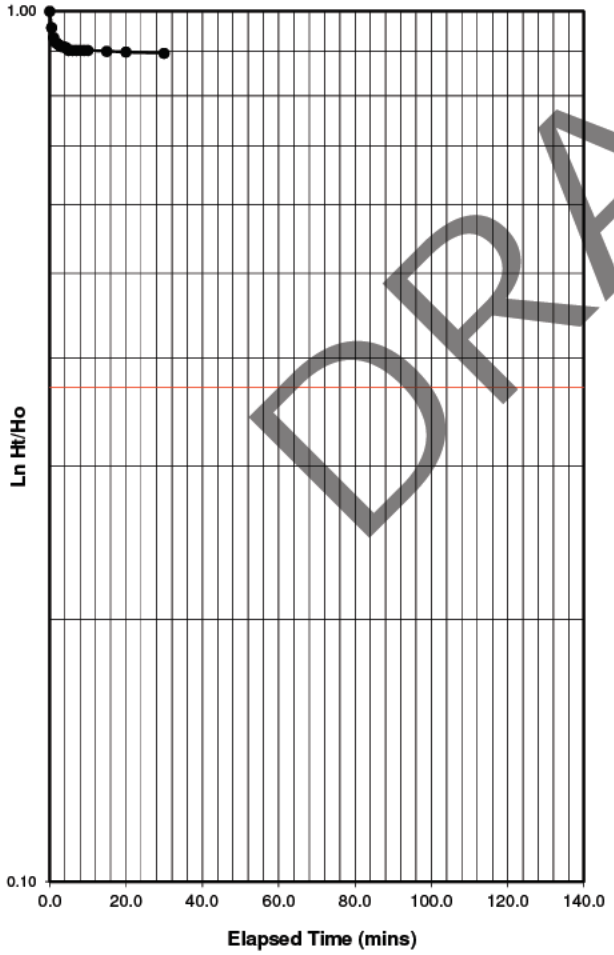
NB. Borehole collapsed from 3.20m back to 2.60m during the test.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH40
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	19/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	14.25	1.00	9.0	12.85	0.90			
0.5	13.65	0.96	10.0	12.85	0.90			
1.0	13.29	0.93	15.0	12.82	0.90			
1.5	13.13	0.92	20.0	12.79	0.90			
2.0	13.09	0.92	30.0	12.75	0.89			
2.5	13.03	0.91						
3.0	12.98	0.91						
3.5	12.98	0.91						
4.0	12.96	0.91						
4.5	12.93	0.91						
5.0	12.85	0.90						
6.0	12.85	0.90						
7.0	12.85	0.90						
8.0	12.85	0.90						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.45	m
Depth to Induced Water Level	1.20	m
Differential head at start (H_o)	14.25	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.40	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.791	
Time (t1)	1.50	mins
Time (t2)	5.00	mins
Head at Time t1 (H1)	13.130	m
Head at Time t2 (H2)	12.850	m
Permeability (k) = A/(F[t2-	**4.16E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	18/11/2020

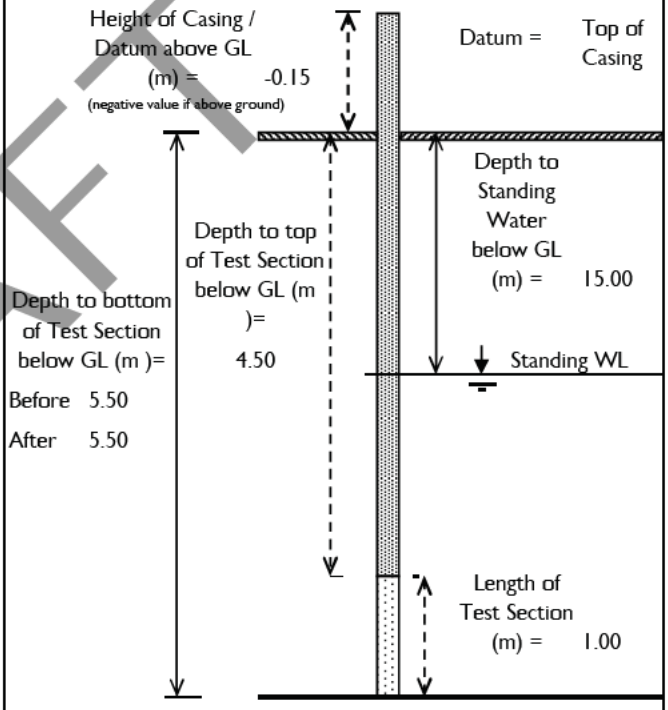
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.56		
0.5	3.85		
1.0	3.99		
1.5	4.04		
2.0	4.14		
2.5	4.17		
3.0	4.17		
3.5	4.20		
4.0	4.24		
5.0	4.28		
6.0	4.34		
7.0	4.37		
8.0	4.40		
9.0	4.46		
10.0	4.48		
15.0	4.59		
20.0	4.68		
30.0	4.85		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	3.56 m
Differential head at start of Test (H_o)	11.59 m
Differential Head at end of Test (H_f)	10.30 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.56	3.41	11.59	0.00					
0.5	3.85	3.70	11.30	0.97					
1.0	3.99	3.84	11.16	0.96					
1.5	4.04	3.89	11.11	0.96					
2.0	4.14	3.99	11.01	0.95					
2.5	4.17	4.02	10.98	0.95					
3.0	4.17	4.02	10.98	0.95					
3.5	4.20	4.05	10.95	0.94					
4.0	4.24	4.09	10.91	0.94					
5.0	4.28	4.13	10.87	0.94					
6.0	4.34	4.19	10.81	0.93					
7.0	4.37	4.22	10.78	0.93					
8.0	4.40	4.25	10.75	0.93					
9.0	4.46	4.31	10.69	0.92					
10.0	4.48	4.33	10.67	0.92					
15.0	4.59	4.44	10.56	0.91					
20.0	4.68	4.53	10.47	0.90					
30.0	4.85	4.70	10.30	0.89					

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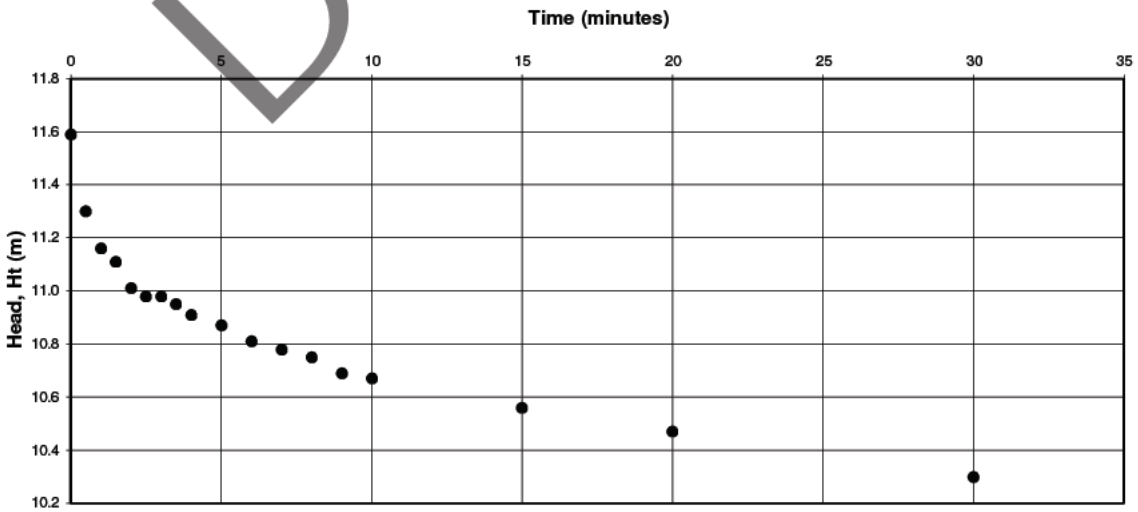


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

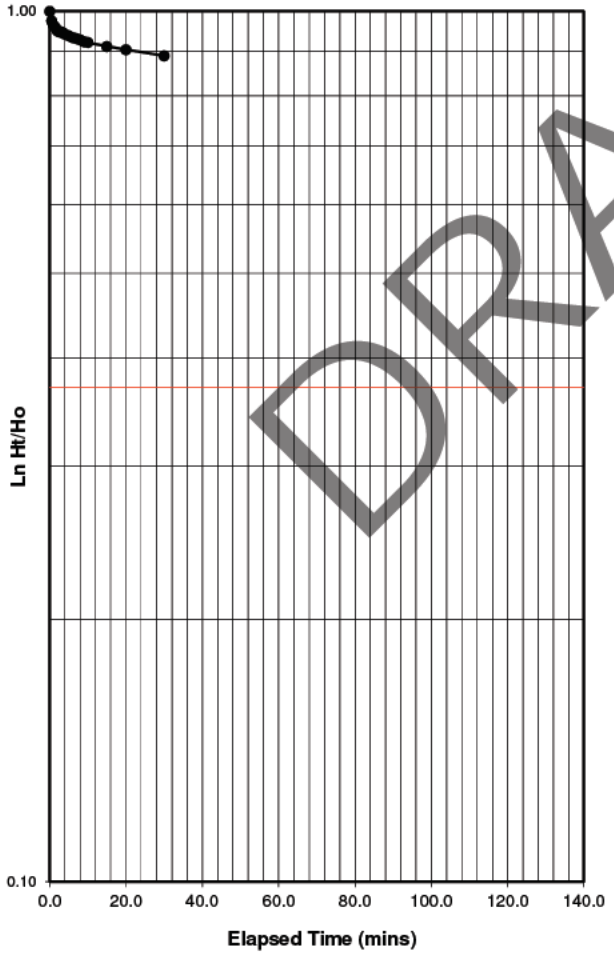
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	11.59	1.00	10.0	10.67	0.92			
0.5	11.30	0.97	15.0	10.56	0.91			
1.0	11.16	0.96	20.0	10.47	0.90			
1.5	11.11	0.96	30.0	10.30	0.89			
2.0	11.01	0.95						
2.5	10.98	0.95						
3.0	10.98	0.95						
3.5	10.95	0.94						
4.0	10.91	0.94						
5.0	10.87	0.94						
6.0	10.81	0.93						
7.0	10.78	0.93						
8.0	10.75	0.93						
9.0	10.69	0.92						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	3.56	m
Differential head at start (H_o)	11.59	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	3.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	10.980	m
Head at Time t2 (H2)	10.300	m
Permeability (k) = A/(F[t2-	**2.00E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	18/11/2020

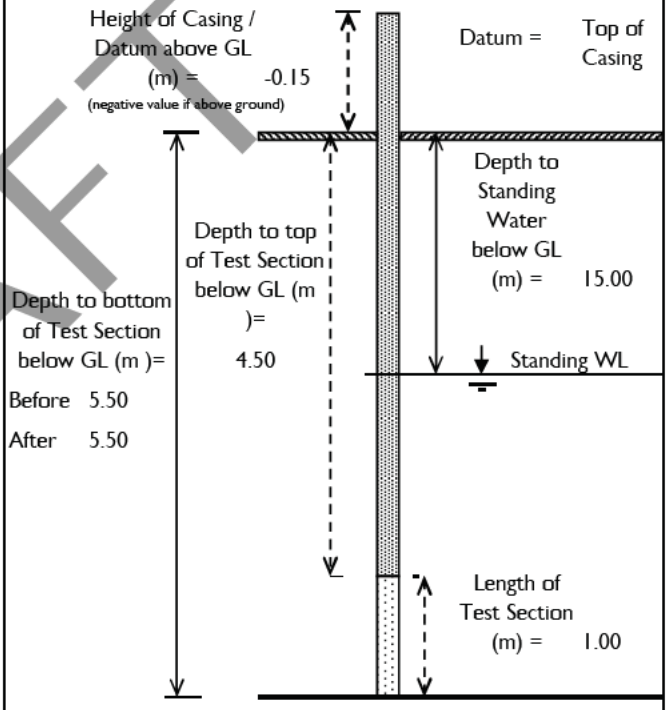
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.30		
0.5	3.80		
1.0	3.94		
1.5	3.96		
2.0	4.08		
2.5	4.14		
3.0	4.18		
3.5	4.23		
4.0	4.26		
5.0	4.32		
6.0	4.40		
7.0	4.46		
8.0	4.51		
9.0	4.54		
10.0	4.55		
15.0	4.63		
20.0	4.73		
30.0	4.97		
40.0	5.14		
50.0	5.27		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	3.30 m
Differential head at start of Test (H_o)	11.85 m
Differential Head at end of Test (H_f)	m
Time Elapsed at end of test (t_f)	50.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.30	3.15	11.85	0.00					
0.5	3.80	3.65	11.35	0.96					
1.0	3.94	3.79	11.21	0.95					
1.5	3.96	3.81	11.19	0.94					
2.0	4.08	3.93	11.07	0.93					
2.5	4.14	3.99	11.01	0.93					
3.0	4.18	4.03	10.97	0.93					
3.5	4.23	4.08	10.92	0.92					
4.0	4.26	4.11	10.89	0.92					
5.0	4.32	4.17	10.83	0.91					
6.0	4.40	4.25	10.75	0.91					
7.0	4.46	4.31	10.69	0.90					
8.0	4.51	4.36	10.64	0.90					
9.0	4.54	4.39	10.61	0.90					
10.0	4.55	4.40	10.60	0.89					
15.0	4.63	4.48	10.52	0.89					
20.0	4.73	4.58	10.42	0.88					
30.0	4.97	4.82	10.18	0.86					
40.0	5.14	4.99	10.01	0.84					
50.0	5.27	5.12	9.88	0.83					

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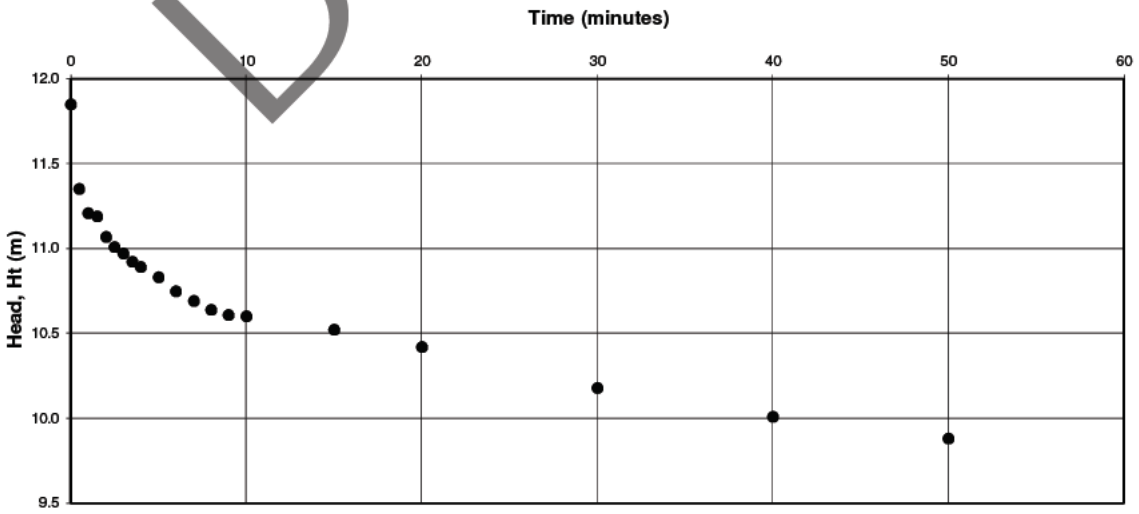


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

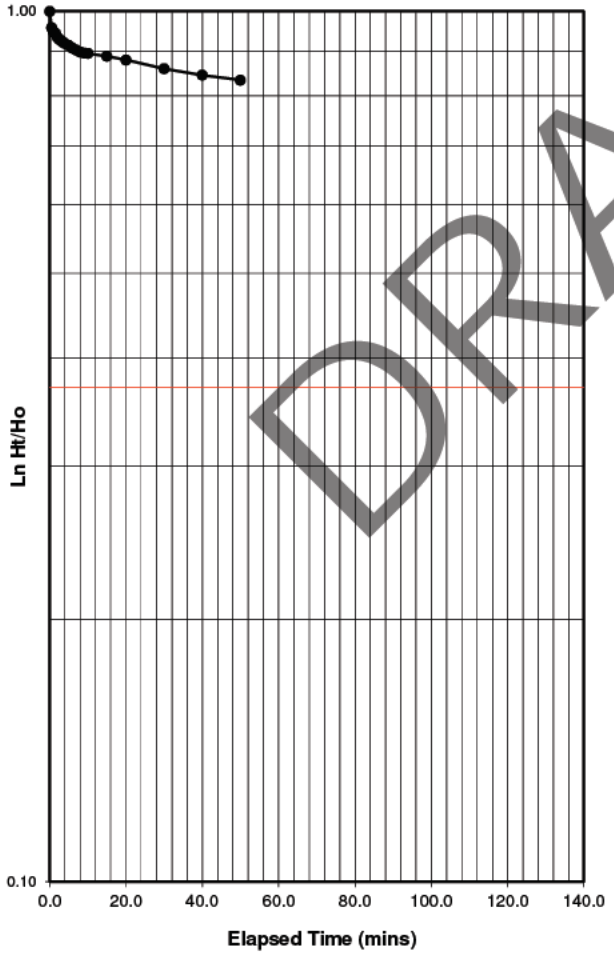
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	11.85	1.00	10.0	10.60	0.89			
0.5	11.35	0.96	15.0	10.52	0.89			
1.0	11.21	0.95	20.0	10.42	0.88			
1.5	11.19	0.94	30.0	10.18	0.86			
2.0	11.07	0.93	40.0	10.01	0.84			
2.5	11.01	0.93	50.0	9.88	0.83			
3.0	10.97	0.93						
3.5	10.92	0.92						
4.0	10.89	0.92						
5.0	10.83	0.91						
6.0	10.75	0.91						
7.0	10.69	0.90						
8.0	10.64	0.90						
9.0	10.61	0.90						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	3.30	m
Differential head at start (H_o)	11.85	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	7.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	10.690	m
Head at Time t2 (H2)	10.180	m
Permeability (k) = A/(F[t2-	**1.80E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	18/11/2020

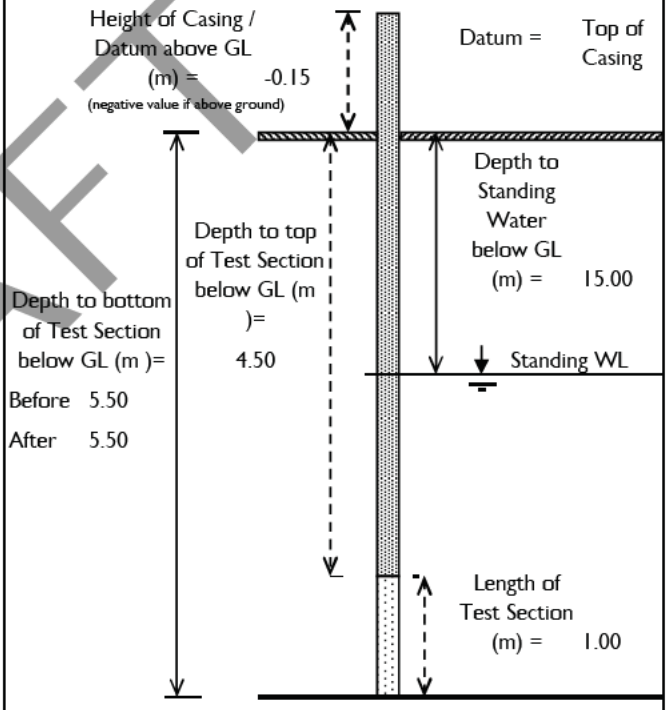
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	3.40		
0.5	3.77		
1.0	3.87		
1.5	3.98		
2.0	4.09		
2.5	4.10		
3.0	4.17		
3.5	4.23		
4.0	4.26		
5.0	4.30		
6.0	4.36		
7.0	4.40		
8.0	4.44		
9.0	4.49		
10.0	4.50		
15.0	4.59		
20.0	4.69		
30.0	4.88		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	3.40 m
Differential head at start of Test (H_o)	11.75 m
Differential Head at end of Test (H_f)	m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless Chalk

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	18/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	3.40	3.25	11.75	0.00					
0.5	3.77	3.62	11.38	0.97					
1.0	3.87	3.72	11.28	0.96					
1.5	3.98	3.83	11.17	0.95					
2.0	4.09	3.94	11.06	0.94					
2.5	4.10	3.95	11.05	0.94					
3.0	4.17	4.02	10.98	0.93					
3.5	4.23	4.08	10.92	0.93					
4.0	4.26	4.11	10.89	0.93					
5.0	4.30	4.15	10.85	0.92					
6.0	4.36	4.21	10.79	0.92					
7.0	4.40	4.25	10.75	0.91					
8.0	4.44	4.29	10.71	0.91					
9.0	4.49	4.34	10.66	0.91					
10.0	4.50	4.35	10.65	0.91					
15.0	4.59	4.44	10.56	0.90					
20.0	4.69	4.54	10.46	0.89					
30.0	4.88	4.73	10.27	0.87					

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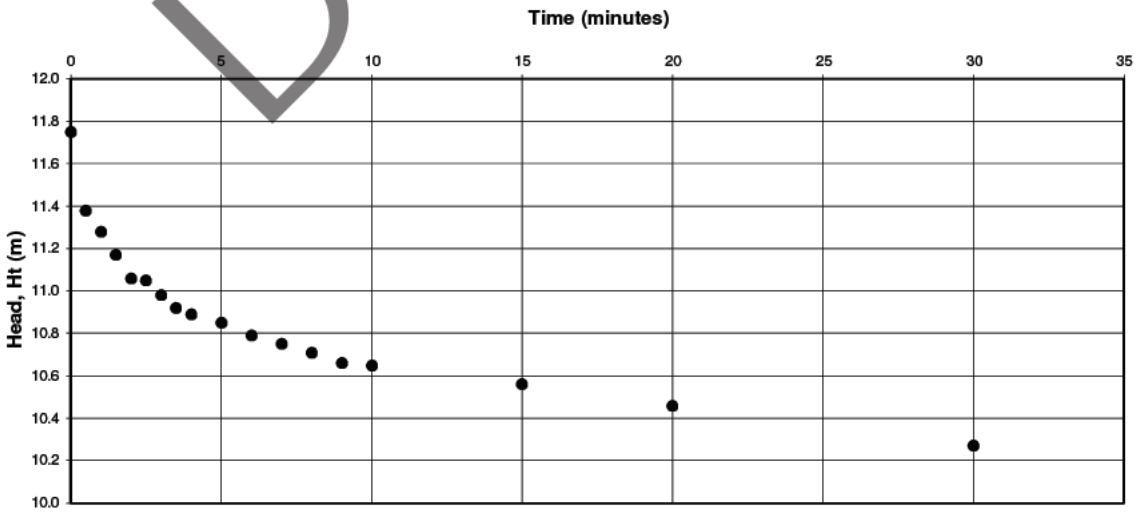


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

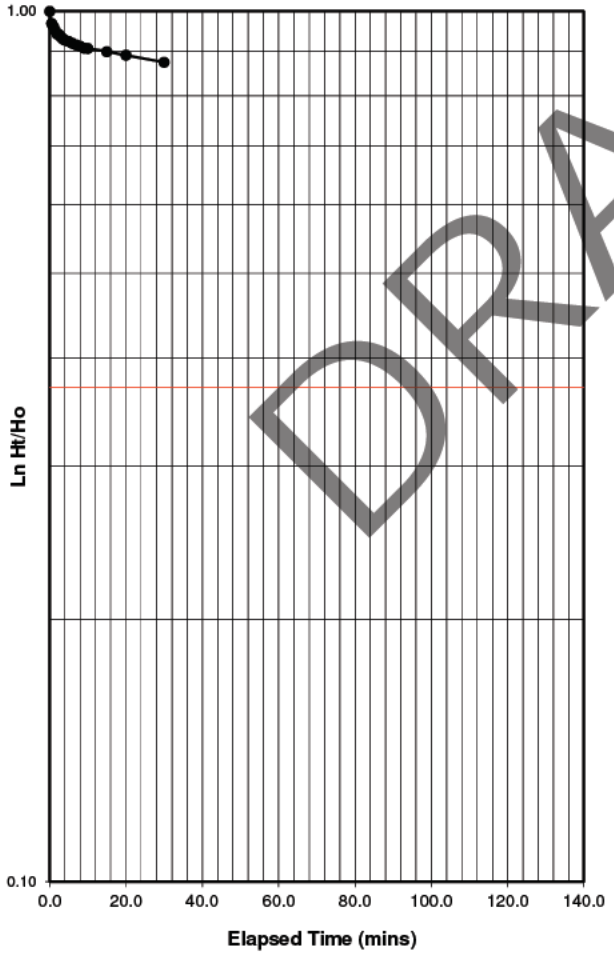
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	18/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	11.75	1.00	10.0	10.65	0.91			
0.5	11.38	0.97	15.0	10.56	0.90			
1.0	11.28	0.96	20.0	10.46	0.89			
1.5	11.17	0.95	30.0	10.27	0.87			
2.0	11.06	0.94						
2.5	11.05	0.94						
3.0	10.98	0.93						
3.5	10.92	0.93						
4.0	10.89	0.93						
5.0	10.85	0.92						
6.0	10.79	0.92						
7.0	10.75	0.91						
8.0	10.71	0.91						
9.0	10.66	0.91						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	3.40	m
Differential head at start (H_o)	11.75	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	4.00	mins
Time (t2)	30.00	mins
Head at Time t1 (H1)	10.890	m
Head at Time t2 (H2)	10.270	m
Permeability (k) = A/(F[t2-	**1.91E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

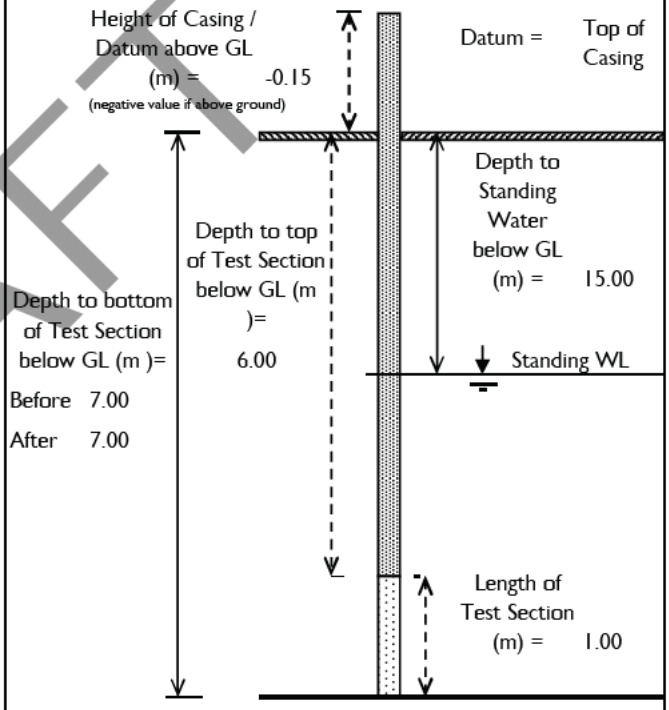
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	2.30		
1.0	3.33		
1.5	3.68		
2.0	3.85		
2.5	3.99		
3.0	4.18		
3.5	4.28		
4.0	4.45		
4.5	4.55		
5.0	4.59		
6.0	4.78		
7.0	4.82		
8.0	4.94		
9.0	5.07		
10.0	5.16		
15.0	5.29		
20.0	5.37		
30.0	5.46		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	13.15 m
Differential Head at end of Test (H_f)	9.69 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structural CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	13.15	0.00					
0.5	2.30	2.15	12.85	0.98					
1.0	3.33	3.18	11.82	0.90					
1.5	3.68	3.53	11.47	0.87					
2.0	3.85	3.70	11.30	0.86					
2.5	3.99	3.84	11.16	0.85					
3.0	4.18	4.03	10.97	0.83					
3.5	4.28	4.13	10.87	0.83					
4.0	4.45	4.30	10.70	0.81					
4.5	4.55	4.40	10.60	0.81					
5.0	4.59	4.44	10.56	0.80					
6.0	4.78	4.63	10.37	0.79					
7.0	4.82	4.67	10.33	0.79					
8.0	4.94	4.79	10.21	0.78					
9.0	5.07	4.92	10.08	0.77					
10.0	5.16	5.01	9.99	0.76					
15.0	5.29	5.14	9.86	0.75					
20.0	5.37	5.22	9.78	0.74					
30.0	5.46	5.31	9.69	0.74					

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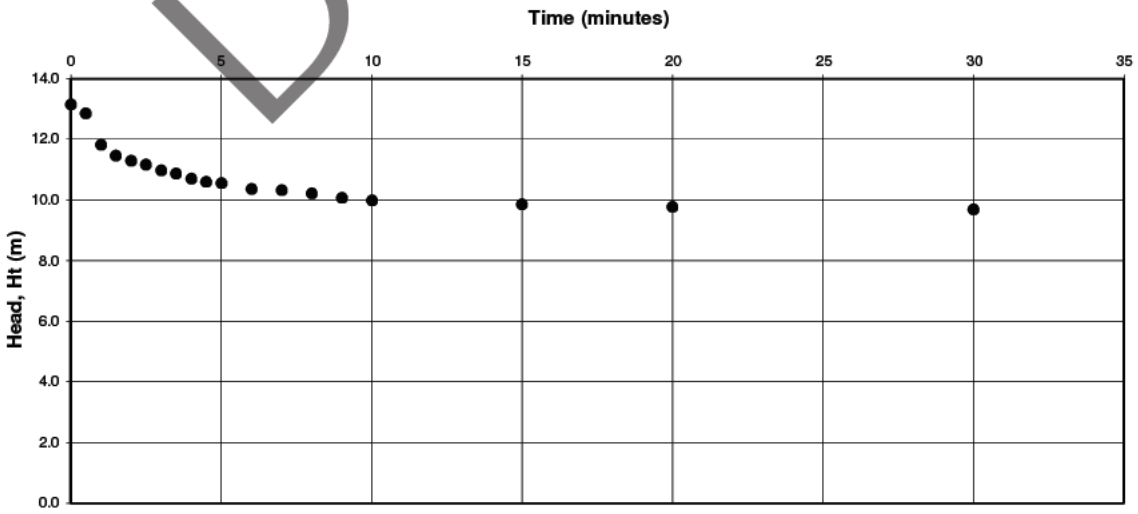


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

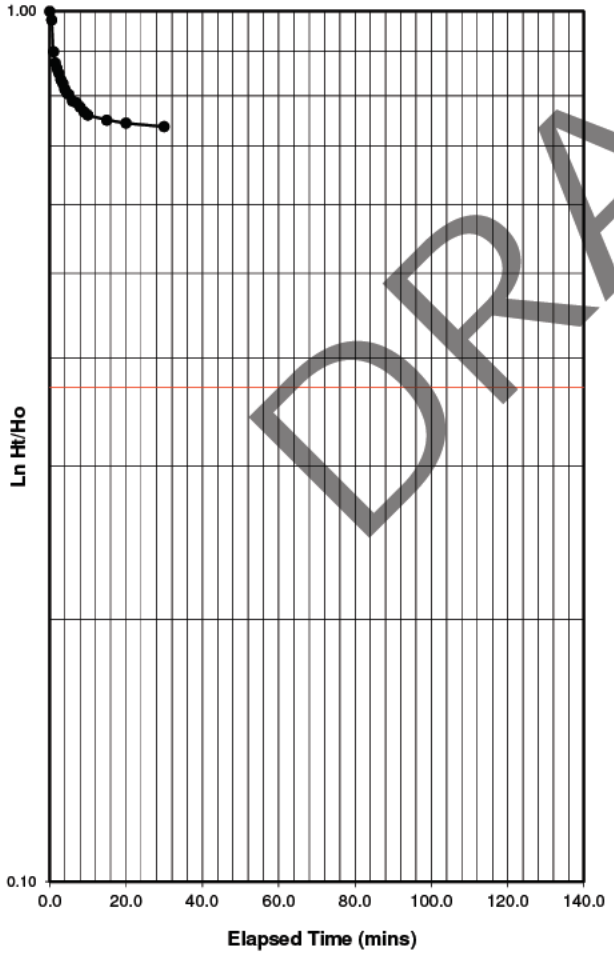
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	13.15	1.00	9.0	10.08	0.77			
0.5	12.85	0.98	10.0	9.99	0.76			
1.0	11.82	0.90	15.0	9.86	0.75			
1.5	11.47	0.87	20.0	9.78	0.74			
2.0	11.30	0.86	30.0	9.69	0.74			
2.5	11.16	0.85						
3.0	10.97	0.83						
3.5	10.87	0.83						
4.0	10.70	0.81						
4.5	10.60	0.81						
5.0	10.56	0.80						
6.0	10.37	0.79						
7.0	10.33	0.79						
8.0	10.21	0.78						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	13.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :	mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	1.50	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	11.470	m
Head at Time t2 (H2)	9.990	m
Permeability (k) = A/(F[t2-	**1.37E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

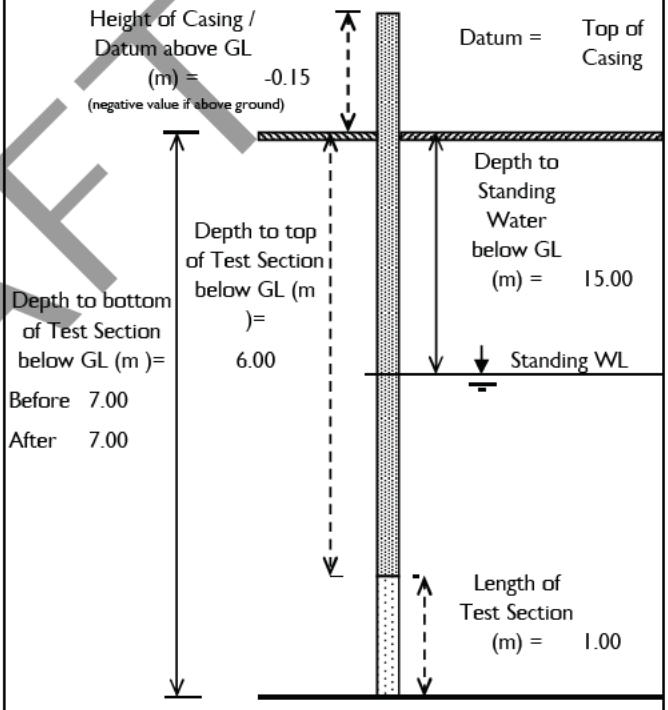
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	2.57		
1.0	3.39		
1.5	3.72		
2.0	3.80		
2.5	4.02		
3.0	4.07		
3.5	4.17		
4.0	4.32		
4.5	4.42		
5.0	4.49		
6.0	4.63		
7.0	4.74		
8.0	4.87		
9.0	4.99		
10.0	5.05		
15.0	5.37		
20.0	5.40		
30.0	5.58		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	13.15 m
Differential Head at end of Test (H_f)	9.57 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	13.15	0.00					
0.5	2.57	2.42	12.58	0.96					
1.0	3.39	3.24	11.76	0.89					
1.5	3.72	3.57	11.43	0.87					
2.0	3.80	3.65	11.35	0.86					
2.5	4.02	3.87	11.13	0.85					
3.0	4.07	3.92	11.08	0.84					
3.5	4.17	4.02	10.98	0.83					
4.0	4.32	4.17	10.83	0.82					
4.5	4.42	4.27	10.73	0.82					
5.0	4.49	4.34	10.66	0.81					
6.0	4.63	4.48	10.52	0.80					
7.0	4.74	4.59	10.41	0.79					
8.0	4.87	4.72	10.28	0.78					
9.0	4.99	4.84	10.16	0.77					
10.0	5.05	4.90	10.10	0.77					
15.0	5.37	5.22	9.78	0.74					
20.0	5.40	5.25	9.75	0.74					
30.0	5.58	5.43	9.57	0.73					

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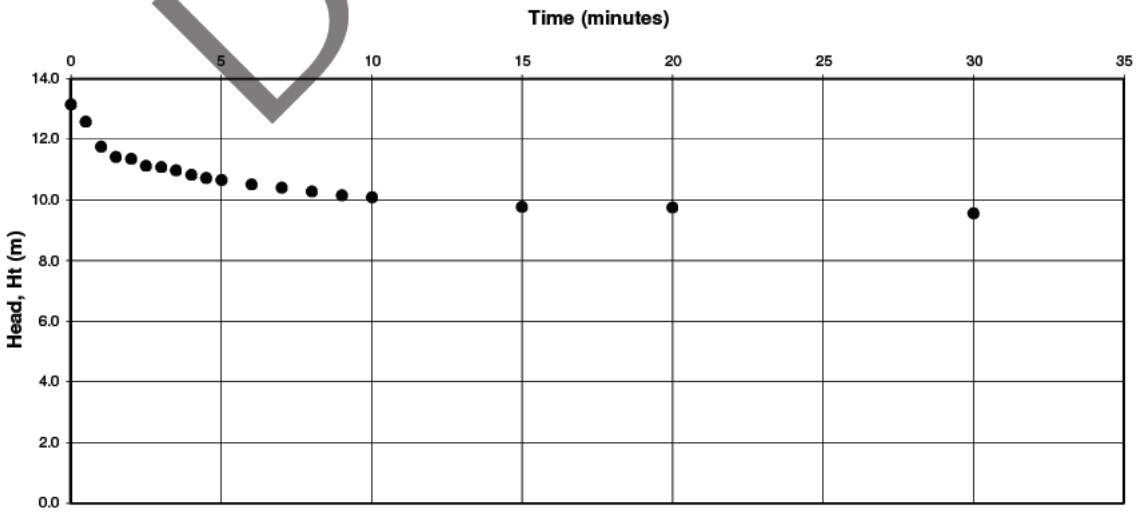


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

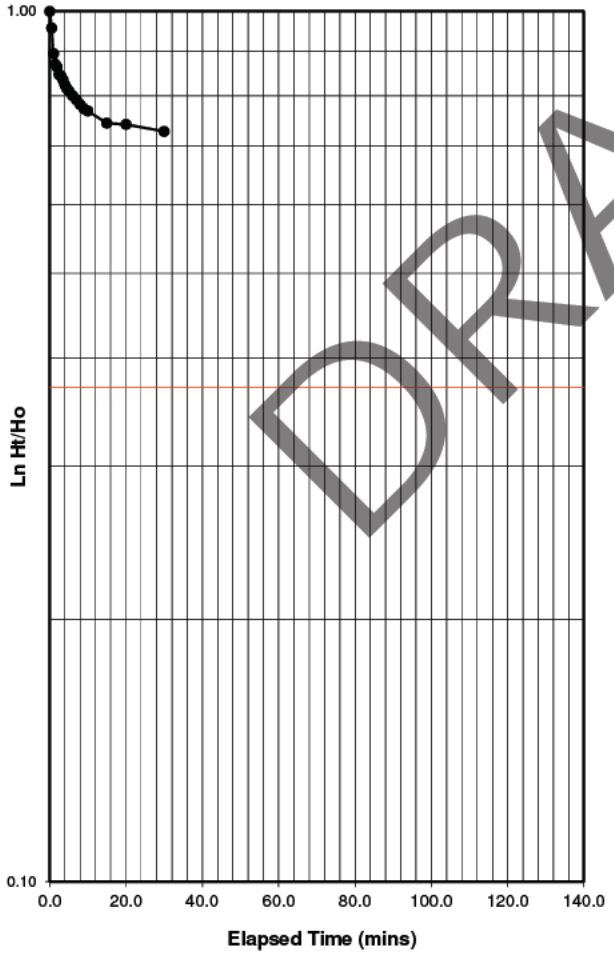
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	13.15	1.00	9.0	10.16	0.77			
0.5	12.58	0.96	10.0	10.10	0.77			
1.0	11.76	0.89	15.0	9.78	0.74			
1.5	11.43	0.87	20.0	9.75	0.74			
2.0	11.35	0.86	30.0	9.57	0.73			
2.5	11.13	0.85						
3.0	11.08	0.84						
3.5	10.98	0.83						
4.0	10.83	0.82						
4.5	10.73	0.82						
5.0	10.66	0.81						
6.0	10.52	0.80						
7.0	10.41	0.79						
8.0	10.28	0.78						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	13.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.230	
Time (t1)	1.50	mins
Time (t2)	15.00	mins
Head at Time t1 (H1)	11.430	m
Head at Time t2 (H2)	9.780	m
Permeability (k) = A/(F[t2-	**9.76E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

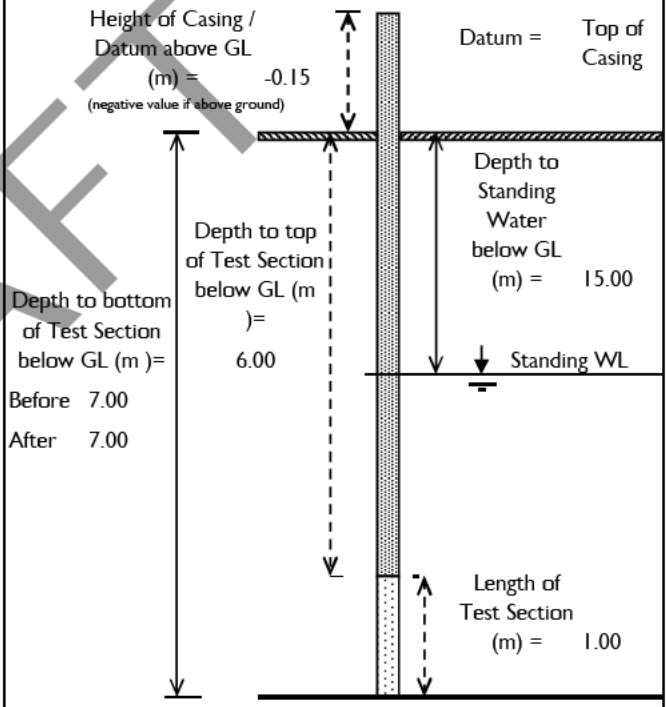
Inclination	Vertical
Method of Drilling	Rotary Coring
Co-ordinates (m)	E 467129.6
	N 113695.4
Level (m OD)	90.27

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.00		
0.5	3.10		
1.0	3.56		
1.5	3.86		
2.0	4.04		
2.5	4.28		
3.0	4.43		
3.5	4.55		
4.0	4.71		
4.5	4.82		
5.0	4.91		
6.0	5.10		
7.0	5.16		
8.0	5.27		
9.0	5.37		
10.0	5.42		
15.0	5.57		
20.0	5.73		
30.0	5.96		
40.0	6.19		
50.0	6.26		



Depth to Standing Water Level below Datum	15.15 m
Depth to Induced Water Level below Datum	2.00 m
Differential head at start of Test (H_o)	13.15 m
Differential Head at end of Test (H_f)	8.96 m
Time Elapsed at end of test (t_f)	50.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.00	1.85	13.15	0.00	50.0	6.26	6.11	8.89	0.68
0.5	3.10	2.95	12.05	0.92					
1.0	3.56	3.41	11.59	0.88					
1.5	3.86	3.71	11.29	0.86					
2.0	4.04	3.89	11.11	0.84					
2.5	4.28	4.13	10.87	0.83					
3.0	4.43	4.28	10.72	0.82					
3.5	4.55	4.40	10.60	0.81					
4.0	4.71	4.56	10.44	0.79					
4.5	4.82	4.67	10.33	0.79					
5.0	4.91	4.76	10.24	0.78					
6.0	5.10	4.95	10.05	0.76					
7.0	5.16	5.01	9.99	0.76					
8.0	5.27	5.12	9.88	0.75					
9.0	5.37	5.22	9.78	0.74					
10.0	5.42	5.27	9.73	0.74					
15.0	5.57	5.42	9.58	0.73					
20.0	5.73	5.58	9.42	0.72					
30.0	5.96	5.81	9.19	0.70					
40.0	6.19	6.04	8.96	0.68					

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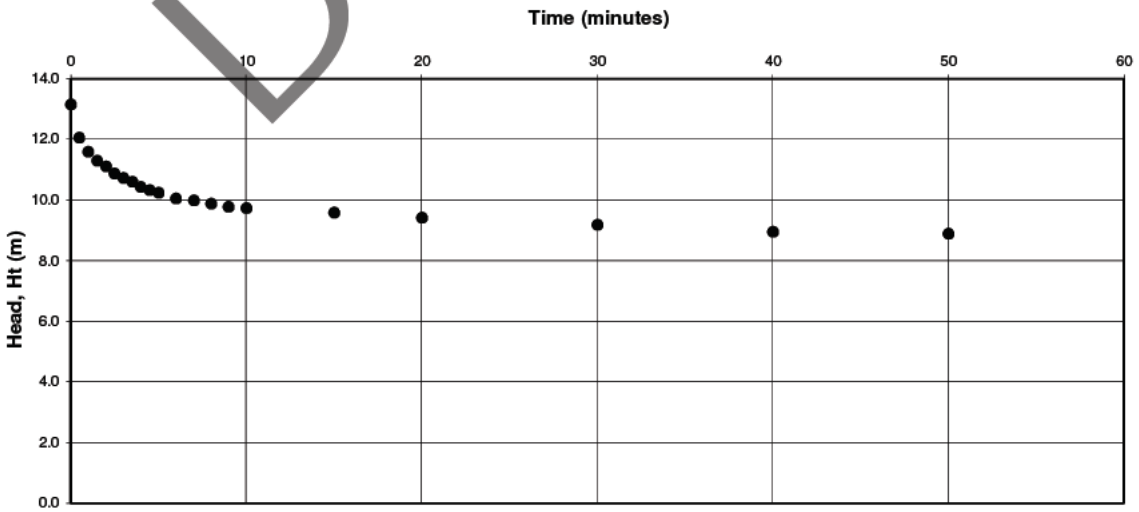


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

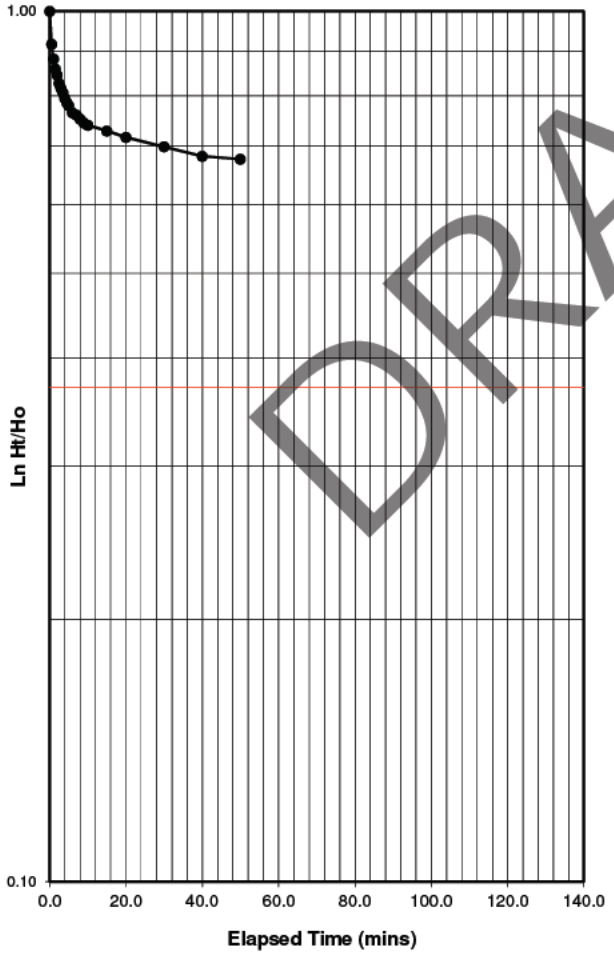
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH41
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	13.15	1.00	9.0	9.78	0.74			
0.5	12.05	0.92	10.0	9.73	0.74			
1.0	11.59	0.88	15.0	9.58	0.73			
1.5	11.29	0.86	20.0	9.42	0.72			
2.0	11.11	0.84	30.0	9.19	0.70			
2.5	10.87	0.83	40.0	8.96	0.68			
3.0	10.72	0.82	50.0	8.89	0.68			
3.5	10.60	0.81						
4.0	10.44	0.79						
4.5	10.33	0.79						
5.0	10.24	0.78						
6.0	10.05	0.76						
7.0	9.99	0.76						
8.0	9.88	0.75						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.15	m
Depth to Induced Water Level	2.00	m
Differential head at start (H_o)	13.15	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.00	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :	mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.233	
Time (t1)	5.00	mins
Time (t2)	50.00	mins
Head at Time t1 (H1)	10.240	m
Head at Time t2 (H2)	8.890	m
Permeability (k) = A/(F[t2-	**2.65E-07**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

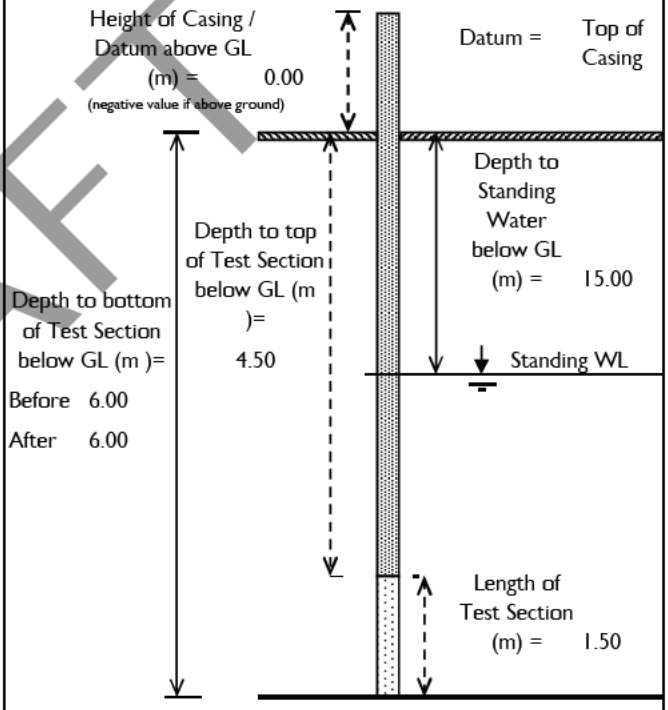
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.37		
0.3	2.64		
0.5	2.80		
0.8	2.93		
1.0	3.10		
1.3	3.25		
1.5	3.40		
1.8	3.52		
2.0	3.62		
2.3	3.70		
2.5	3.79		
2.8	3.87		
3.0	3.93		



Depth to Standing Water Level below Datum	15.00 m
Depth to Induced Water Level below Datum	2.37 m
Differential head at start of Test (H_o)	12.63 m
Differential Head at end of Test (H_f)	1.92 m
Time Elapsed at end of test (t_f)	3.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.37	2.37	12.63	0.00					
0.3	2.64	2.64	12.36	0.98					
0.5	2.80	2.80	12.20	0.97					
0.8	2.93	2.93	12.07	0.96					
1.0	3.10	3.10	11.90	0.94					
1.3	3.25	3.25	11.75	0.93					
1.5	3.40	3.40	11.60	0.92					
1.8	3.52	3.52	11.48	0.91					
2.0	3.62	3.62	11.38	0.90					
2.3	3.70	3.70	11.30	0.89					
2.5	3.79	3.79	11.21	0.89					
2.8	3.87	3.87	11.13	0.88					
3.0	3.93	3.93	11.07	0.88					

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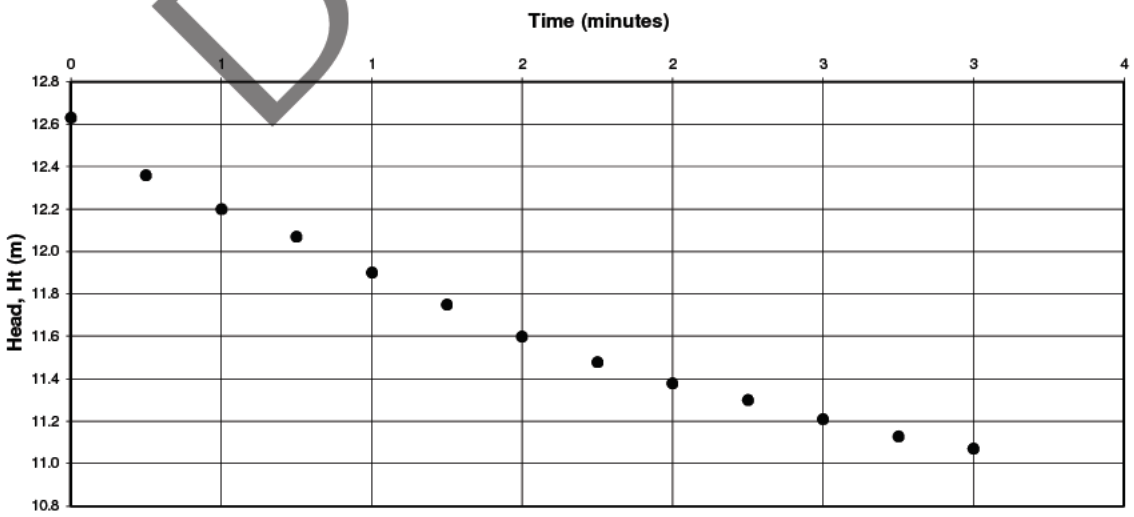


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

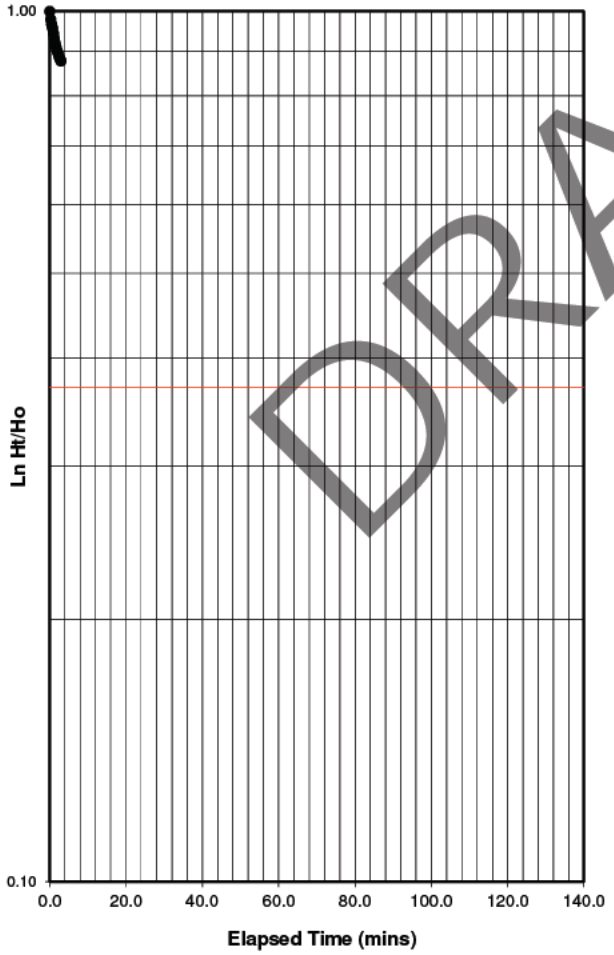
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	12.63	1.00						
0.3	12.36	0.98						
0.5	12.20	0.97						
0.8	12.07	0.96						
1.0	11.90	0.94						
1.3	11.75	0.93						
1.5	11.60	0.92						
1.8	11.48	0.91						
2.0	11.38	0.90						
2.3	11.30	0.89						
2.5	11.21	0.89						
2.8	11.13	0.88						
3.0	11.07	0.88						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.00	m
Depth to Induced Water Level	2.37	m
Differential head at start (H_o)	12.63	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	1.50	mins
Time (t2)	3.00	mins
Head at Time t1 (H1)	11.600	m
Head at Time t2 (H2)	11.070	m
Permeability (k) = A/(F[t2-	**2.01E-06**	**m/sec**

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Remarks and Additional Information

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

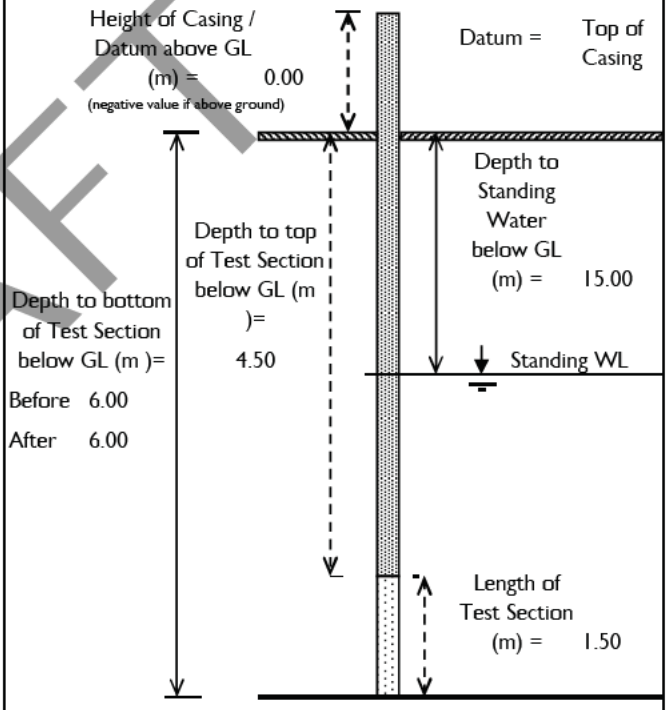
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.25		
0.3	2.72		
0.5	2.95		
0.8	3.10		
1.0	3.25		
1.3	3.38		
1.5	3.47		
1.8	3.65		
2.0	3.77		
2.3	3.80		



Depth to Standing Water Level below Datum	15.00 m
Depth to Induced Water Level below Datum	2.25 m
Differential head at start of Test (H_o)	12.75 m
Differential Head at end of Test (H_f)	11.20 m
Time Elapsed at end of test (t_f)	2.3 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.25	2.25	12.75	0.00					
0.3	2.72	2.72	12.28	0.96					
0.5	2.95	2.95	12.05	0.95					
0.8	3.10	3.10	11.90	0.93					
1.0	3.25	3.25	11.75	0.92					
1.3	3.38	3.38	11.62	0.91					
1.5	3.47	3.47	11.53	0.90					
1.8	3.65	3.65	11.35	0.89					
2.0	3.77	3.77	11.23	0.88					
2.3	3.80	3.80	11.20	0.88					

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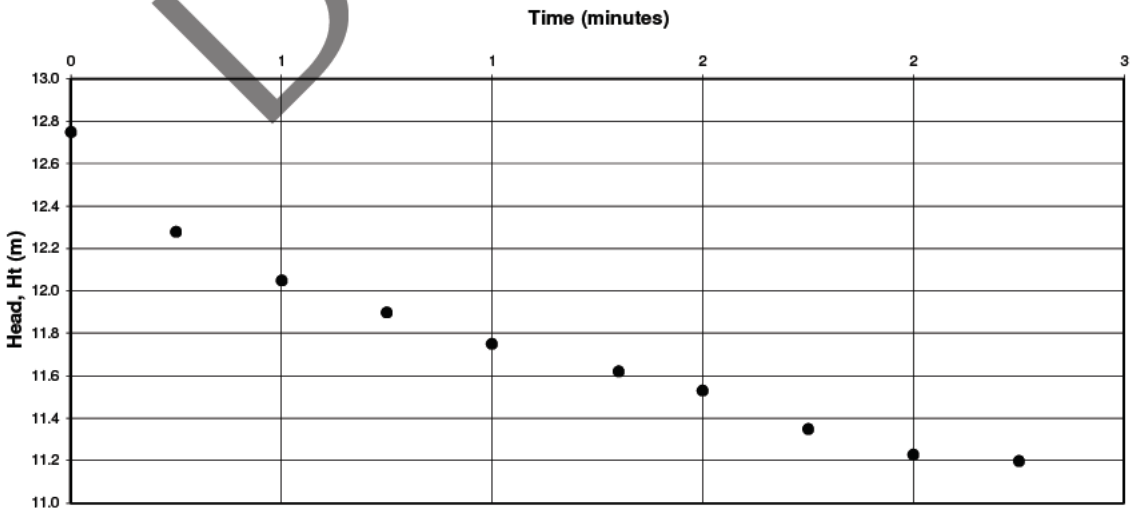


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

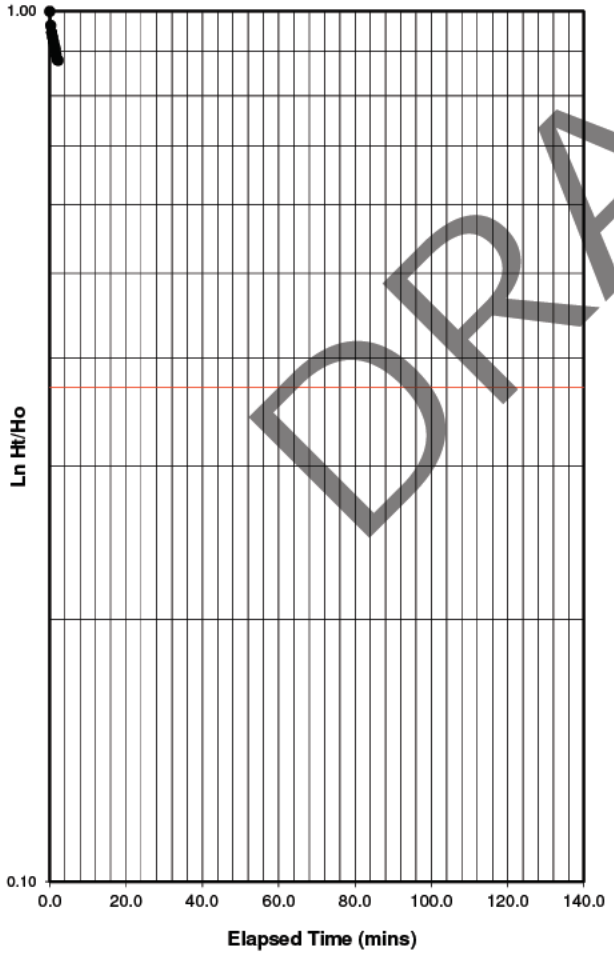
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	12.75	1.00						
0.3	12.28	0.96						
0.5	12.05	0.95						
0.8	11.90	0.93						
1.0	11.75	0.92						
1.3	11.62	0.91						
1.5	11.53	0.90						
1.8	11.35	0.89						
2.0	11.23	0.88						
2.3	11.20	0.88						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.00	m
Depth to Induced Water Level	2.25	m
Differential head at start (H_o)	12.75	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	0.50	mins
Time (t2)	2.00	mins
Head at Time t1 (H1)	12.050	m
Head at Time t2 (H2)	11.230	m
Permeability (k) = A/(F[t2-	**3.03E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details

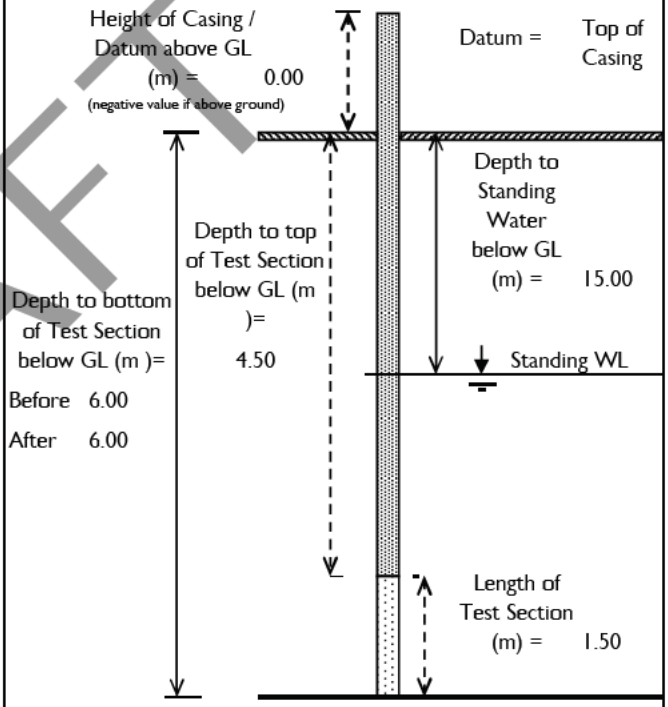
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467208.7
	N 113601.0
Level (m OD)	86.13

Test Details

Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	2.35		
0.3	2.77		
0.5	2.92		
0.8	3.12		
1.0	3.25		
1.3	3.38		
1.5	3.51		
1.8	3.61		
2.0	3.67		
2.5	3.88		
3.0	3.99		
3.5	4.13		
4.0	4.26		
4.5	4.38		
5.0	4.52		
6.0	4.68		
7.0	4.97		
8.0	5.14		
9.0	5.23		
10.0	5.42		
15.0	5.73		
20.0	5.73		
25.0	5.73		
30.0	5.73		



Depth to Standing Water Level below Datum	15.00 m
Depth to Induced Water Level below Datum	2.35 m
Differential head at start of Test (H_o)	12.65 m
Differential Head at end of Test (H_f)	9.27 m
Time Elapsed at end of test (t_f)	30.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Structureless CHALK

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	2.35	2.35	12.65	0.00	15.0	5.73	5.73	9.27	0.73
0.3	2.77	2.77	12.23	0.97	20.0	5.73	5.73	9.27	0.73
0.5	2.92	2.92	12.08	0.95	25.0	5.73	5.73	9.27	0.73
0.8	3.12	3.12	11.88	0.94	30.0	5.73	5.73	9.27	0.73
1.0	3.25	3.25	11.75	0.93					
1.3	3.38	3.38	11.62	0.92					
1.5	3.51	3.51	11.49	0.91					
1.8	3.61	3.61	11.39	0.90					
2.0	3.67	3.67	11.33	0.90					
2.5	3.88	3.88	11.12	0.88					
3.0	3.99	3.99	11.01	0.87					
3.5	4.13	4.13	10.87	0.86					
4.0	4.26	4.26	10.74	0.85					
4.5	4.38	4.38	10.62	0.84					
5.0	4.52	4.52	10.48	0.83					
6.0	4.68	4.68	10.32	0.82					
7.0	4.97	4.97	10.03	0.79					
8.0	5.14	5.14	9.86	0.78					
9.0	5.23	5.23	9.77	0.77					
10.0	5.42	5.42	9.58	0.76					

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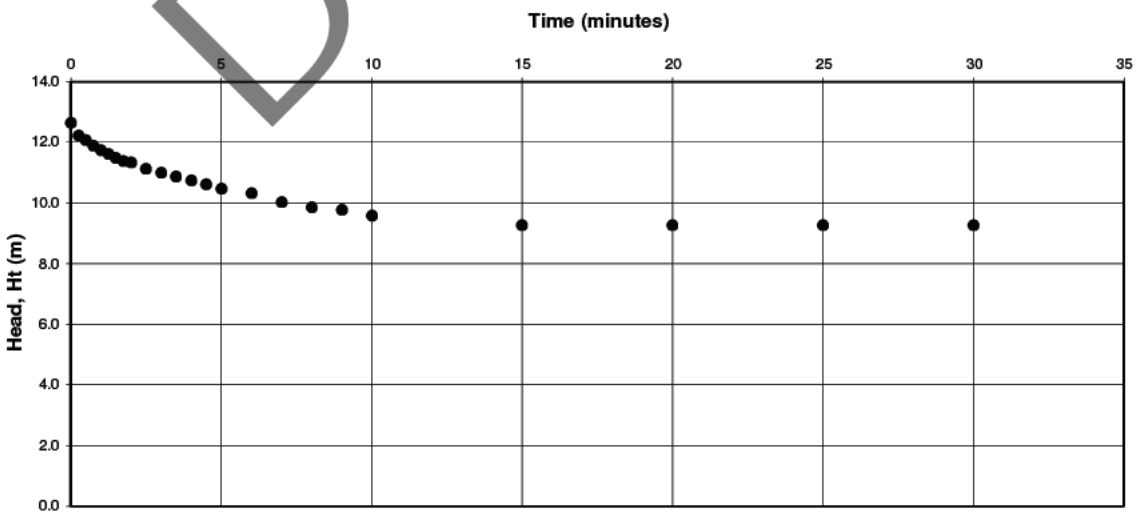


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

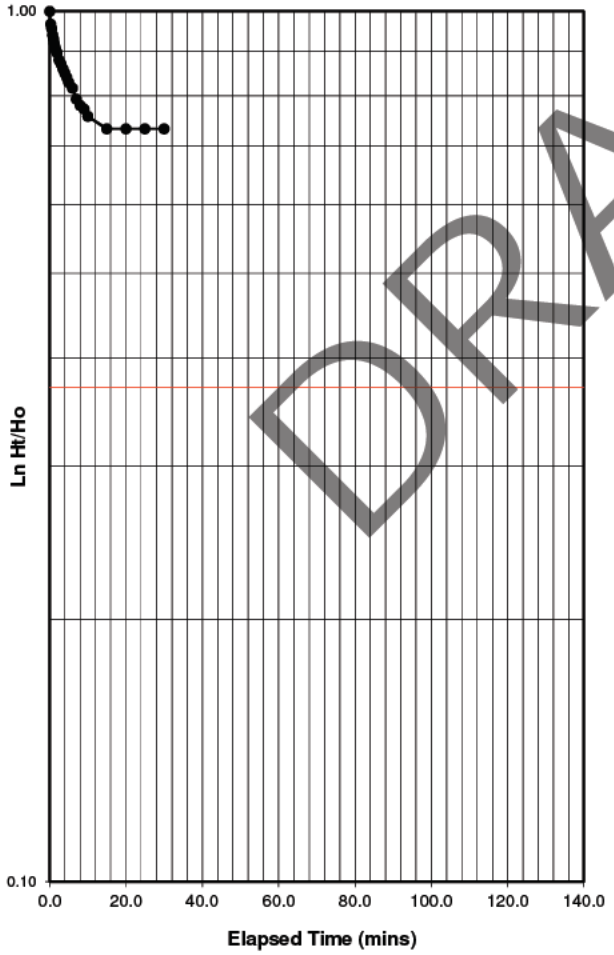
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH42
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	12.65	1.00	5.0	10.48	0.83			
0.3	12.23	0.97	6.0	10.32	0.82			
0.5	12.08	0.95	7.0	10.03	0.79			
0.8	11.88	0.94	8.0	9.86	0.78			
1.0	11.75	0.93	9.0	9.77	0.77			
1.3	11.62	0.92	10.0	9.58	0.76			
1.5	11.49	0.91	15.0	9.27	0.73			
1.8	11.39	0.90	20.0	9.27	0.73			
2.0	11.33	0.90	25.0	9.27	0.73			
2.5	11.12	0.88	30.0	9.27	0.73			
3.0	11.01	0.87						
3.5	10.87	0.86						
4.0	10.74	0.85						
4.5	10.62	0.84						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.00	m
Depth to Induced Water Level	2.35	m
Differential head at start (H_o)	12.65	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	1.50	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	2.927	
Time (t1)	2.50	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	11.120	m
Head at Time t2 (H2)	9.580	m
Permeability (k) = A/(F[t2-	**1.28E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

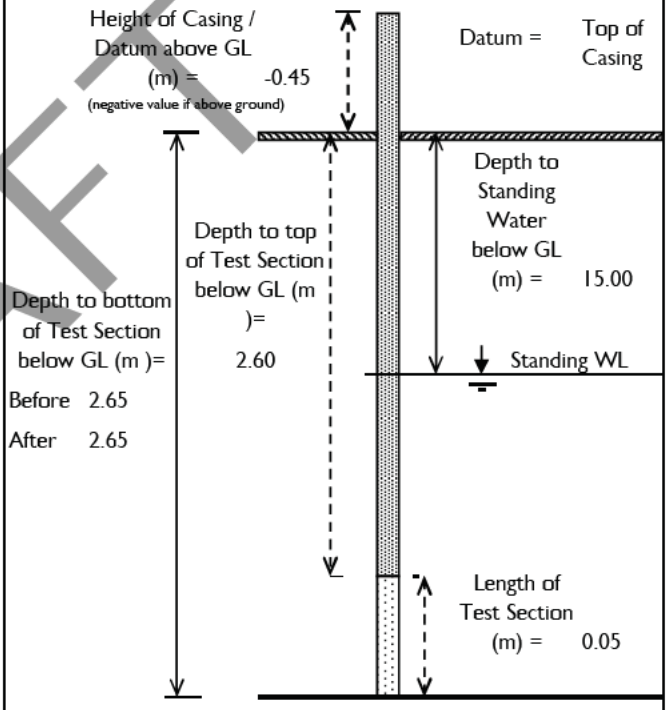
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.77		
0.5	1.23		
1.0	1.52		
1.5	1.62		
2.0	1.78		
2.5	1.90		
3.0	2.00		
3.5	2.10		
4.0	2.16		
4.5	2.23		
5.0	2.37		
6.0	2.43		
7.0	2.51		
8.0	2.57		
9.0	2.62		
14.0	2.73		



Depth to Standing Water Level below Datum	15.45 m
Depth to Induced Water Level below Datum	0.77 m
Differential head at start of Test (H_o)	14.68 m
Differential Head at end of Test (H_f)	12.72 m
Time Elapsed at end of test (t_f)	14.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.77	0.32	14.68	0.00					
0.5	1.23	0.78	14.22	0.97					
1.0	1.52	1.07	13.93	0.95					
1.5	1.62	1.17	13.83	0.94					
2.0	1.78	1.33	13.67	0.93					
2.5	1.90	1.45	13.55	0.92					
3.0	2.00	1.55	13.45	0.92					
3.5	2.10	1.65	13.35	0.91					
4.0	2.16	1.71	13.29	0.91					
4.5	2.23	1.78	13.22	0.90					
5.0	2.37	1.92	13.08	0.89					
6.0	2.43	1.98	13.02	0.89					
7.0	2.51	2.06	12.94	0.88					
8.0	2.57	2.12	12.88	0.88					
9.0	2.62	2.17	12.83	0.87					
14.0	2.73	2.28	12.72	0.87					

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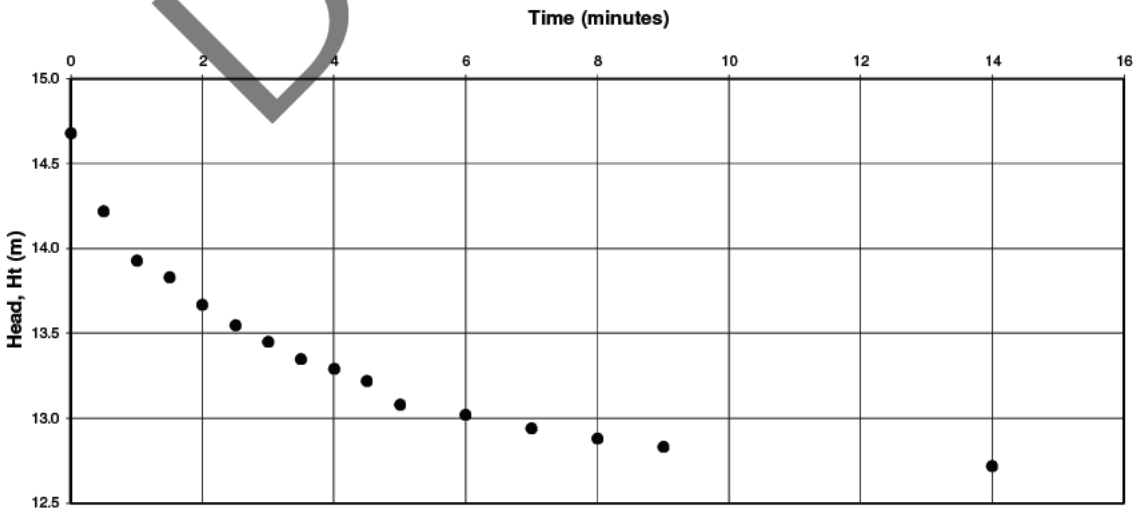


Remarks and Additional Information

Results is an approximation only and is not a true permeability as no water was encountered during drilling.

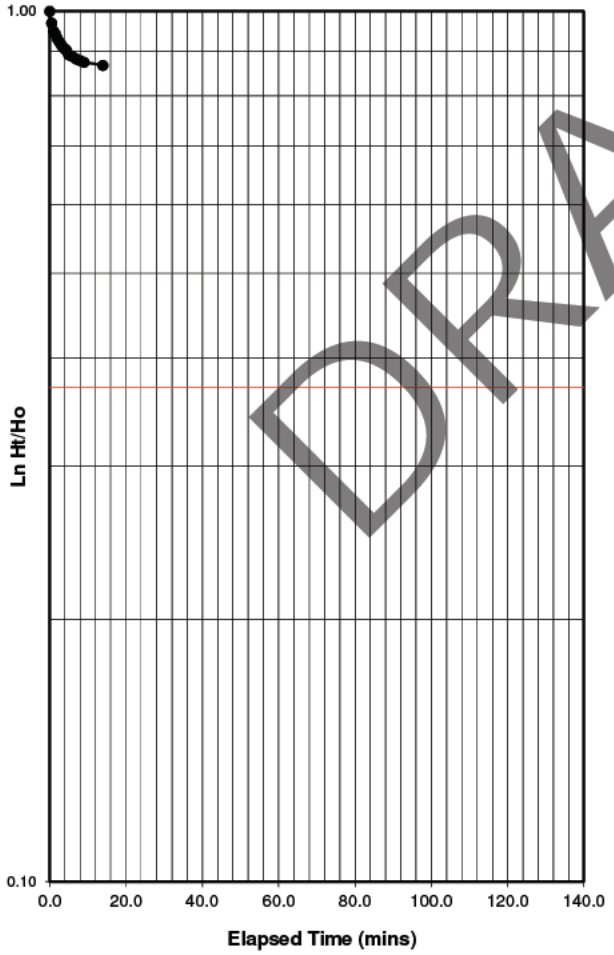
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	1.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	14.68	1.00	9.0	12.83	0.87			
0.5	14.22	0.97	14.0	12.72	0.87			
1.0	13.93	0.95						
1.5	13.83	0.94						
2.0	13.67	0.93						
2.5	13.55	0.92						
3.0	13.45	0.92						
3.5	13.35	0.91						
4.0	13.29	0.91						
4.5	13.22	0.90						
5.0	13.08	0.89						
6.0	13.02	0.89						
7.0	12.94	0.88						
8.0	12.88	0.88						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.45	m
Depth to Induced Water Level	0.77	m
Differential head at start (H_o)	14.68	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	1.00	mins
Time (t2)	8.00	mins
Head at Time t1 (H1)	13.930	m
Head at Time t2 (H2)	12.880	m
Permeability (k) = A/(F[t2-	**6.39E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

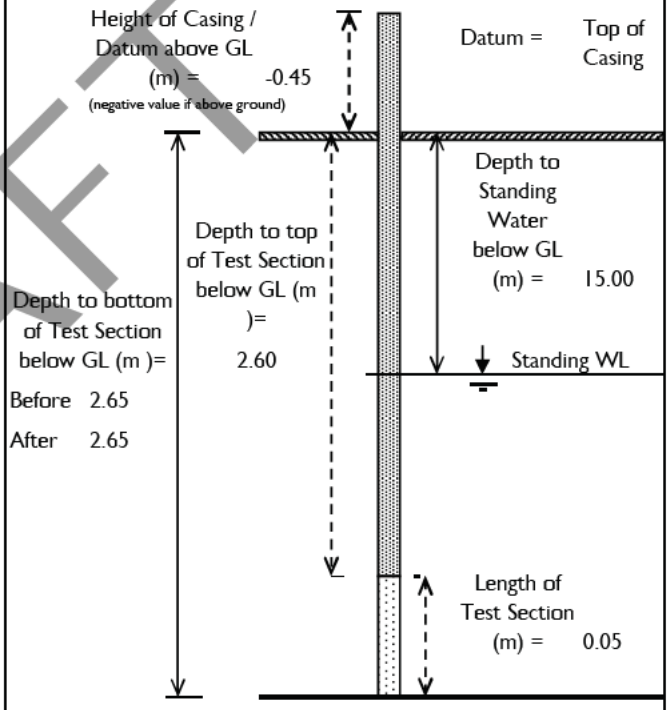
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.51		
0.5	0.67		
1.0	0.86		
1.5	1.00		
2.0	1.14		
2.5	1.26		
3.0	1.39		
3.5	1.50		
4.0	1.67		
4.5	1.72		
5.0	1.78		
6.0	1.92		
7.0	2.07		
8.0	2.19		
9.0	2.24		
10.0	2.34		
11.0	2.45		
12.0	2.50		
13.0	2.58		
14.0	2.59		
15.0	2.65		
16.0	2.70		



Depth to Standing Water Level below Datum	15.45 m
Depth to Induced Water Level below Datum	0.51 m
Differential head at start of Test (H_o)	14.94 m
Differential Head at end of Test (H_f)	12.75 m
Time Elapsed at end of test (t_f)	16.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

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INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.51	0.06	14.94	0.00	15.0	2.65	2.20	12.80	0.86
0.5	0.67	0.22	14.78	0.99	16.0	2.70	2.25	12.75	0.85
1.0	0.86	0.41	14.59	0.98					
1.5	1.00	0.55	14.45	0.97					
2.0	1.14	0.69	14.31	0.96					
2.5	1.26	0.81	14.19	0.95					
3.0	1.39	0.94	14.06	0.94					
3.5	1.50	1.05	13.95	0.93					
4.0	1.67	1.22	13.78	0.92					
4.5	1.72	1.27	13.73	0.92					
5.0	1.78	1.33	13.67	0.91					
6.0	1.92	1.47	13.53	0.91					
7.0	2.07	1.62	13.38	0.90					
8.0	2.19	1.74	13.26	0.89					
9.0	2.24	1.79	13.21	0.88					
10.0	2.34	1.89	13.11	0.88					
11.0	2.45	2.00	13.00	0.87					
12.0	2.50	2.05	12.95	0.87					
13.0	2.58	2.13	12.87	0.86					
14.0	2.59	2.14	12.86	0.86					

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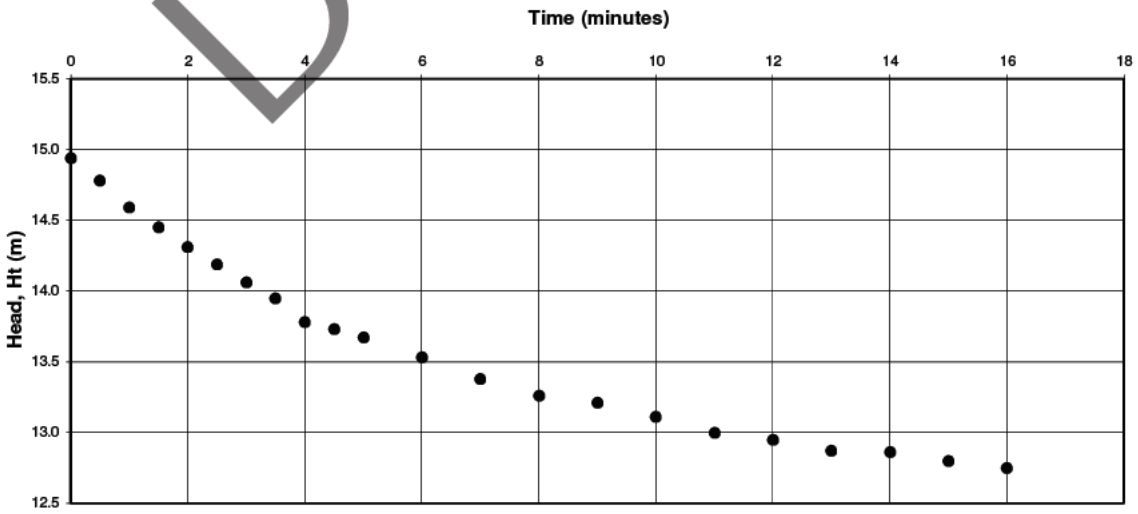


Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

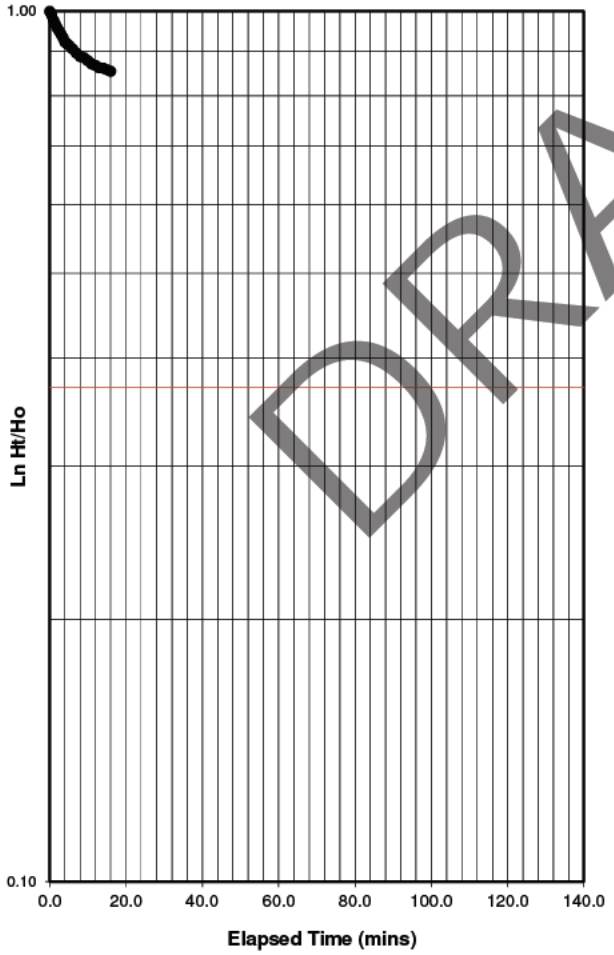
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	2.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	14.94	1.00	9.0	13.21	0.88			
0.5	14.78	0.99	10.0	13.11	0.88			
1.0	14.59	0.98	11.0	13.00	0.87			
1.5	14.45	0.97	12.0	12.95	0.87			
2.0	14.31	0.96	13.0	12.87	0.86			
2.5	14.19	0.95	14.0	12.86	0.86			
3.0	14.06	0.94	15.0	12.80	0.86			
3.5	13.95	0.93	16.0	12.75	0.85			
4.0	13.78	0.92						
4.5	13.73	0.92						
5.0	13.67	0.91						
6.0	13.53	0.91						
7.0	13.38	0.90						
8.0	13.26	0.89						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.45	m
Depth to Induced Water Level	0.51	m
Differential head at start (H_o)	14.94	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	0.00	mins
Time (t2)	10.00	mins
Head at Time t1 (H1)	14.940	m
Head at Time t2 (H2)	13.110	m
Permeability (k) = A/(F[t2-	**7.46E-06**	**m/sec**

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Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

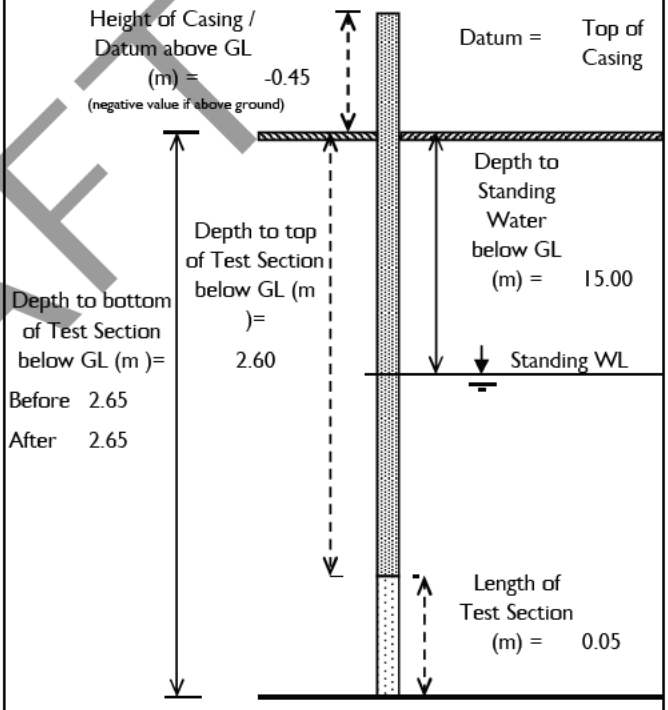
Water Permeability Test in a Borehole using Open Systems in accordance with BS EN ISO 22282-2:201

Borehole Details	
Inclination	Vertical
Method of Drilling	Dynamic Sampling
Co-ordinates (m)	E 467849.3
	N 99138.0
Level (m OD)	3.46

Test Details	
Test Type	Variable Head - Falling
Hydrogeological Conditions	Test Section Patially Saturated
Type of Filter	None
Isolation Device	None
Test Section Dia. (m)	0.12
Measuring Tube Dia. (m)	0.12

Test Measurements

Elapsed Time (minutes)	Depth of Water below Top of Casing (m)	Elapsed Time (Continued) (minutes)	Depth of Water below Top of Casing (continued) (m)
0.0	0.60		
0.5	0.77		
1.0	0.83		
1.5	0.97		
2.0	1.09		
2.5	1.21		
3.0	1.34		
3.5	1.44		
4.0	1.61		
4.5	1.70		
5.0	1.80		
6.0	1.90		
7.0	2.03		
8.0	2.21		
9.0	2.26		
10.0	2.35		
11.0	2.47		
12.0	2.54		
13.0	2.59		
14.0	2.63		
15.0	2.68		
16.0	2.70		



Depth to Standing Water Level below Datum	15.45 m
Depth to Induced Water Level below Datum	0.60 m
Differential head at start of Test (H_o)	14.85 m
Differential Head at end of Test (H_f)	12.75 m
Time Elapsed at end of test (t_f)	16.0 mins

Weather during Test	
Test Carried Out By	CJ
Test Checked By	AS
Description of Test Section	Light brown gravelly fine to coarse SAND.

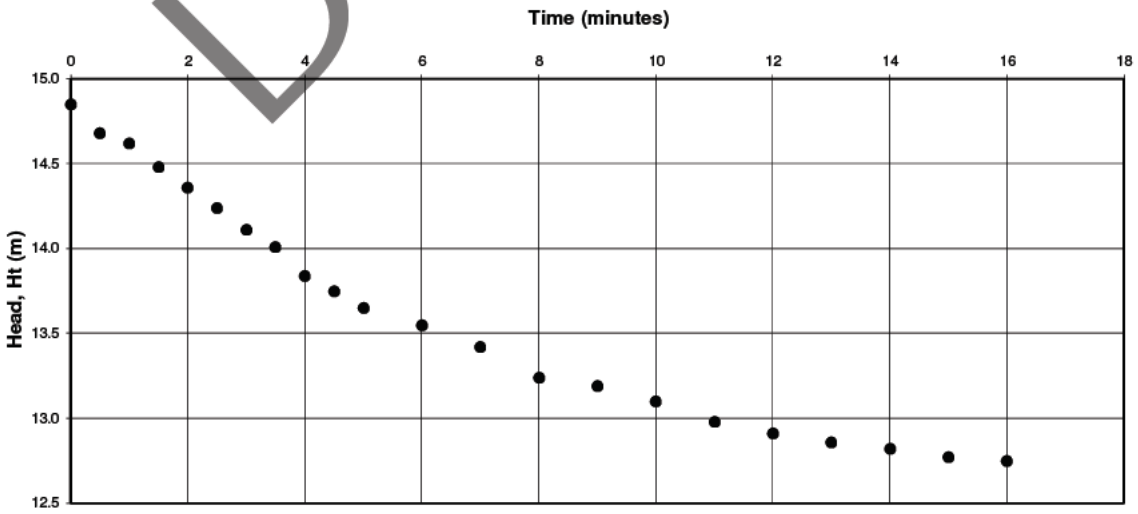
DRAFT

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3
Client	WSP UK Limited	Date	17/11/2020

Test Results

Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)	Time (mins)	Measured Depth (m)	Relative Depth (m bgl)	Ht (m)	ΔH (m)
0.0	0.60	0.15	14.85	0.00	15.0	2.68	2.23	12.77	0.86
0.5	0.77	0.32	14.68	0.99	16.0	2.70	2.25	12.75	0.86
1.0	0.83	0.38	14.62	0.98					
1.5	0.97	0.52	14.48	0.98					
2.0	1.09	0.64	14.36	0.97					
2.5	1.21	0.76	14.24	0.96					
3.0	1.34	0.89	14.11	0.95					
3.5	1.44	0.99	14.01	0.94					
4.0	1.61	1.16	13.84	0.93					
4.5	1.70	1.25	13.75	0.93					
5.0	1.80	1.35	13.65	0.92					
6.0	1.90	1.45	13.55	0.91					
7.0	2.03	1.58	13.42	0.90					
8.0	2.21	1.76	13.24	0.89					
9.0	2.26	1.81	13.19	0.89					
10.0	2.35	1.90	13.10	0.88					
11.0	2.47	2.02	12.98	0.87					
12.0	2.54	2.09	12.91	0.87					
13.0	2.59	2.14	12.86	0.87					
14.0	2.63	2.18	12.82	0.86					



DRAFT

Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.

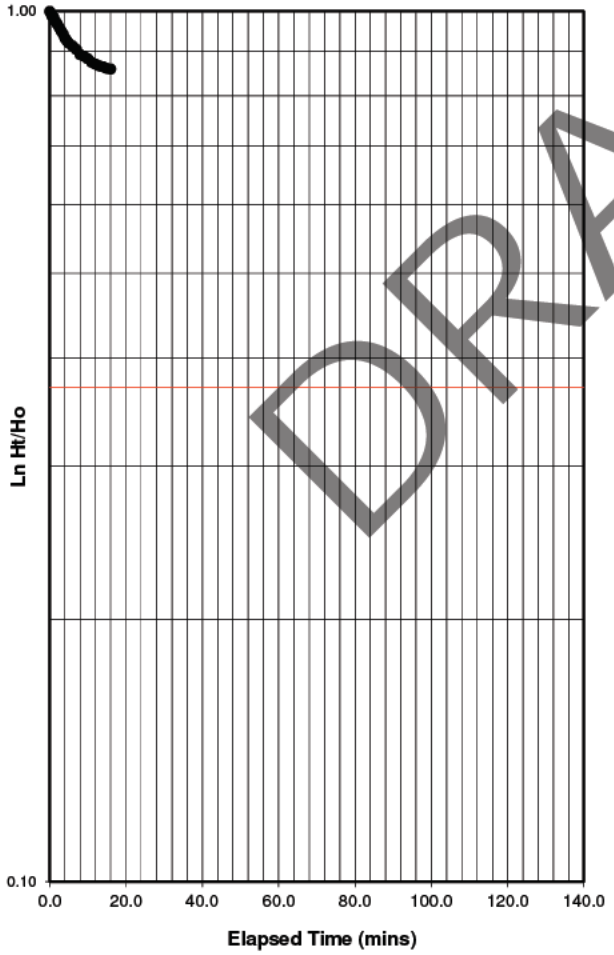
Water assumed at 15m bgl.

INSITU TESTING - *Permeability (Borehole)*

Project	Aquind Drainage Design Additional GI	Borehole	BH43
		Project No	PE201677
		Test No	3.000
Client	WSP UK Limited	Date	17/11/2020

Calculation of Permeability using Hvorslev Method (Ref BS5930:1999 + A2:2010)

Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho	Time (mins)	Ht (m)	Ht/Ho
0.0	14.85	1.00	9.0	13.19	0.89			
0.5	14.68	0.99	10.0	13.10	0.88			
1.0	14.62	0.98	11.0	12.98	0.87			
1.5	14.48	0.98	12.0	12.91	0.87			
2.0	14.36	0.97	13.0	12.86	0.87			
2.5	14.24	0.96	14.0	12.82	0.86			
3.0	14.11	0.95	15.0	12.77	0.86			
3.5	14.01	0.94	16.0	12.75	0.86			
4.0	13.84	0.93						
4.5	13.75	0.93						
5.0	13.65	0.92						
6.0	13.55	0.91						
7.0	13.42	0.90						
8.0	13.24	0.89						



Type of Test	Variable Head - Falling	
Depth to Standing Water Level	15.45	m
Depth to Induced Water Level	0.60	m
Differential head at start (H_o)	14.85	m
Diameter of Test Section	0.12	m
Diameter of Measuring Tube	0.12	m
Test Length (L)	0.05	m
Area of Test Section (As)	1.13E-02	m^2
Area of Measuring Tube (Af)	1.13E-02	m^2

Time at ratio H/Ho=.37 :		mins

VARIABLE HEAD TEST	**(GENERAL APPROACH**	
Shape factor (F)	0.330	
Time (t1)	0.00	mins
Time (t2)	8.00	mins
Head at Time t1 (H1)	14.850	m
Head at Time t2 (H2)	13.240	m
Permeability (k) = A/(F[t2-	**8.19E-06**	**m/sec**

DRAFT

Remarks and Additional Information

Result is an approximation only and is not a true permeability as no water was encountered during drilling.
Water assumed at 15m bgl.

DRAFT

APPENDIX 9

Trial Pit Soakaway Test Results

INSITU TESTING - Soakaway Test

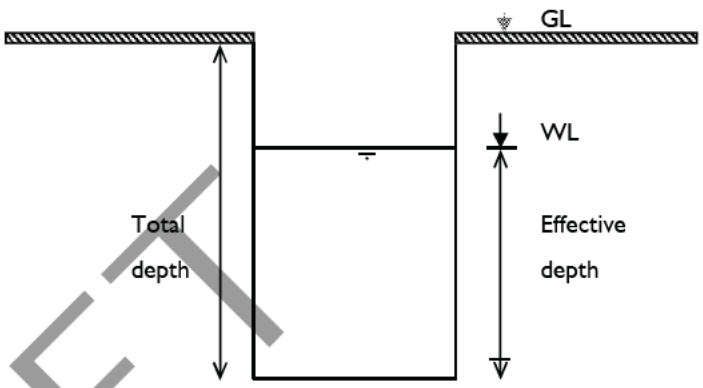
Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP21
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	16/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.40	0.60	100.00
1.00	0.41	0.59	98.33
2.00	0.41	0.59	98.33
3.00	0.41	0.59	98.33
4.00	0.42	0.58	96.67
5.00	0.43	0.57	95.00
10.00	0.43	0.57	95.00
15.00	0.43	0.57	95.00
20.00	0.43	0.57	95.00
30.00	0.43	0.57	95.00
45.00	0.43	0.57	95.00
60.00	0.44	0.56	93.33
1320.00	0.64	0.36	60.00
1680.00	0.70	0.30	50.00

x
x

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.000 m
Effective depth (Head of Water)	=	0.600 m

DRAFT

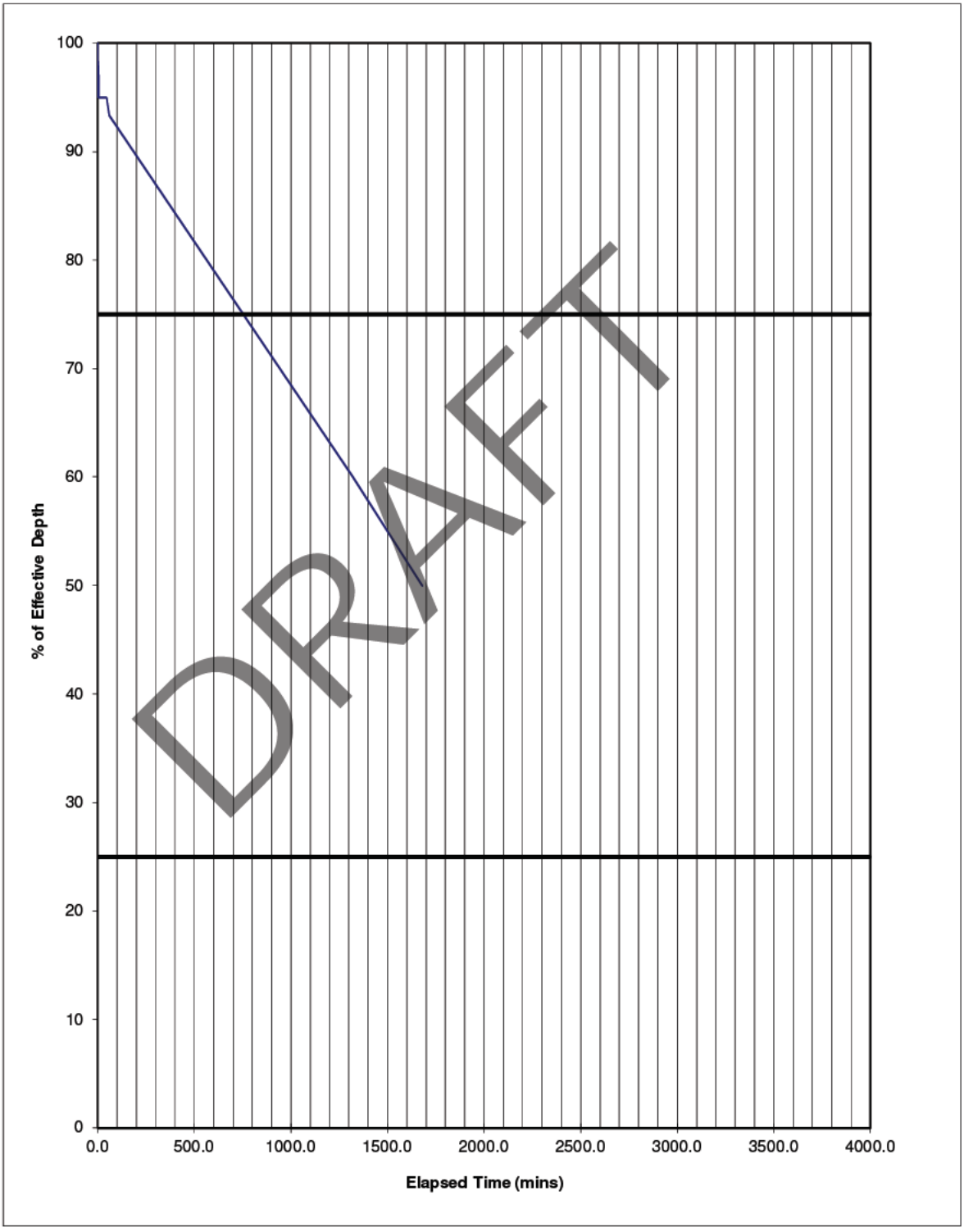
Initial depth from GL	=	0.400m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.450	0.550	750.00
25%	0.150	0.850	2600.00
Vp75-25	=	0.360	m3
ap50	=	2.760	m2
tp75-25	=	1,850.000	min
Soil Infiltration, f	=	**1.18E-06**	m/sec

Remarks Infiltration Rate estimated only by extrapolation.

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP21
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	16/11/2020



tp75	=	750.00
tp25	=	2600.00

Remarks Infiltration Rate estimated only by extrapolation.

GEOTECHNICS

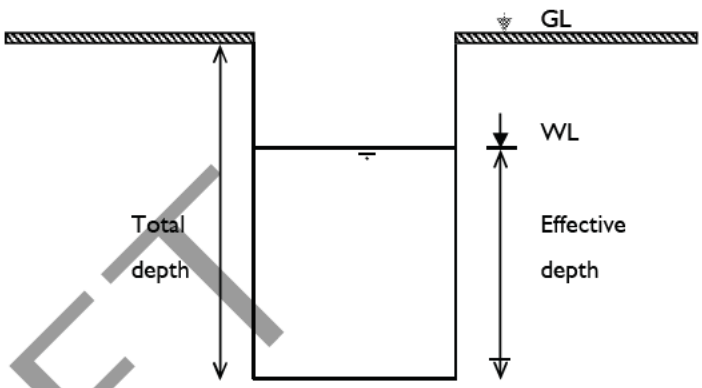
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	16/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.32	1.38	100.00
1.00	0.40	1.30	94.20
2.00	0.45	1.25	90.58
3.00	0.50	1.20	86.96
4.00	0.56	1.14	82.61
5.00	0.59	1.11	80.43
10.00	0.88	0.82	59.42
15.00	0.93	0.77	55.80
20.00	1.09	0.61	44.20
30.00	1.20	0.50	36.23
45.00	1.59	0.11	7.97

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.700 m
Effective depth (Head of Water)	=	1.380 m

Initial depth from GL	=	0.320m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	1.035	0.665	6.40
25%	0.345	1.355	36.00
Vp75-25	=	0.828	m3
ap50	=	4.788	m2
tp75-25	=	29.600	min
Soil Infiltration, f	=	**9.74E-05**	m/sec

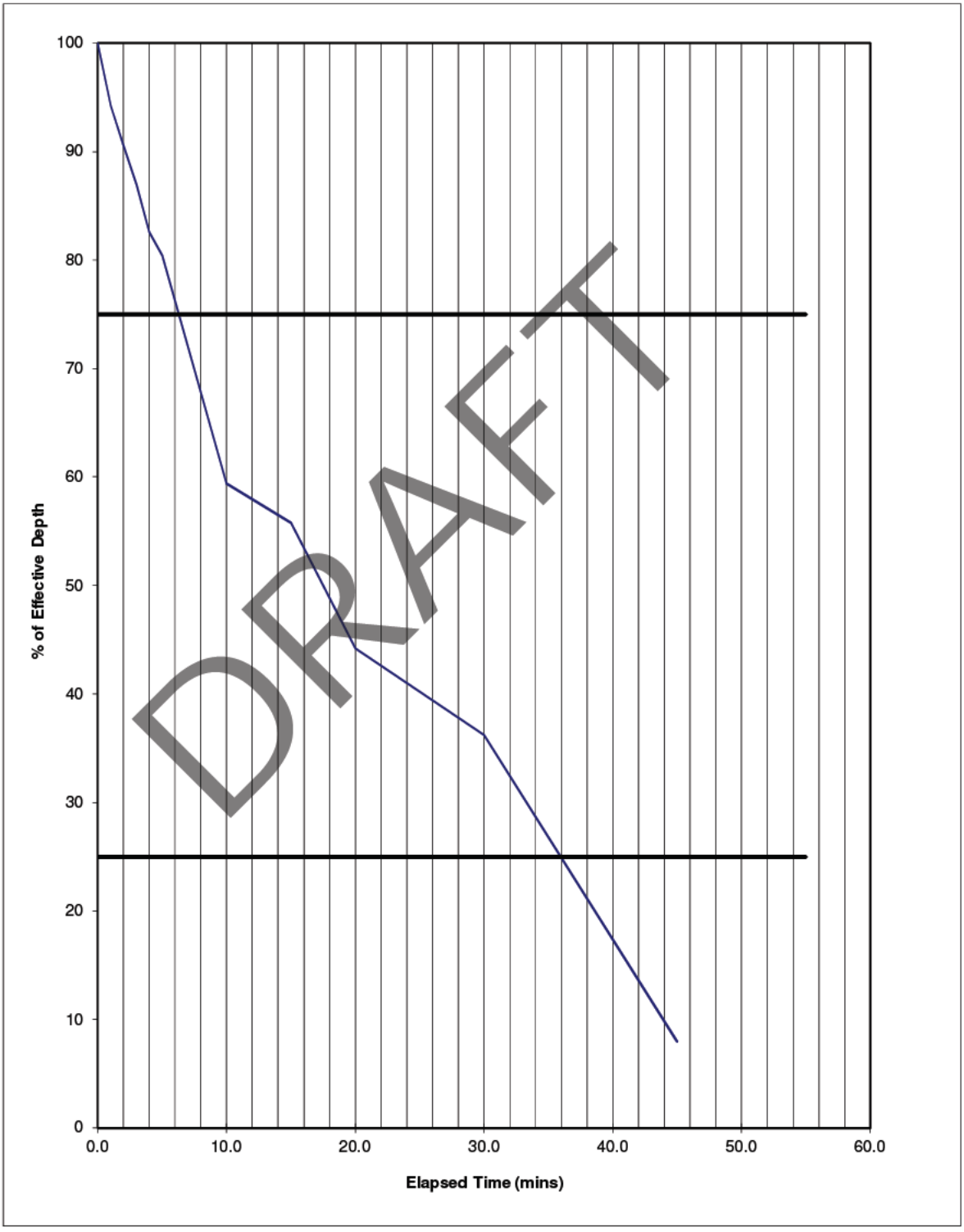
DRAFT

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	16/11/2020



DRAFT

tp75	=	6.40
tp25	=	36.00

Remarks

GEOTECHNICS

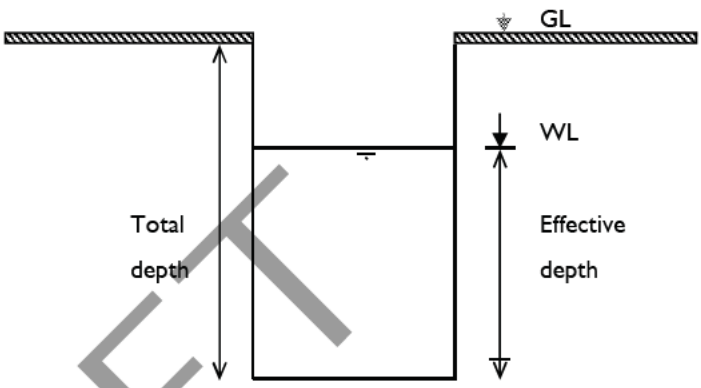
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.51	1.19	100.00
1.00	0.57	1.13	94.96
2.00	0.61	1.09	91.60
3.00	0.63	1.07	89.92
4.00	0.65	1.05	88.24
5.00	0.68	1.02	85.71
10.00	0.79	0.91	76.47
15.00	0.88	0.82	68.91
20.00	0.96	0.74	62.18
30.00	1.14	0.56	47.06
60.00	1.51	0.19	15.97
90.00	1.70	0.00	0.00

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.700 m
Effective depth (Head of Water)	=	1.190 m

DRAFT

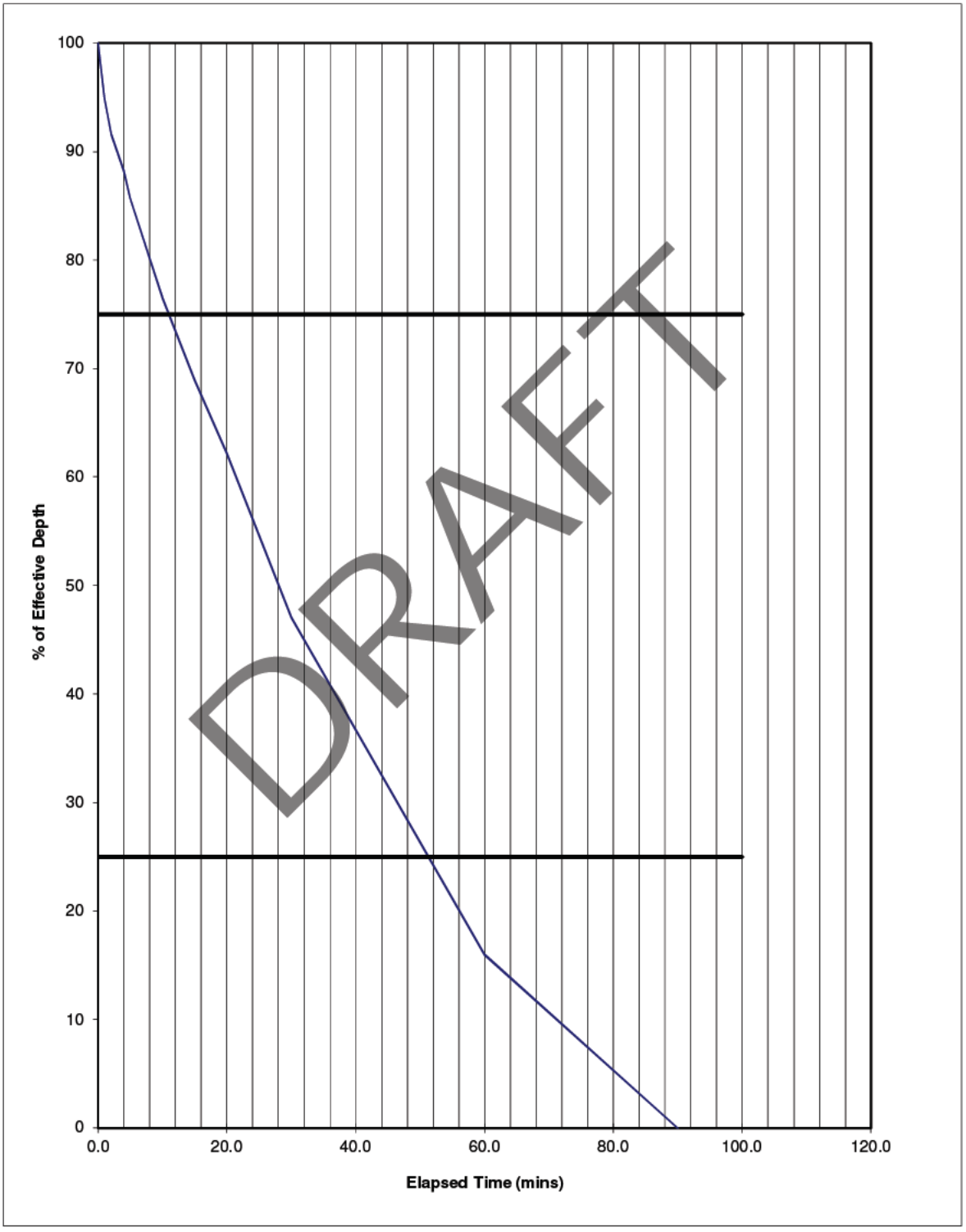
Initial depth from GL	=	0.510m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.893	0.808	11.00
25%	0.298	1.403	51.50
Vp75-25	=	0.714	m3
ap50	=	4.294	m2
tp75-25	=	40.500	min
Soil Infiltration, f	=	**6.84E-05**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	11.00
tp25	=	51.50

Remarks

GEOTECHNICS

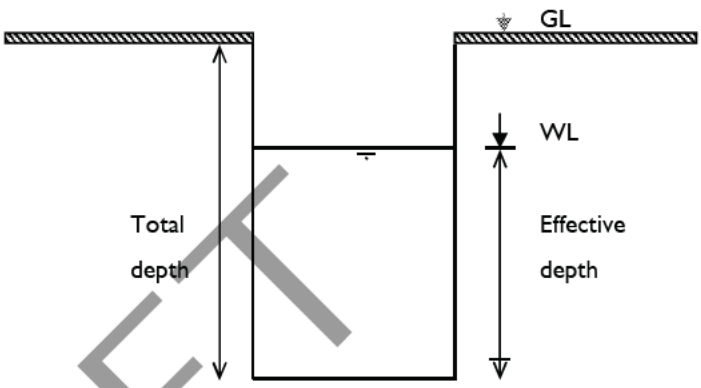
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.34	1.36	100.00
2.00	0.38	1.32	97.06
3.00	0.39	1.31	96.32
4.00	0.42	1.28	94.12
52.00	1.01	0.69	50.74
120.00	1.55	0.15	11.03

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.700	m
Effective depth (Head of Water)	=	1.360	m

DRAFT

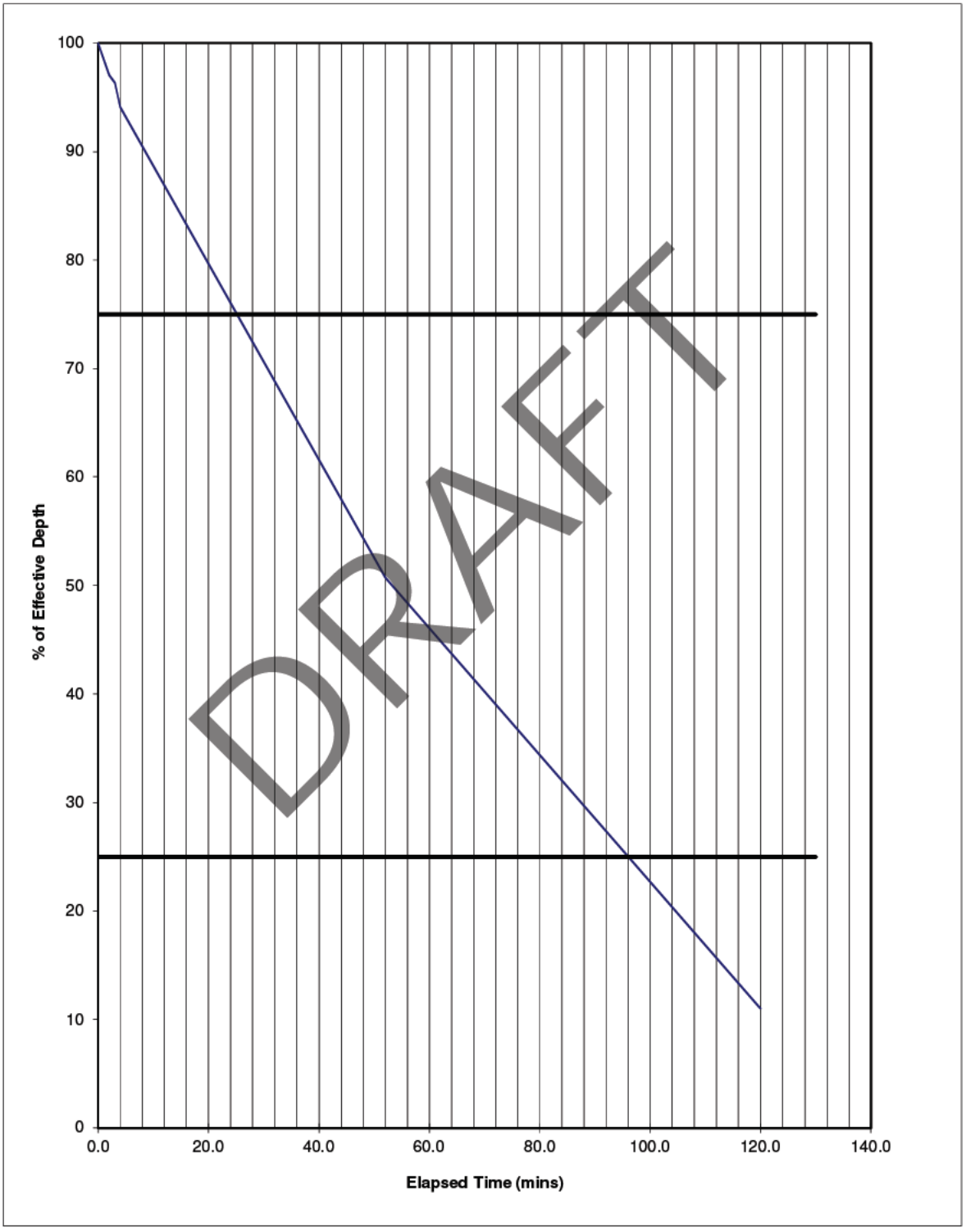
Initial depth from GL	=	0.340m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	1.020	0.680	25.00
25%	0.340	1.360	96.00
Vp75-25	=	0.816	m3
ap50	=	4.736	m2
tp75-25	=	71.000	min
Soil Infiltration, f	=	**4.04E-05**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP22
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	25.00
tp25	=	96.00

Remarks

GEOTECHNICS

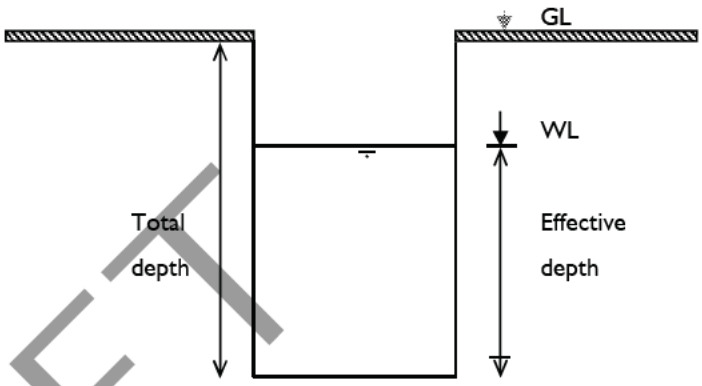
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.45	0.55	100.00
1.00	0.54	0.46	83.64
2.00	0.62	0.38	69.09
3.00	0.68	0.32	58.18
4.00	0.74	0.26	47.27
5.00	0.78	0.22	40.00
15.00	1.00	0.00	0.00

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.000	m
Effective depth (Head of Water)	=	0.550	m

DRAFT

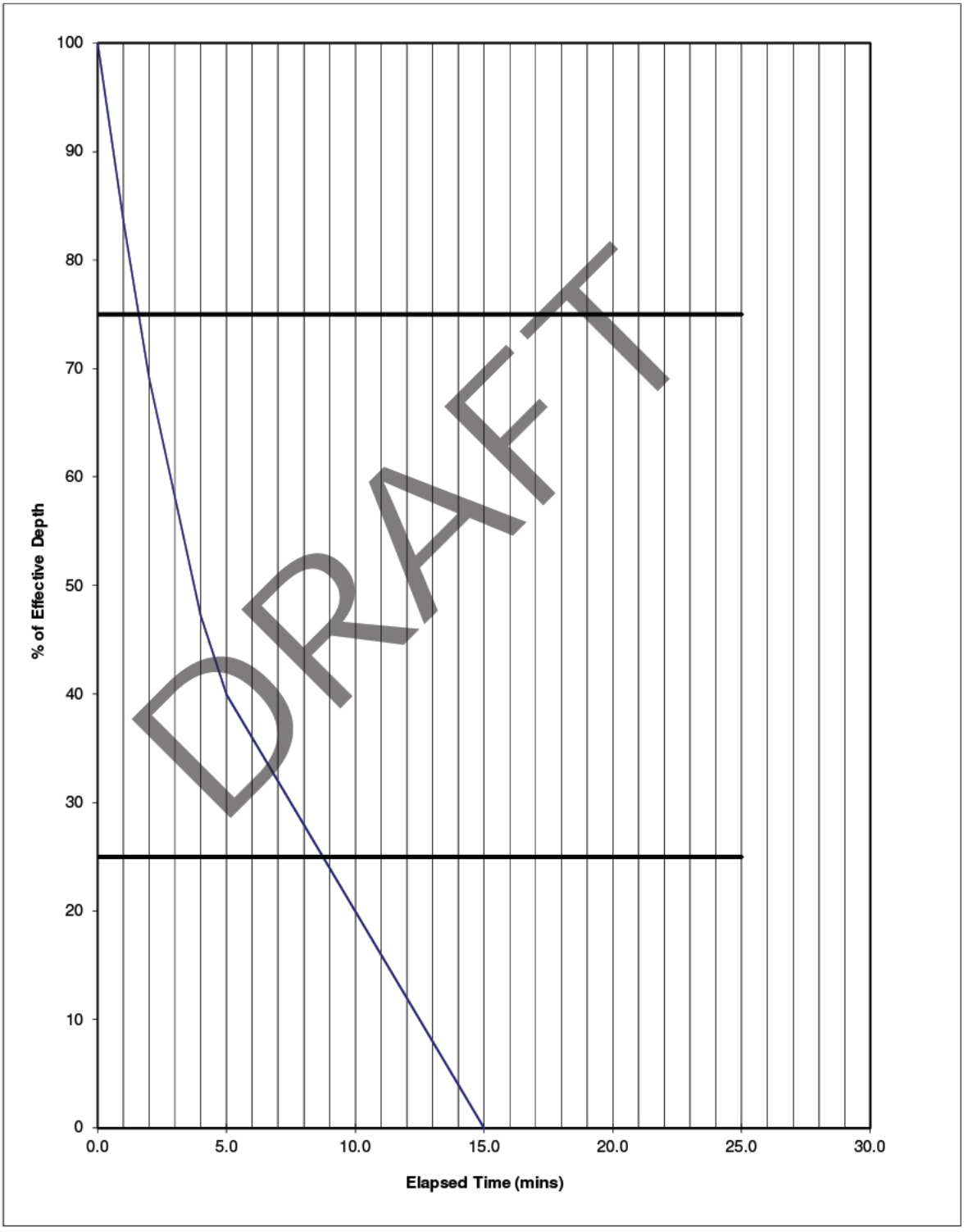
Initial depth from GL	=	0.450m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.413	0.588	1.60
25%	0.138	0.863	8.70
Vp75-25	=	0.330	m3
ap50	=	2.630	m2
tp75-25	=	7.100	min
Soil Infiltration, f	=	**2.95E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	1.60
tp25	=	8.70

Remarks

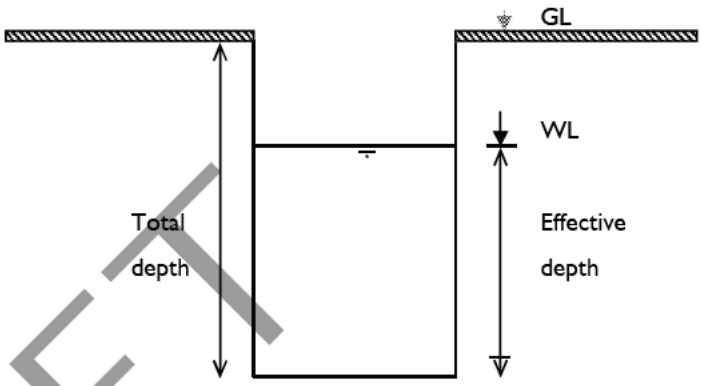
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.40	0.60	100.00
1.00	0.45	0.55	91.67
2.00	0.48	0.52	86.67
3.00	0.54	0.46	76.67
4.00	0.57	0.43	71.67
5.00	0.60	0.40	66.67
10.00	0.72	0.28	46.67
15.00	0.82	0.18	30.00
18.00	0.91	0.09	15.00
20.00	0.95	0.05	8.33

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.000	m
Effective depth (Head of Water)	=	0.600	m

DRAFT

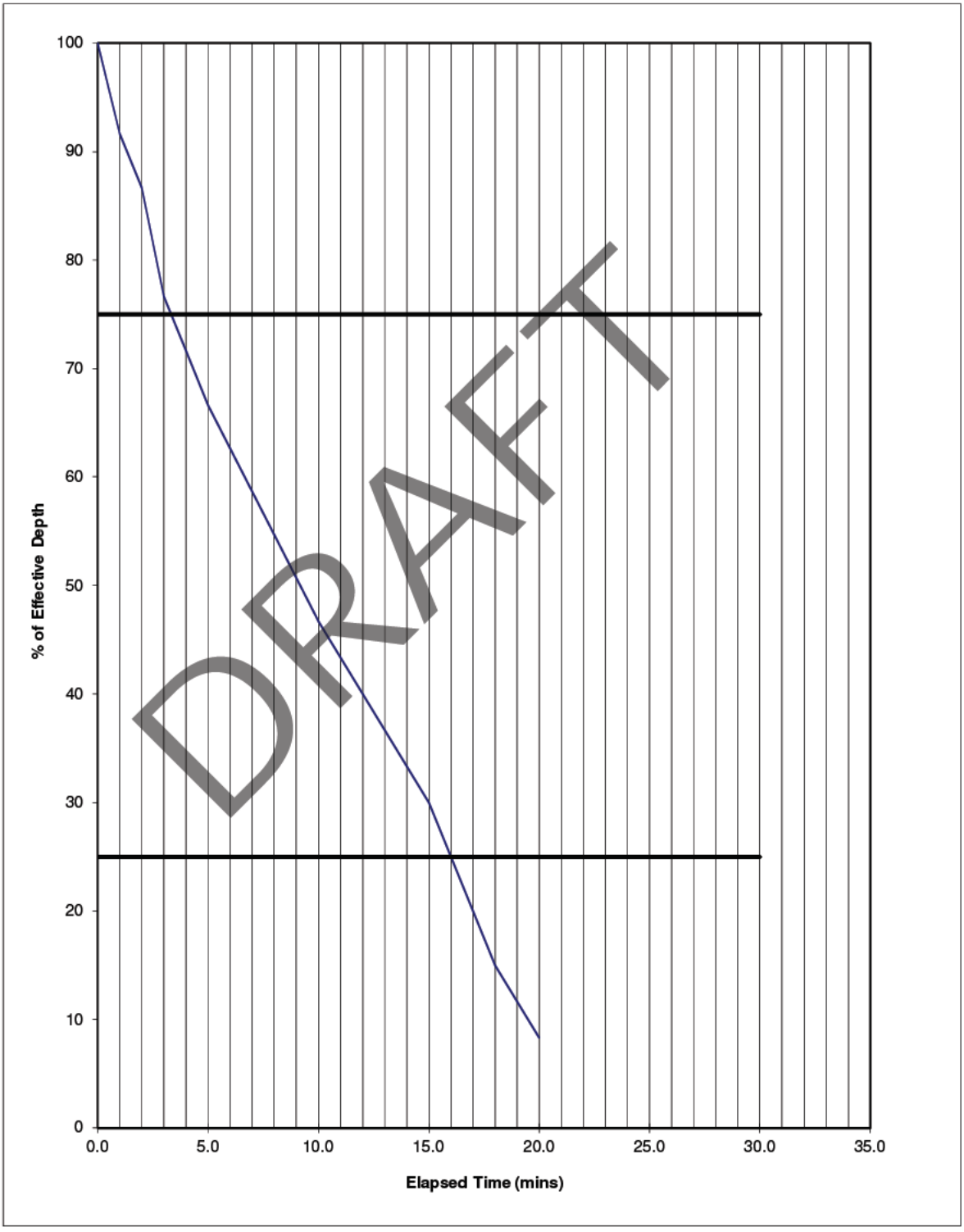
Initial depth from GL	=	0.400m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.450	0.550	3.40
25%	0.150	0.850	16.00
Vp75-25	=	0.360	m3
ap50	=	2.760	m2
tp75-25	=	12.600	min
Soil Infiltration, f	=	**1.73E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



tp75	=	3.40
tp25	=	16.00

Remarks

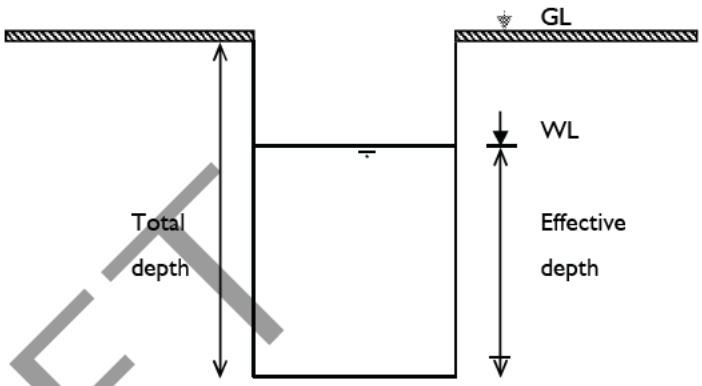
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.35	0.65	100.00
1.00	0.40	0.60	92.31
3.00	0.45	0.55	84.62
5.00	0.50	0.50	76.92
7.00	0.56	0.44	67.69
10.00	0.62	0.38	58.46
15.00	0.74	0.26	40.00
20.00	0.84	0.16	24.62
25.00	0.89	0.11	16.92
30.00	0.97	0.03	4.62

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.000	m
Effective depth (Head of Water)	=	0.650	m

DRAFT

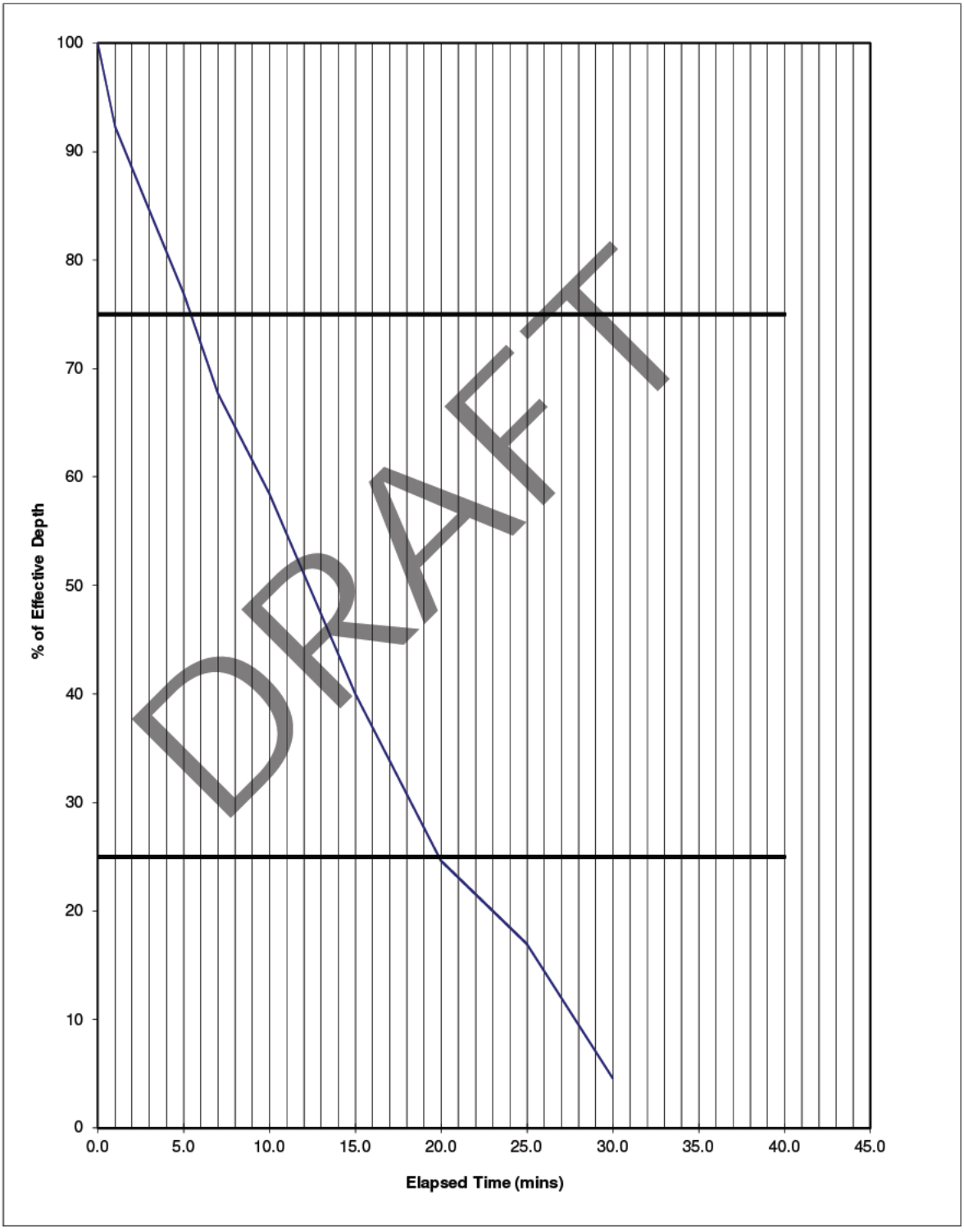
Initial depth from GL	=	0.350m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.488	0.513	6.50
25%	0.163	0.838	19.80
Vp75-25	=	0.390	m3
ap50	=	2.890	m2
tp75-25	=	13.300	min
Soil Infiltration, f	=	**1.69E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP23
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	6.50
tp25	=	19.80

Remarks

GEOTECHNICS

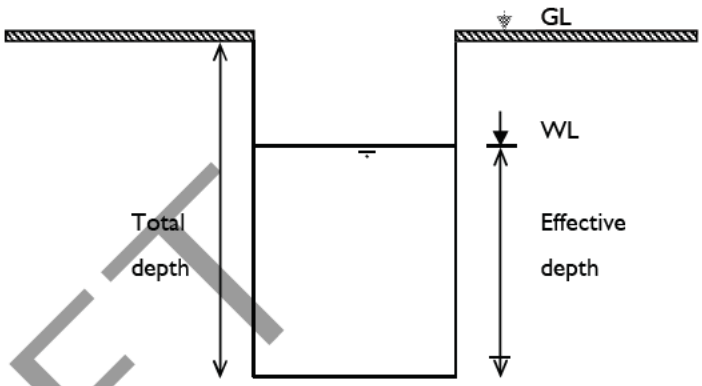
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.65	0.95	100.00
1.00	0.75	0.85	89.47
2.00	0.90	0.70	73.68
3.00	1.14	0.46	48.42
4.00	1.24	0.36	37.89
6.00	1.32	0.28	29.47
9.00	1.42	0.18	18.95
10.00	1.44	0.16	16.84

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.600	m
Effective depth (Head of Water)	=	0.950	m

DRAFT

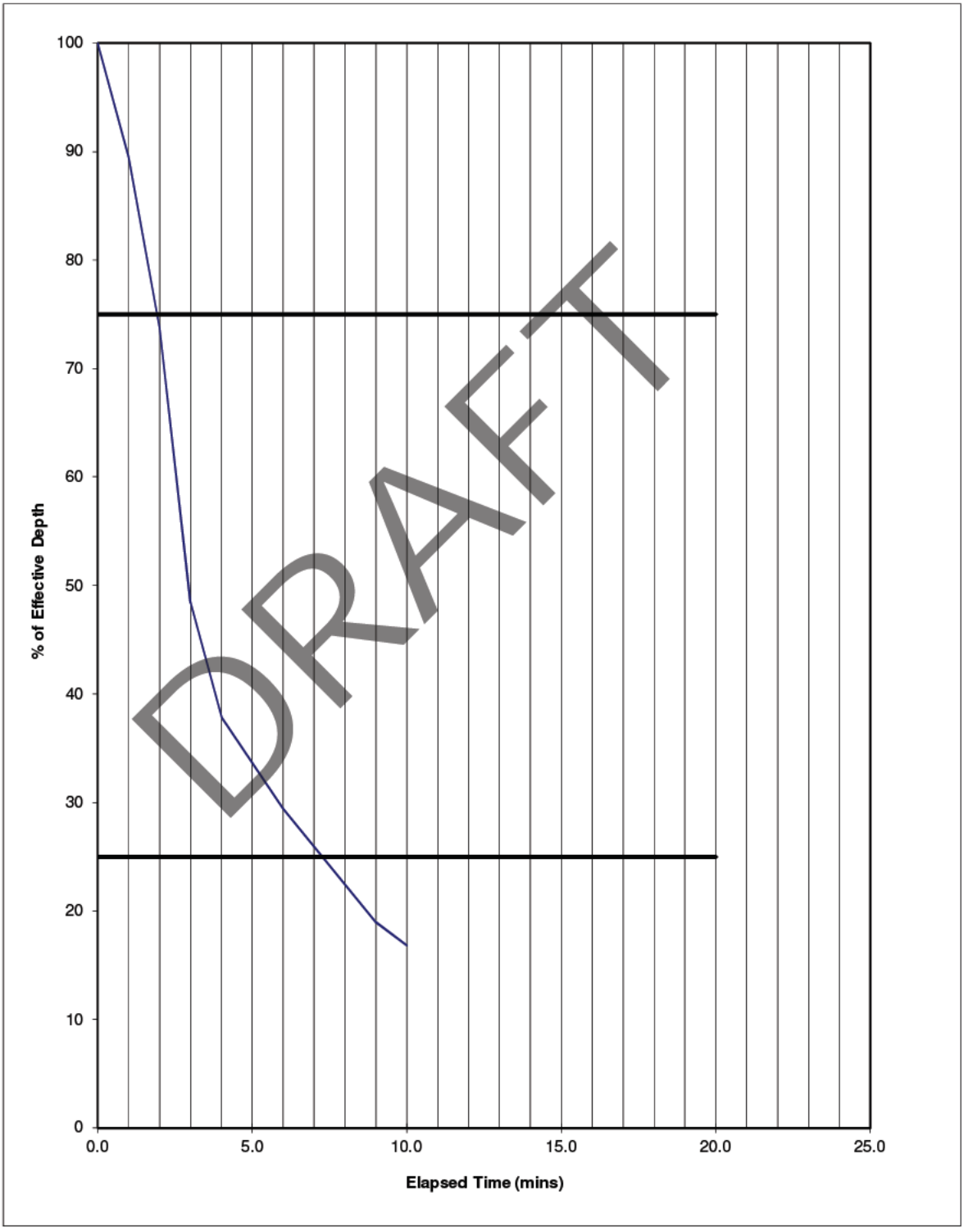
Initial depth from GL	=	0.650m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.713	0.888	2.00
25%	0.238	1.363	7.30
Vp75-25	=	0.570	m3
ap50	=	3.670	m2
tp75-25	=	5.300	min
Soil Infiltration, f	=	**4.88E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	2.00
tp25	=	7.30

Remarks

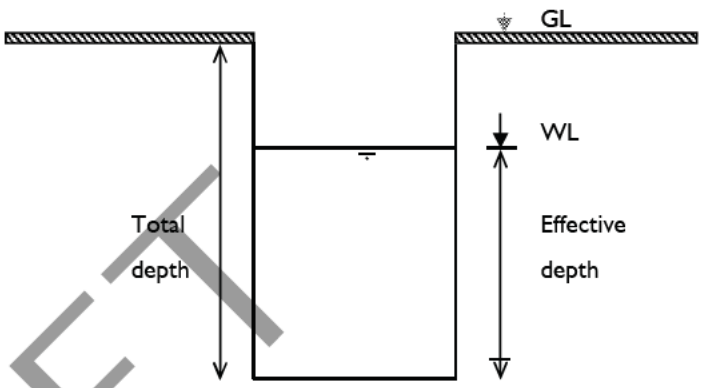
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.40	1.20	100.00
1.00	0.52	1.08	90.00
2.00	0.60	1.00	83.33
3.00	0.68	0.92	76.67
4.00	0.76	0.84	70.00
5.00	0.82	0.78	65.00
10.00	1.15	0.45	37.50
15.00	1.26	0.34	28.33
17.00	1.32	0.28	23.33
20.00	1.42	0.18	15.00
25.00	1.50	0.10	8.33

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.600	m
Effective depth (Head of Water)	=	1.200	m

DRAFT

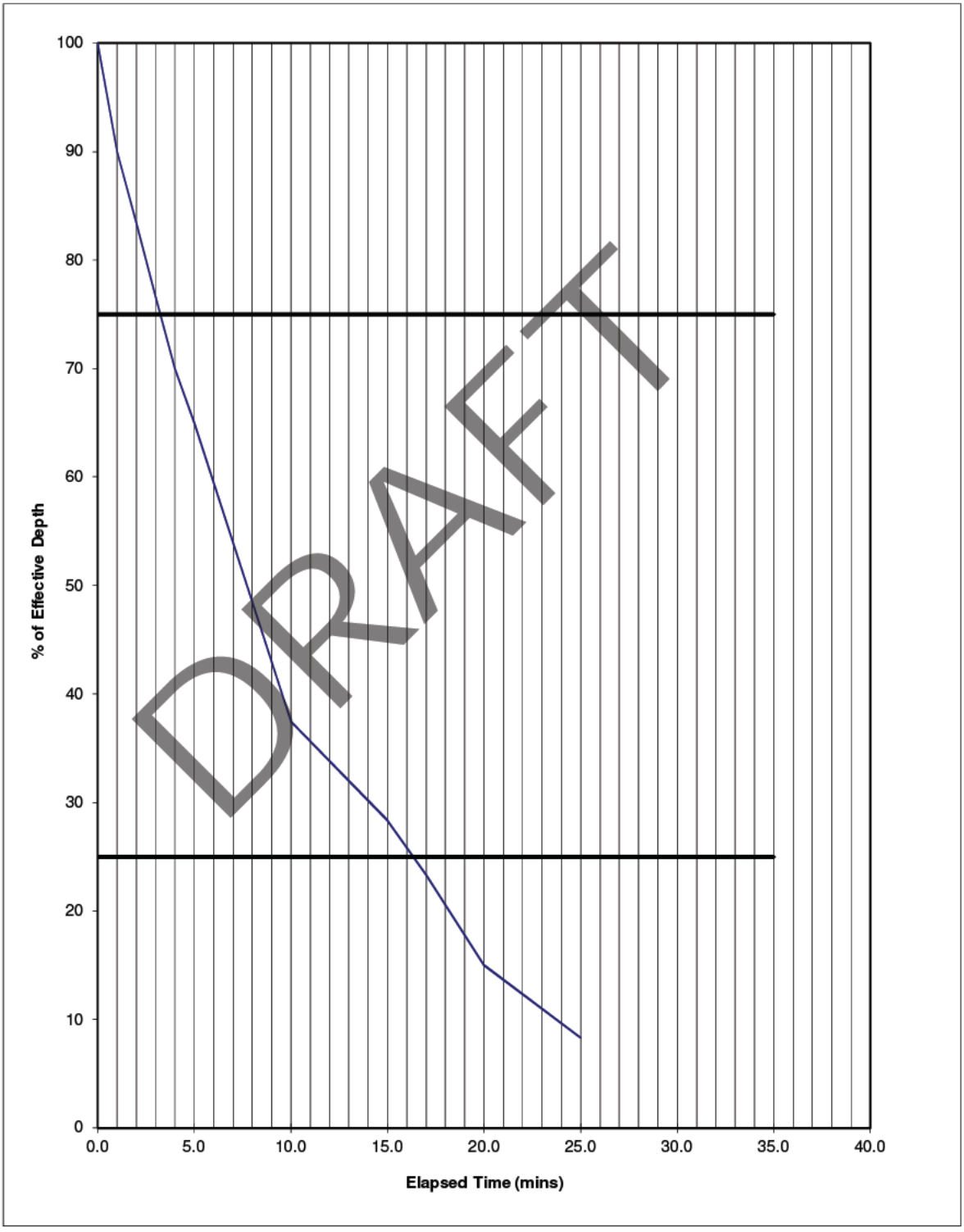
Initial depth from GL	=	0.400m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.900	0.700	3.25
25%	0.300	1.300	16.40
Vp75-25	=	0.720	m3
ap50	=	4.320	m2
tp75-25	=	13.150	min
Soil Infiltration, f	=	**2.11E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



tp75	=	3.25
tp25	=	16.40

Remarks

GEOTECHNICS

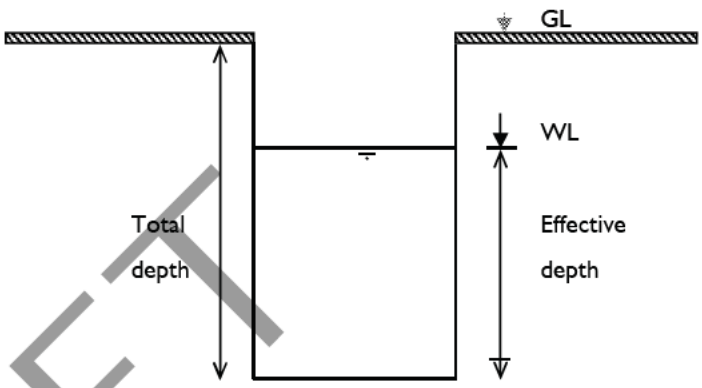
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.49	1.11	100.00
1.00	0.54	1.06	95.50
2.00	0.59	1.01	90.99
3.00	0.67	0.93	83.78
4.00	0.74	0.86	77.48
5.00	0.82	0.78	70.27
6.00	0.90	0.70	63.06
10.00	1.02	0.58	52.25
18.00	1.28	0.32	28.83
20.00	1.32	0.28	25.23
22.00	1.37	0.23	20.72

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.600 m
Effective depth (Head of Water)	=	1.110 m

DRAFT

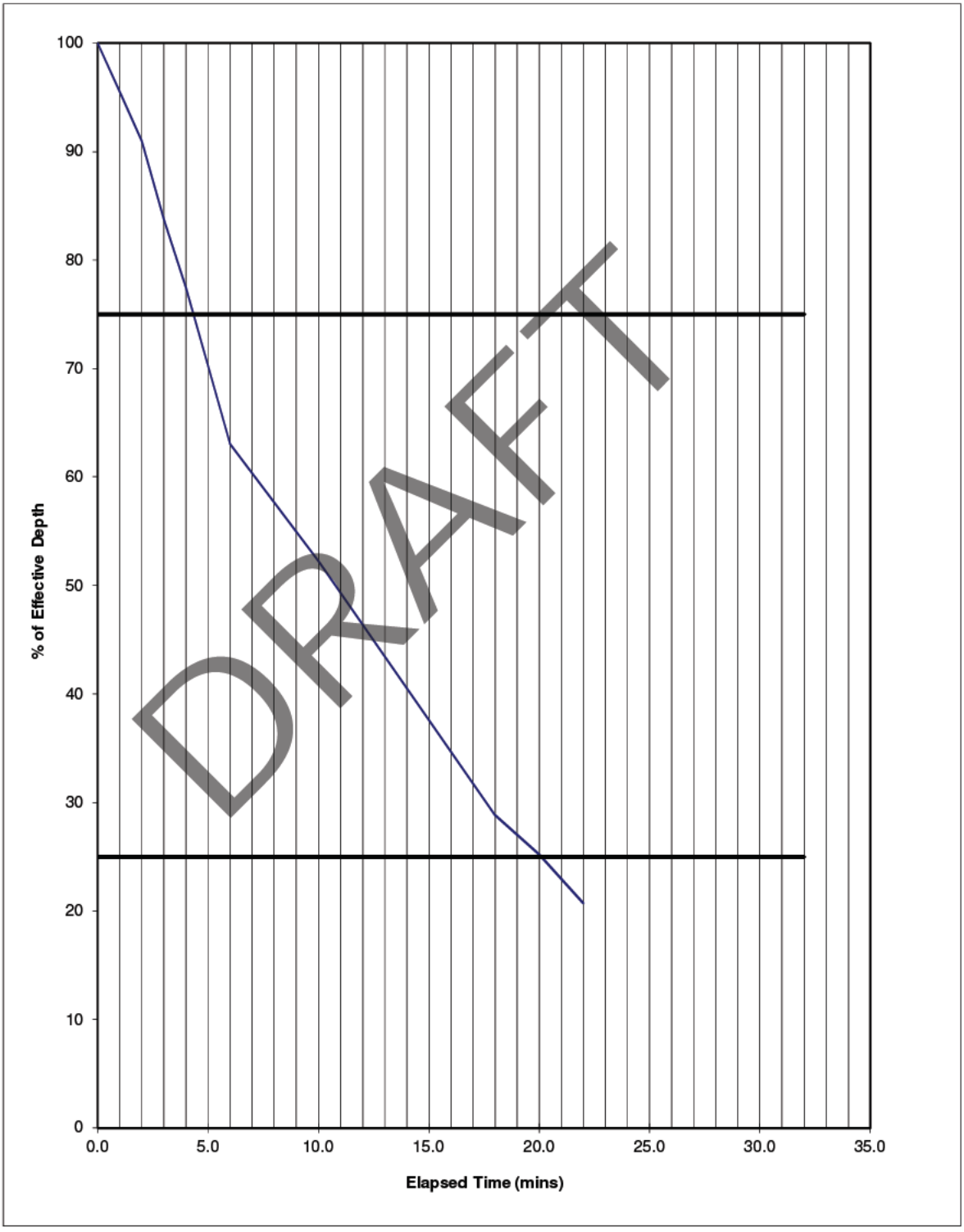
Initial depth from GL	=	0.490m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.833	0.768	5.40
25%	0.278	1.323	20.00
Vp75-25	=	0.666	m3
ap50	=	4.086	m2
tp75-25	=	14.600	min
Soil Infiltration, f	=	**1.86E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP24
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	5.40
tp25	=	20.00

Remarks

GEOTECHNICS

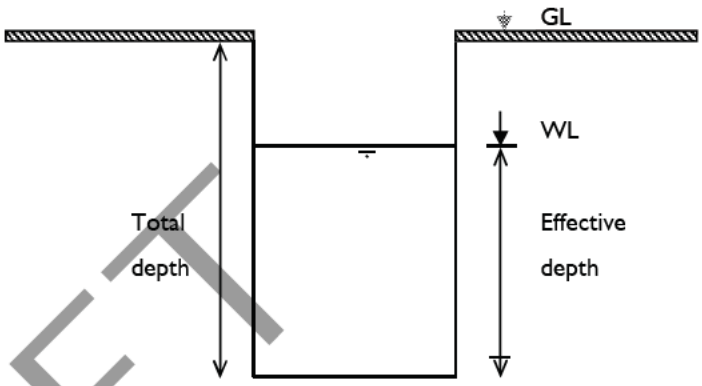
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.31	2.19	100.00
1.00	0.33	2.17	99.09
2.00	0.35	2.15	98.17
3.00	0.38	2.12	96.80
4.00	0.40	2.10	95.89
5.00	0.48	2.02	92.24
6.00	0.46	2.04	93.15
10.00	0.69	1.81	82.65
15.00	0.78	1.72	78.54
45.00	1.00	1.50	68.49

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	2.500 m
Effective depth (Head of Water)	=	2.190 m

DRAFT

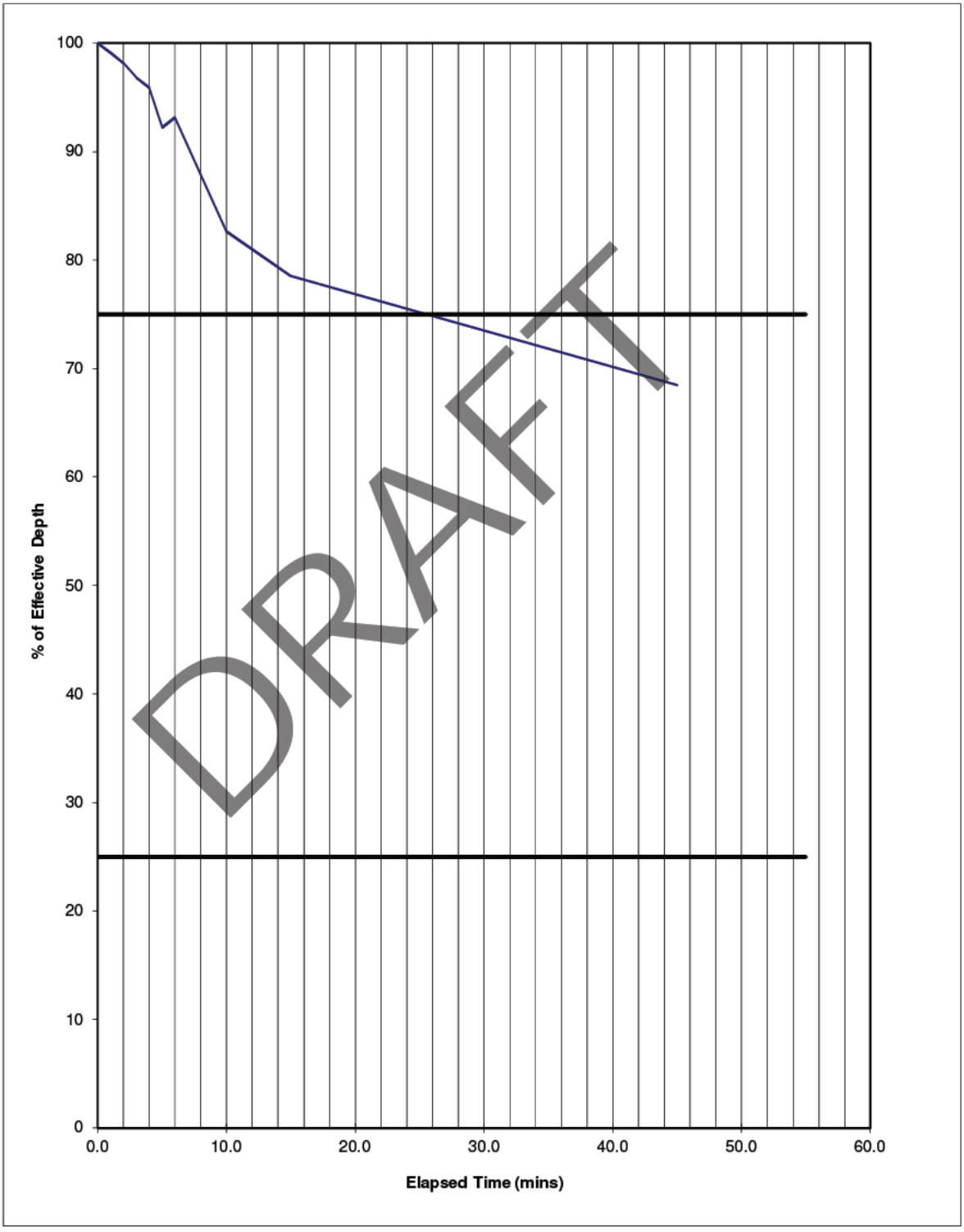
Initial depth from GL	=	0.310m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	1.643	0.858	
25%	0.548	1.953	
Vp75-25	=	m3	
ap50	=	m2	
tp75-25	=	min	
Soil Infiltration, f	=	*	m/sec

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=
tp25	=

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

GEOTECHNICS

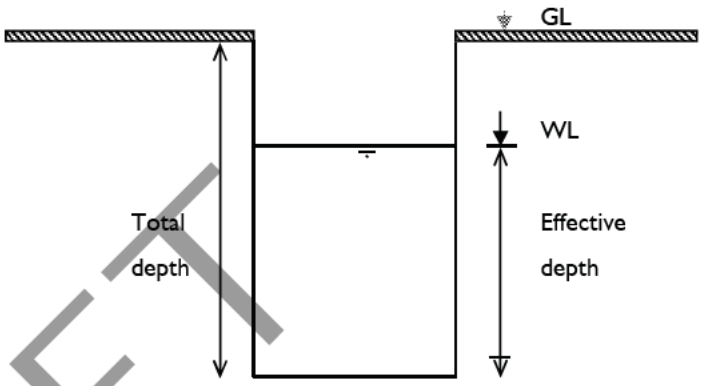
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.32	2.18	100.00
15.00	0.42	2.08	95.41
20.00	0.49	2.01	92.20
25.00	0.58	1.92	88.07
60.00	0.69	1.81	83.03
90.00	0.85	1.65	75.69

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	2.500	m
Effective depth (Head of Water)	=	2.180	m

DRAFT

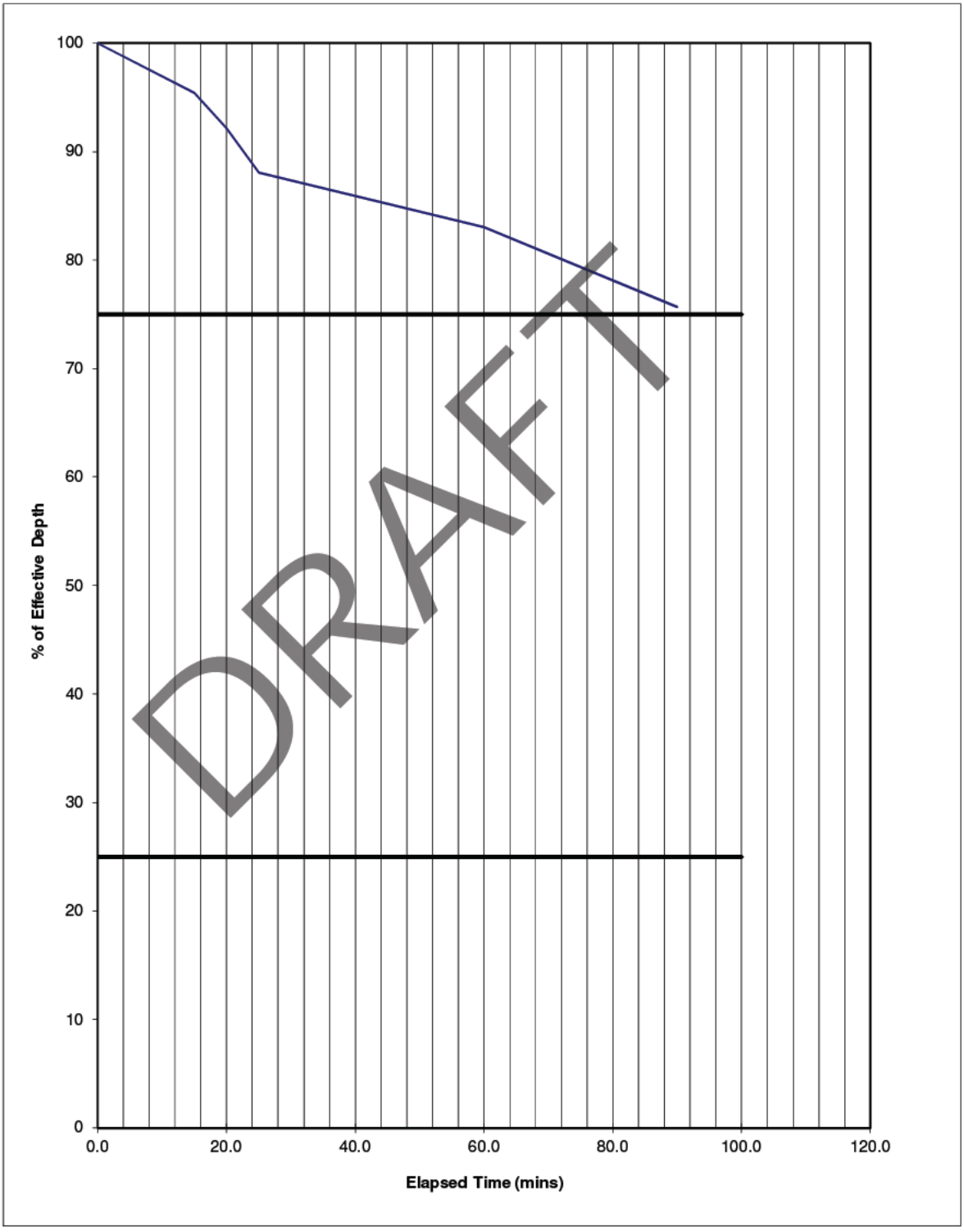
Initial depth from GL	=	0.320m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	1.635	0.865	
25%	0.545	1.955	
Vp75-25	=		m3
ap50	=		m2
tp75-25	=		min
Soil Infiltration, f	=	*	m/sec

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=
tp25	=

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

GEOTECHNICS

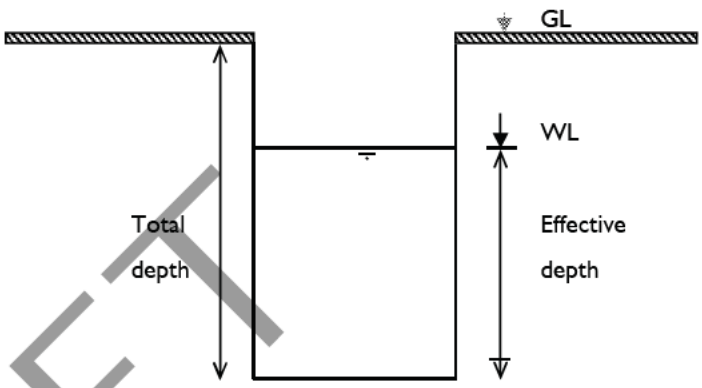
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.30	2.20	100.00
12.00	0.35	2.15	97.73
20.00	0.43	2.07	94.09
25.00	0.46	2.04	92.73
60.00	0.66	1.84	83.64
90.00	0.87	1.63	74.09

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	2.500	m
Effective depth (Head of Water)	=	2.200	m

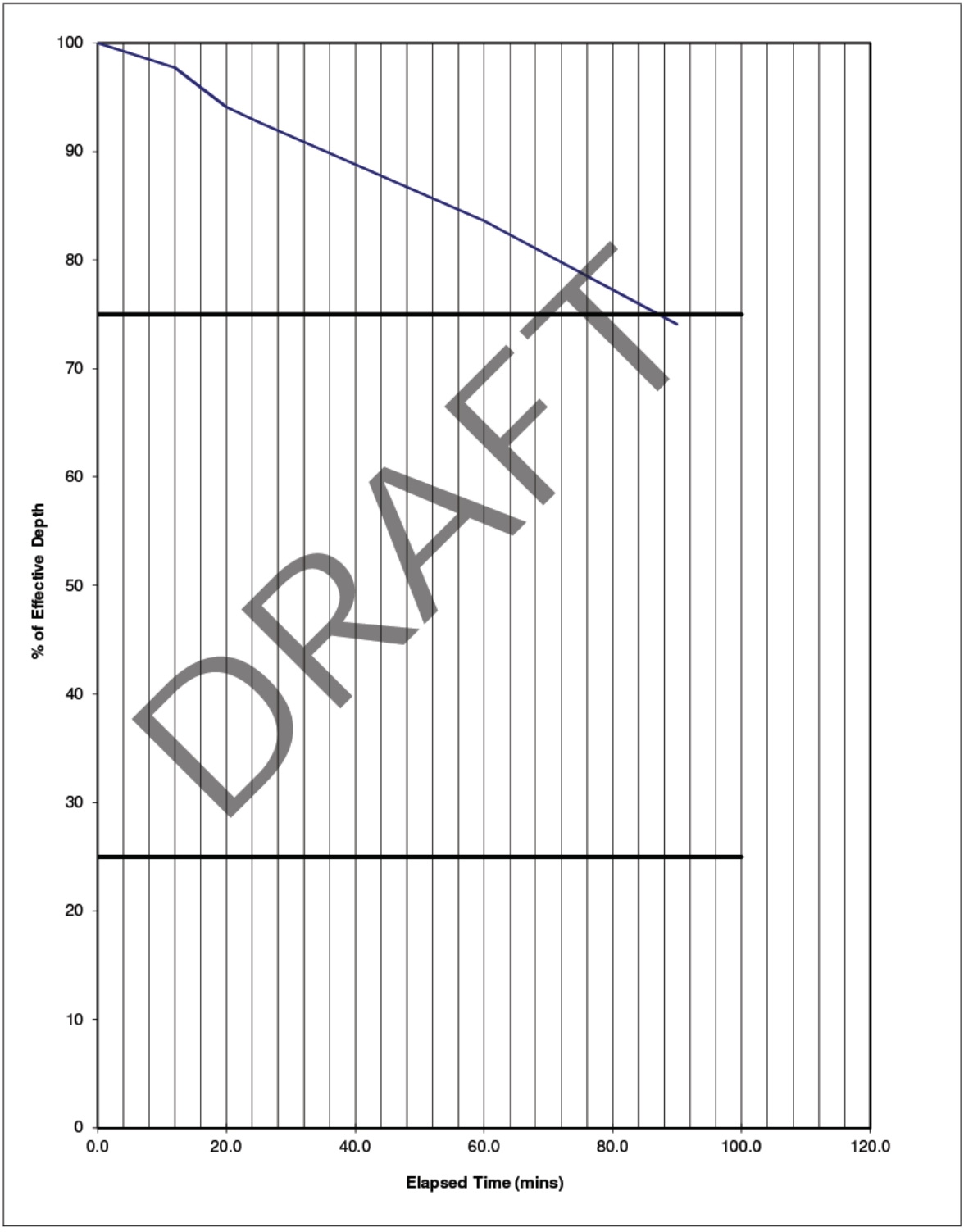
DRAFT

Initial depth from GL	=	0.300m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	1.650	0.850	
25%	0.550	1.950	
Vp75-25	=		m3
ap50	=		m2
tp75-25	=		min
Soil Infiltration, f	=	*	m/sec

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

INSITU TESTING - Soakaway Test

Project	Aquind Drainage Design Additional GI	Trial Pit	TP25
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=
tp25	=

Remarks Unable to claculate infiltration rate due to slow rate of soakage.

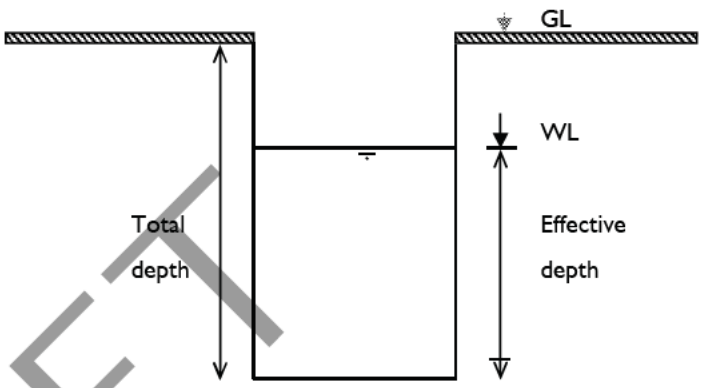
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	17/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	2.00	0.50	100.00
1.00	2.04	0.46	92.00
2.00	2.08	0.42	84.00
3.00	2.10	0.40	80.00
4.00	2.16	0.34	68.00
5.00	2.18	0.32	64.00
10.00	2.27	0.23	46.00
15.00	2.37	0.13	26.00

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	2.500	m
Effective depth (Head of Water)	=	0.500	m

DRAFT

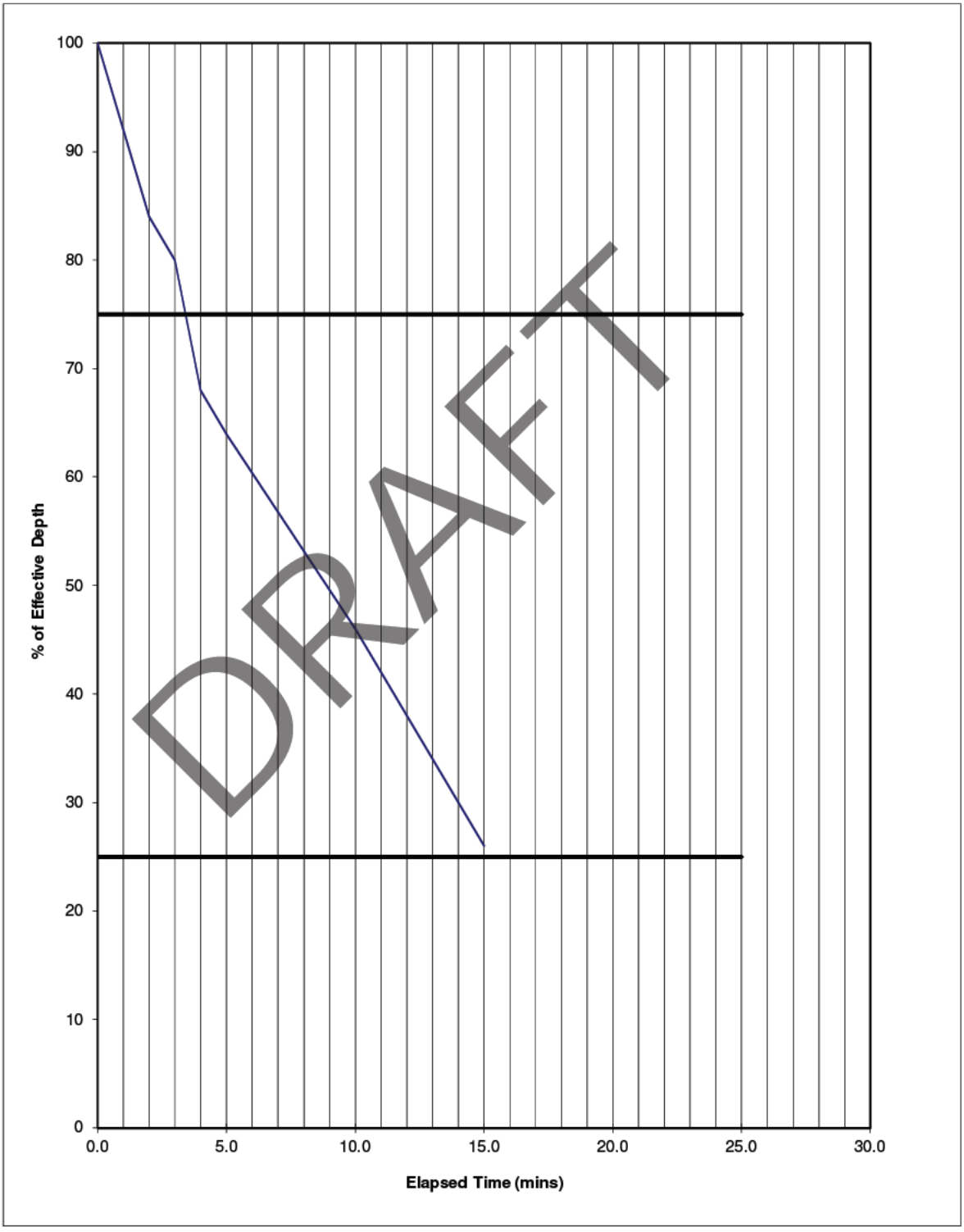
Initial depth from GL	=	2.000m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.375	2.125	3.50
25%	0.125	2.375	15.50
Vp75-25	=	0.300	m3
ap50	=	2.500	m2
tp75-25	=	12.000	min
Soil Infiltration, f	=	**1.67E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	17/11/2020



DRAFT

tp75	=	3.50
tp25	=	15.50

Remarks

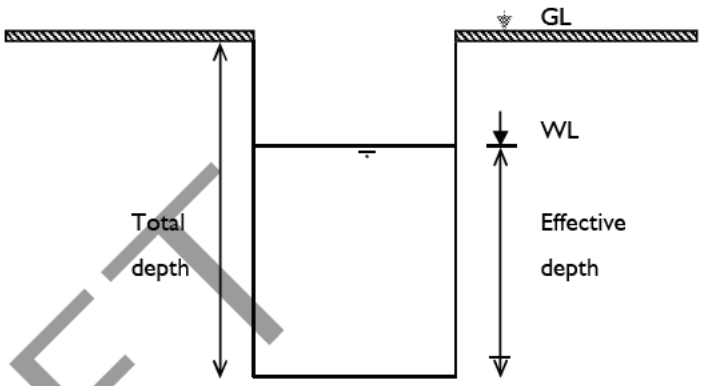
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	1.51	0.99	100.00
1.00	1.61	0.89	89.90
3.00	1.70	0.80	80.81
10.00	2.10	0.40	40.40
34.00	2.50	0.00	0.00

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	2.500	m
Effective depth (Head of Water)	=	0.990	m

DRAFT

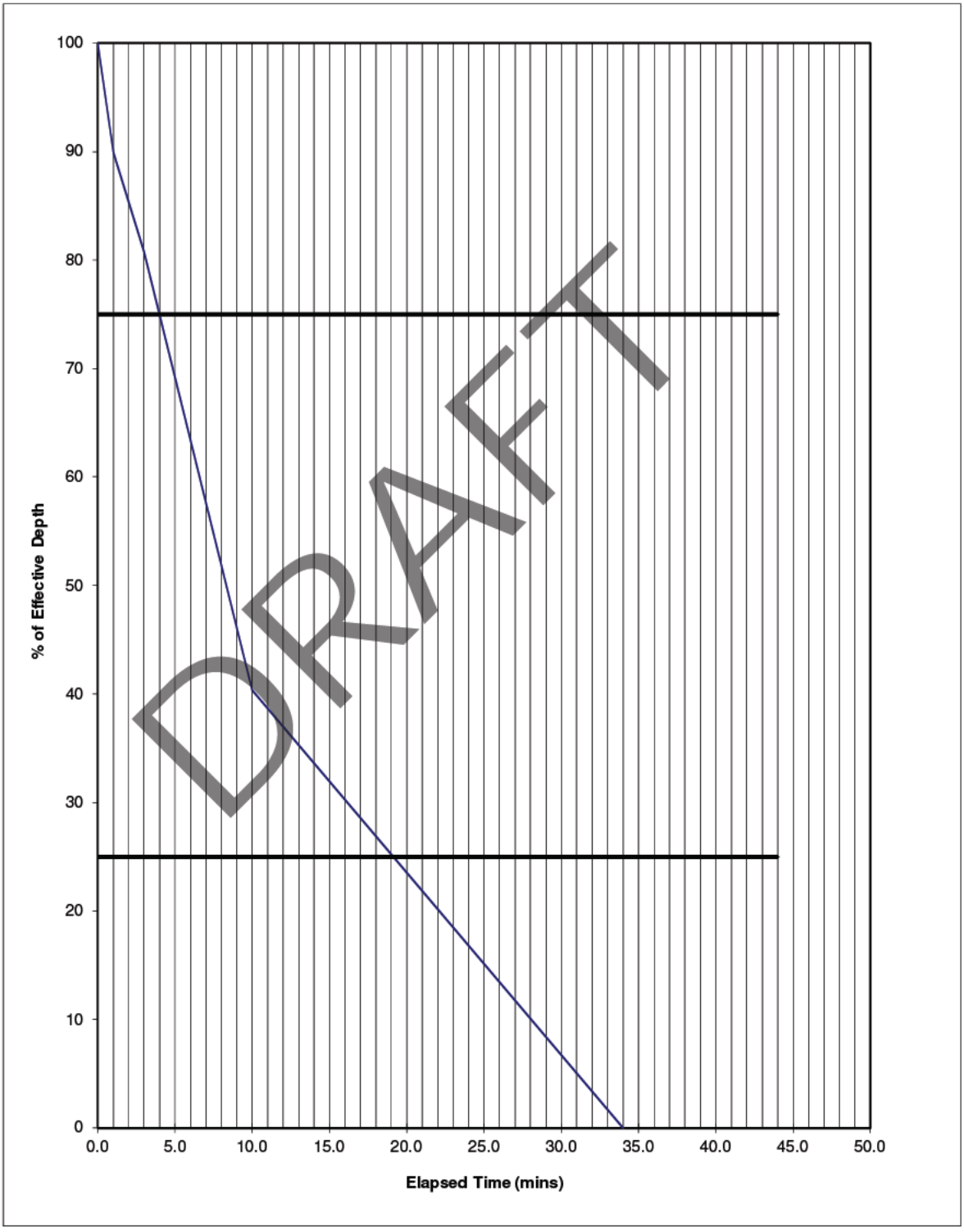
Initial depth from GL	=	1.510m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.743	1.758	4.00
25%	0.248	2.253	19.20
Vp75-25	=	0.594	m3
ap50	=	3.774	m2
tp75-25	=	15.200	min
Soil Infiltration, f	=	**1.73E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



tp75	=	4.00
tp25	=	19.20

Remarks

GEOTECHNICS

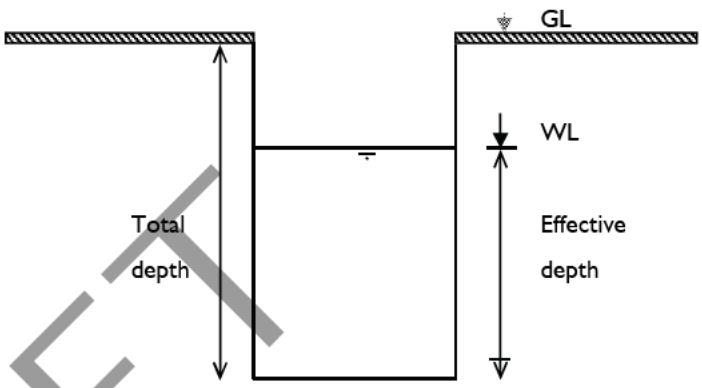
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	1.48	1.02	100.00
2.00	1.56	0.94	92.16
4.00	1.77	0.73	71.57
6.00	1.86	0.64	62.75
35.00	2.50	0.00	0.00

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	2.500	m
Effective depth (Head of Water)	=	1.020	m

DRAFT

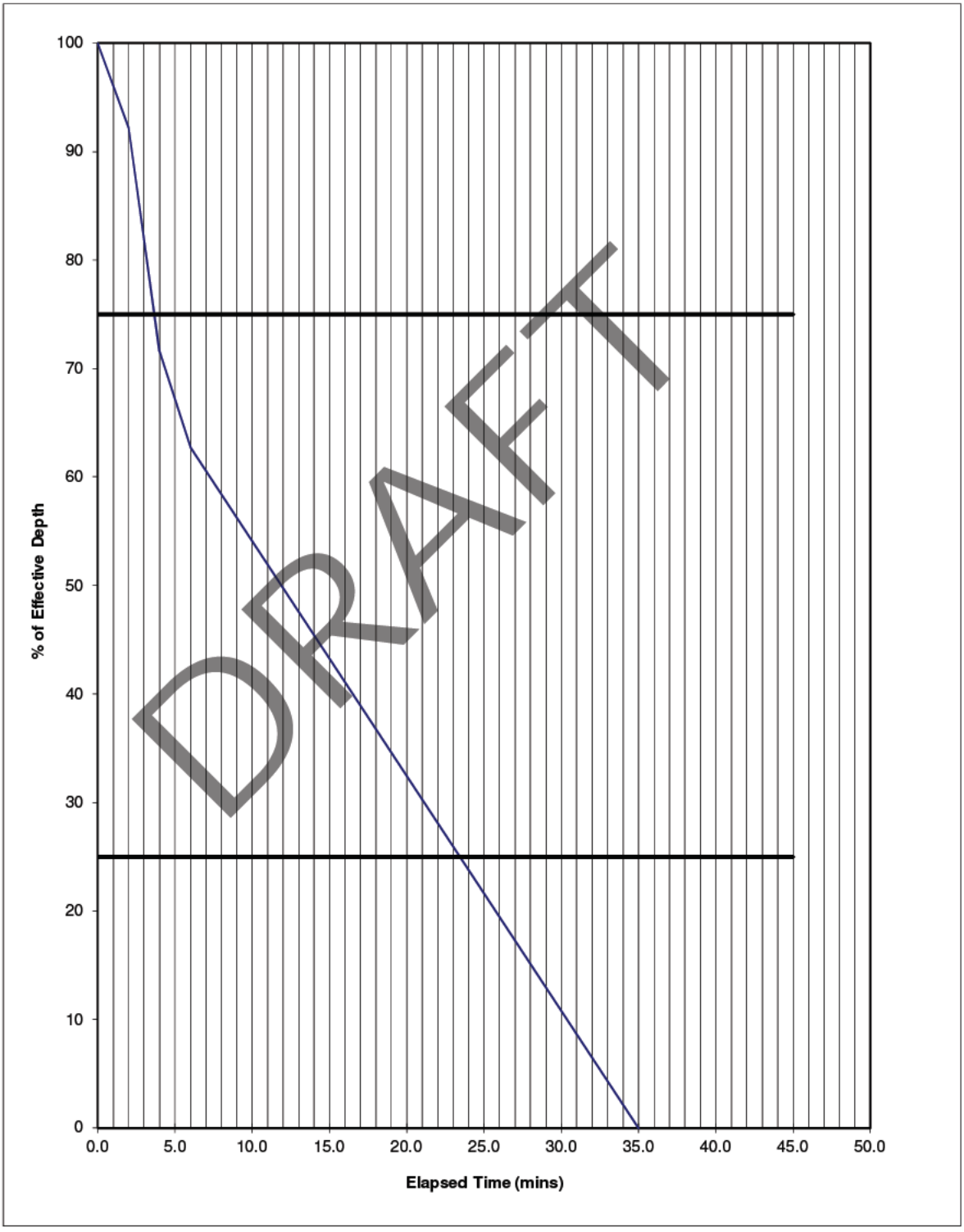
Initial depth from GL	=	1.480m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.765	1.735	3.80
25%	0.255	2.245	23.50
Vp75-25	=	0.612	m3
ap50	=	3.852	m2
tp75-25	=	19.700	min
Soil Infiltration, f	=	**1.34E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP26
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



tp75	=	3.80
tp25	=	23.50

Remarks

GEOTECHNICS

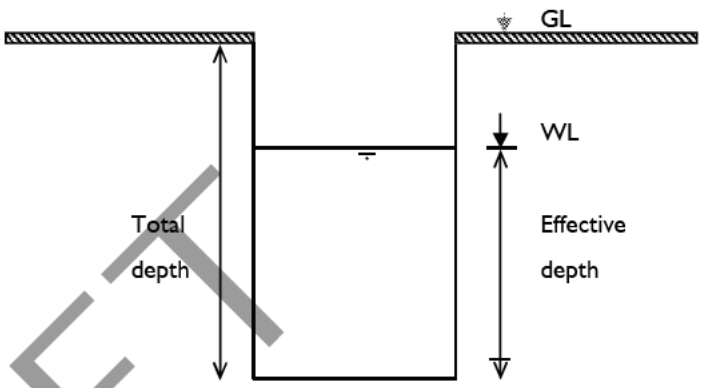
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	17/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	1.30	0.26	100.00
1.00	1.34	0.22	84.62
2.00	1.37	0.19	73.08
3.00	1.40	0.16	61.54
4.00	1.44	0.12	46.15
5.00	1.44	0.12	46.15
10.00	1.52	0.04	15.38

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.560	m
Effective depth (Head of Water)	=	0.260	m

DRAFT

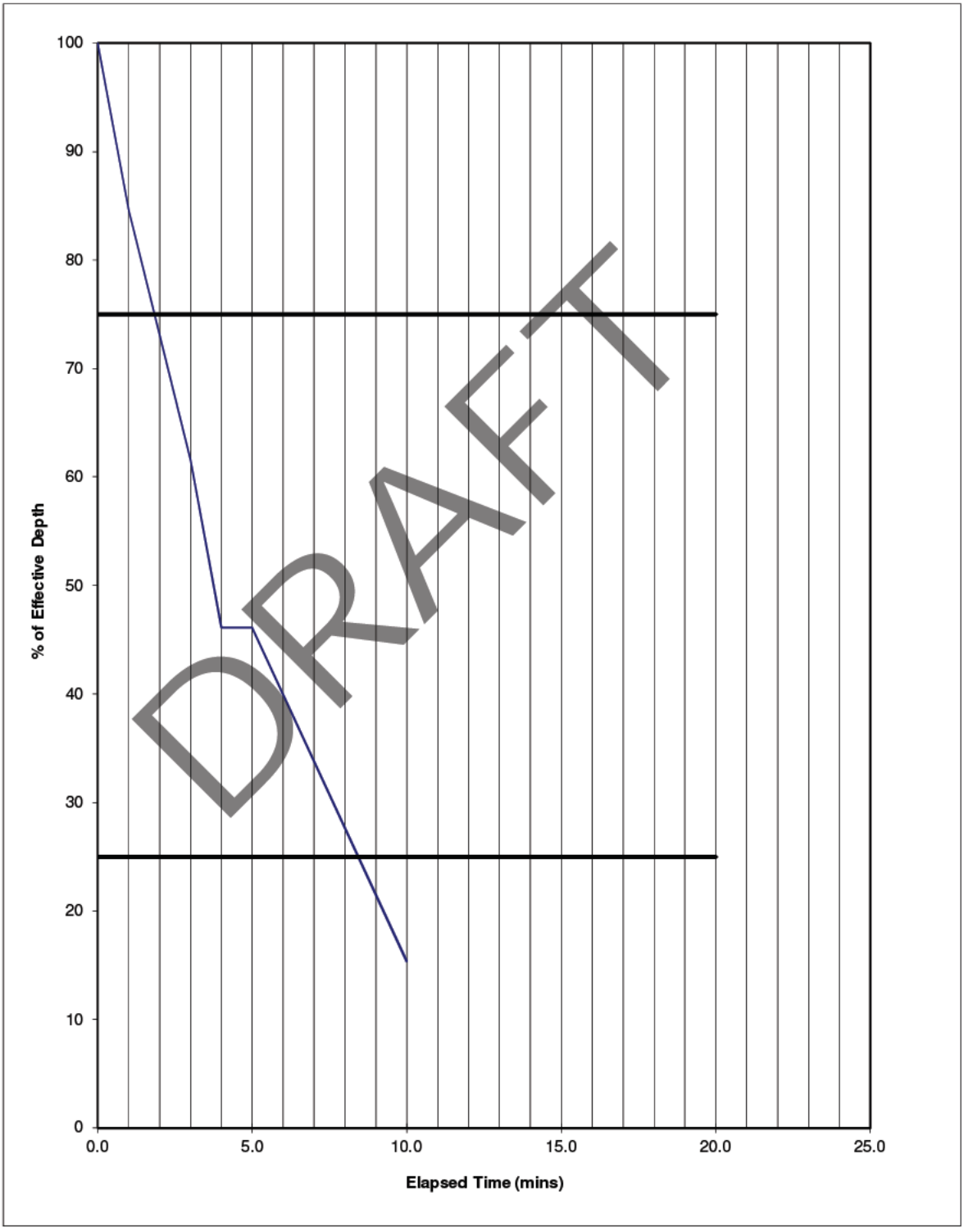
Initial depth from GL	=	1.300m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.195	1.365	1.80
25%	0.065	1.495	8.45
Vp75-25	=	0.156	m3
ap50	=	1.876	m2
tp75-25	=	6.650	min
Soil Infiltration, f	=	**2.08E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	17/11/2020



DRAFT

tp75	=	1.80
tp25	=	8.45

Remarks

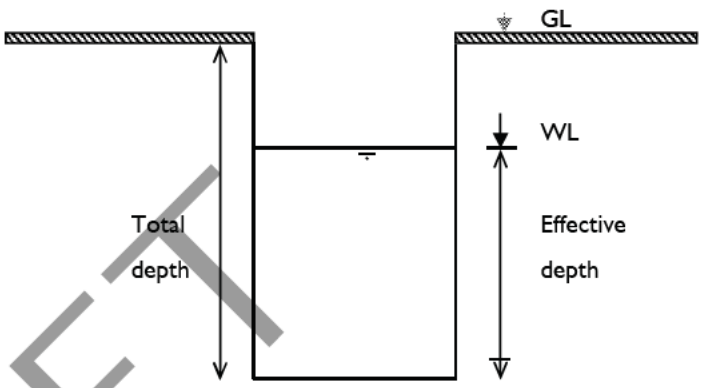
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.73	0.83	100.00
1.00	0.90	0.66	79.52
3.00	1.09	0.47	56.63
6.00	1.20	0.36	43.37
9.00	1.30	0.26	31.33
11.00	1.34	0.22	26.51
17.00	1.48	0.08	9.64

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000	m
Trial pit width	=	0.600	m
Trial pit depth	=	1.560	m
Effective depth (Head of Water)	=	0.830	m

DRAFT

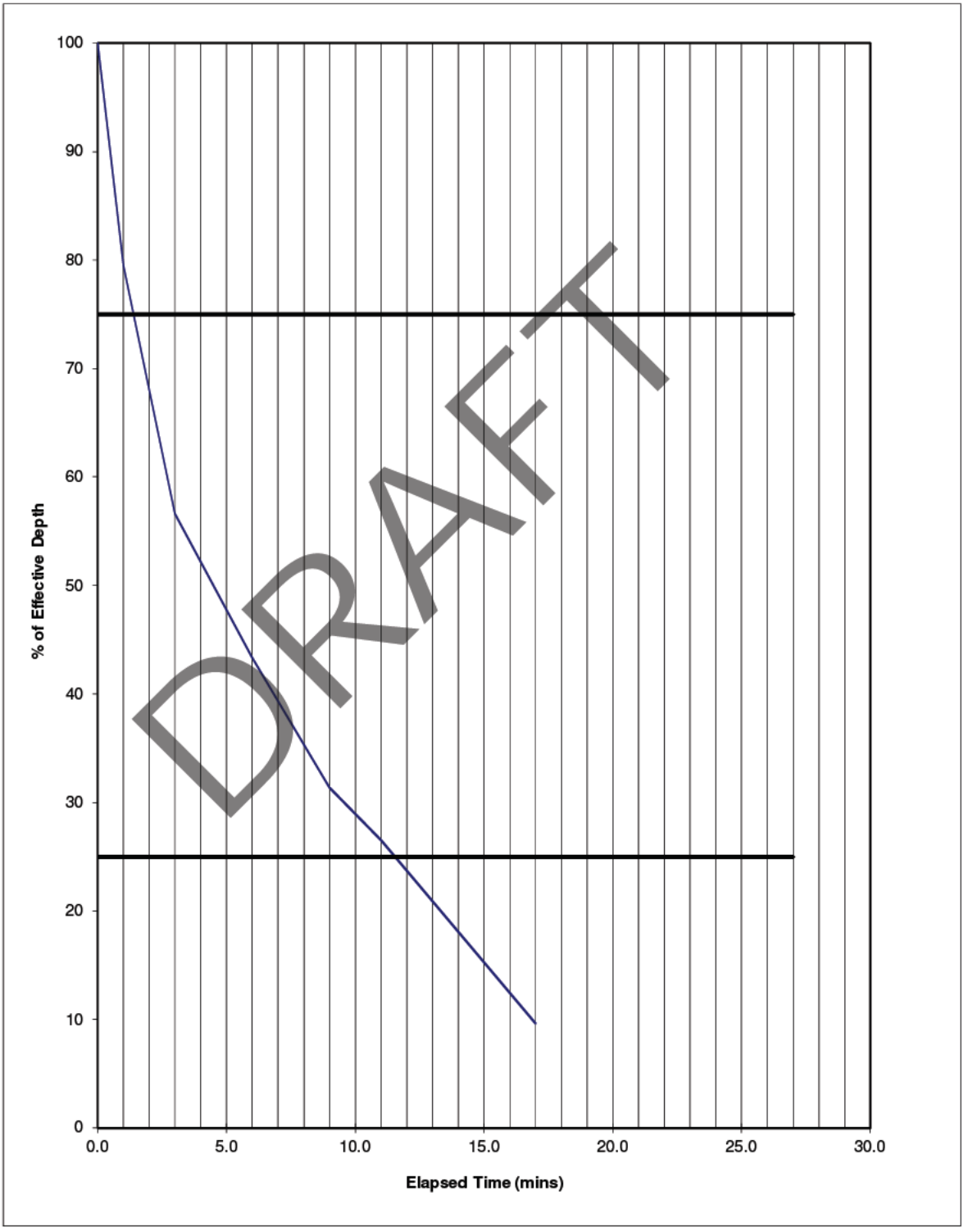
Initial depth from GL	=	0.730m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.623	0.938	1.45
25%	0.208	1.353	11.50
Vp75-25	=	0.498	m3
ap50	=	3.358	m2
tp75-25	=	10.050	min
Soil Infiltration, f	=	**2.46E-04**	m/sec

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	1.45
tp25	=	11.50

Remarks

GEOTECHNICS

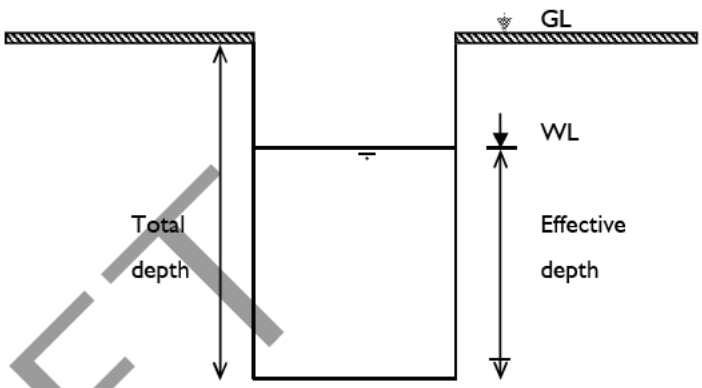
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.54	1.02	100.00
1.00	0.67	0.89	87.25
2.00	0.76	0.80	78.43
3.00	0.86	0.70	68.63
4.00	0.92	0.64	62.75
5.00	0.97	0.59	57.84
10.00	1.02	0.54	52.94
16.00	1.45	0.11	10.78

TRIAL PIT SOAKAWAY



Trial pit length	=	2.000 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.560 m
Effective depth (Head of Water)	=	1.020 m

DRAFT

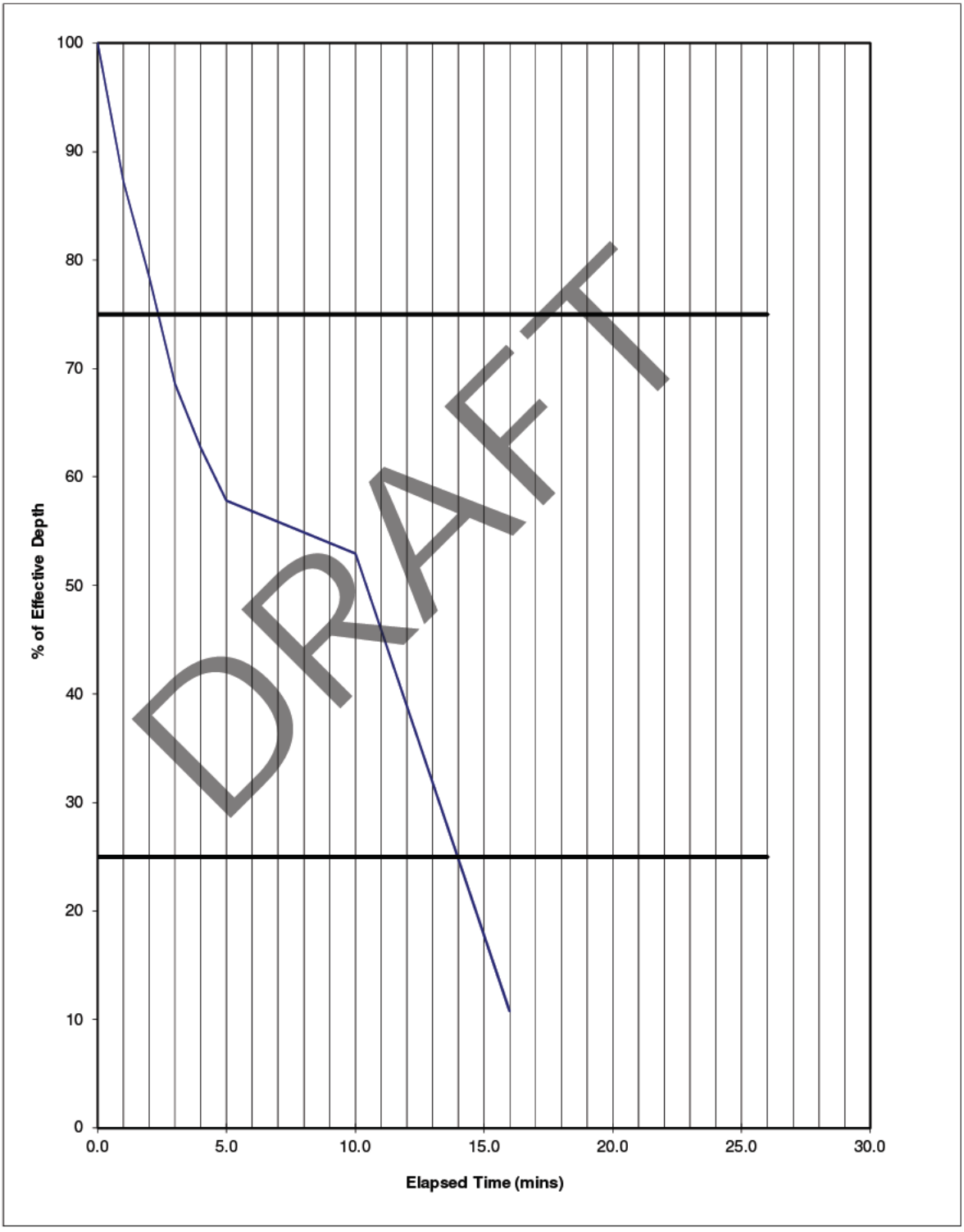
Initial depth from GL	=	0.540m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.765	0.795	2.30
25%	0.255	1.305	14.00
Vp75-25	=	0.612 m3	
ap50	=	3.852 m2	
tp75-25	=	11.700 min	
Soil Infiltration, f	=	**2.26E-04** m/sec	

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP27
		Test No	3
		Project No	PE201667
Client	WSP UK Limited	Date	18/11/2020



DRAFT

tp75	=	2.30
tp25	=	14.00

Remarks

GEOTECHNICS

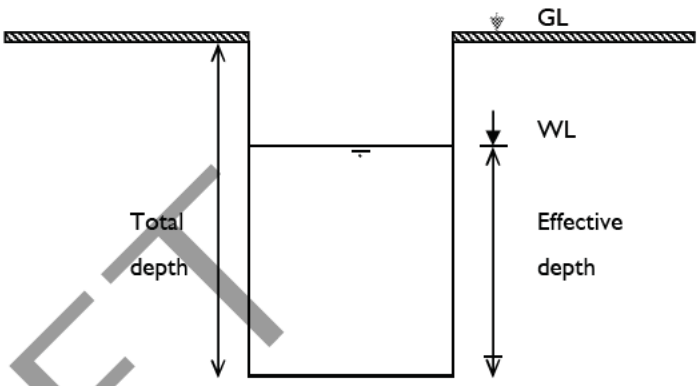
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP28
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	19/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.89	0.81	100.00
1.00	0.79	0.91	112.35
2.00	1.01	0.69	85.19
3.00	1.08	0.62	76.54
5.00	1.19	0.51	62.96
10.00	1.31	0.39	48.15
17.00	1.50	0.20	24.69

TRIAL PIT SOAKAWAY



Trial pit length	=	2.200 m
Trial pit width	=	0.600 m
Trial pit depth	=	1.700 m
Effective depth (Head of Water)	=	0.810 m

DRAFT

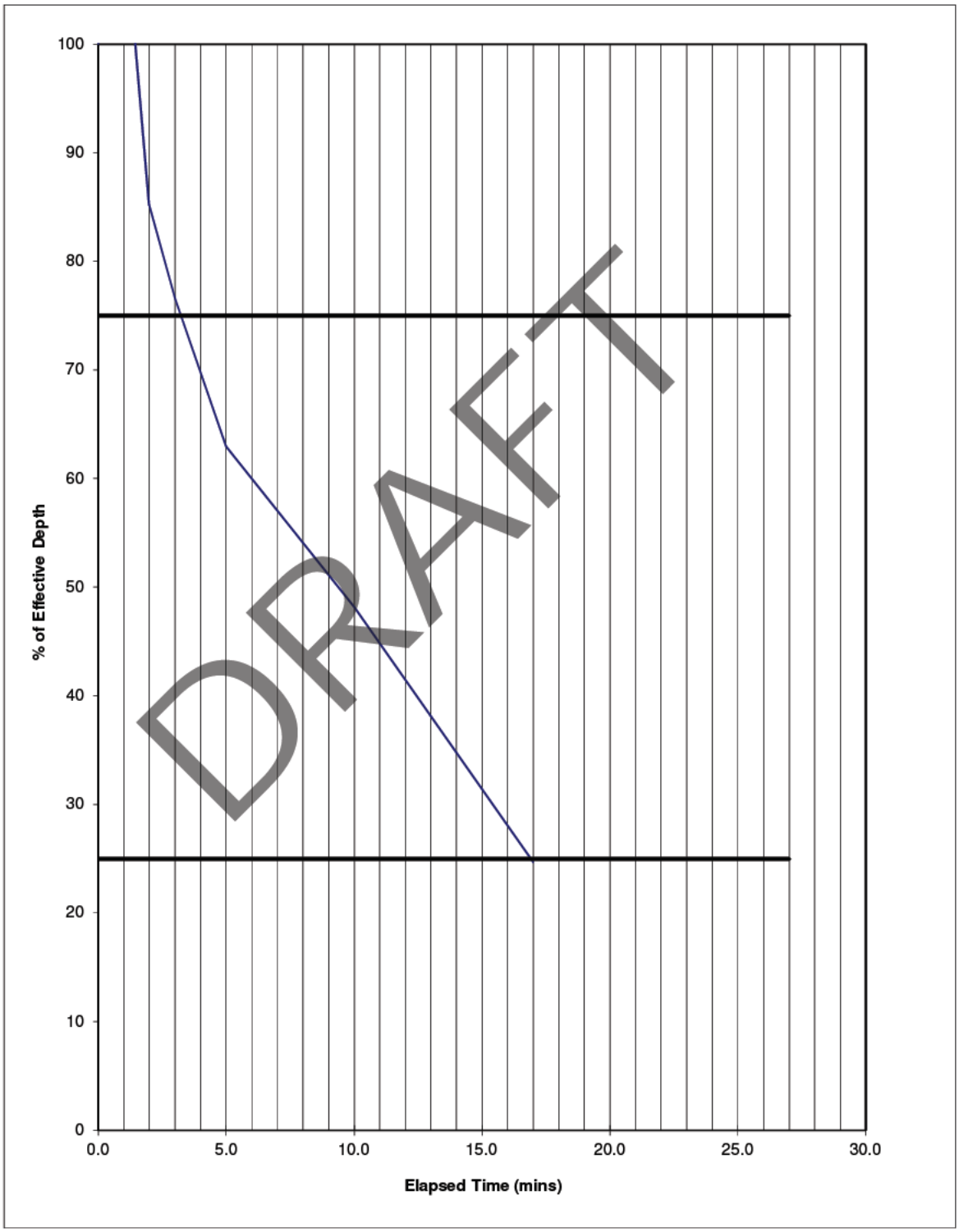
Initial depth from GL	=	0.890m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.608	1.093	3.30
25%	0.203	1.498	16.90
Vp75-25	=	0.535 m3	
ap50	=	3.588 m2	
tp75-25	=	13.600 min	
Soil Infiltration, f	=	**1.83E-04** m/sec	

Remarks

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP28
		Test No	1
		Project No	PE201667
Client	WSP UK Limited	Date	19/11/2020



tp75	=	3.30
tp25	=	16.90

Remarks

GEOTECHNICS

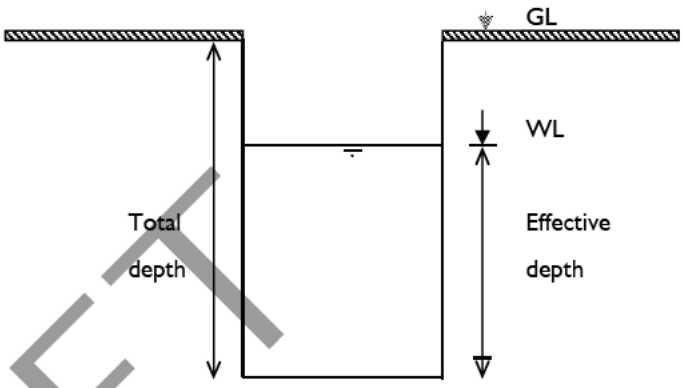
INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP28
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	13/11/2020

ELAPSED TIME (mins)	DEPTH of water below ground level (m)	HEAD (m)	HEAD (%)
0.00	0.75	0.85	100.00
1.00	0.85	0.75	88.24
2.00	0.91	0.69	81.18
3.00	0.99	0.61	71.76
6.00	1.09	0.51	60.00
11.00	1.21	0.39	45.88
13.00	1.23	0.37	43.53

TRIAL PIT SOAKAWAY



Trial pit length	=	2.200	m
Trial pit width	=	1.000	m
Trial pit depth	=	1.600	m
Effective depth (Head of Water)	=	0.850	m

DRAFT

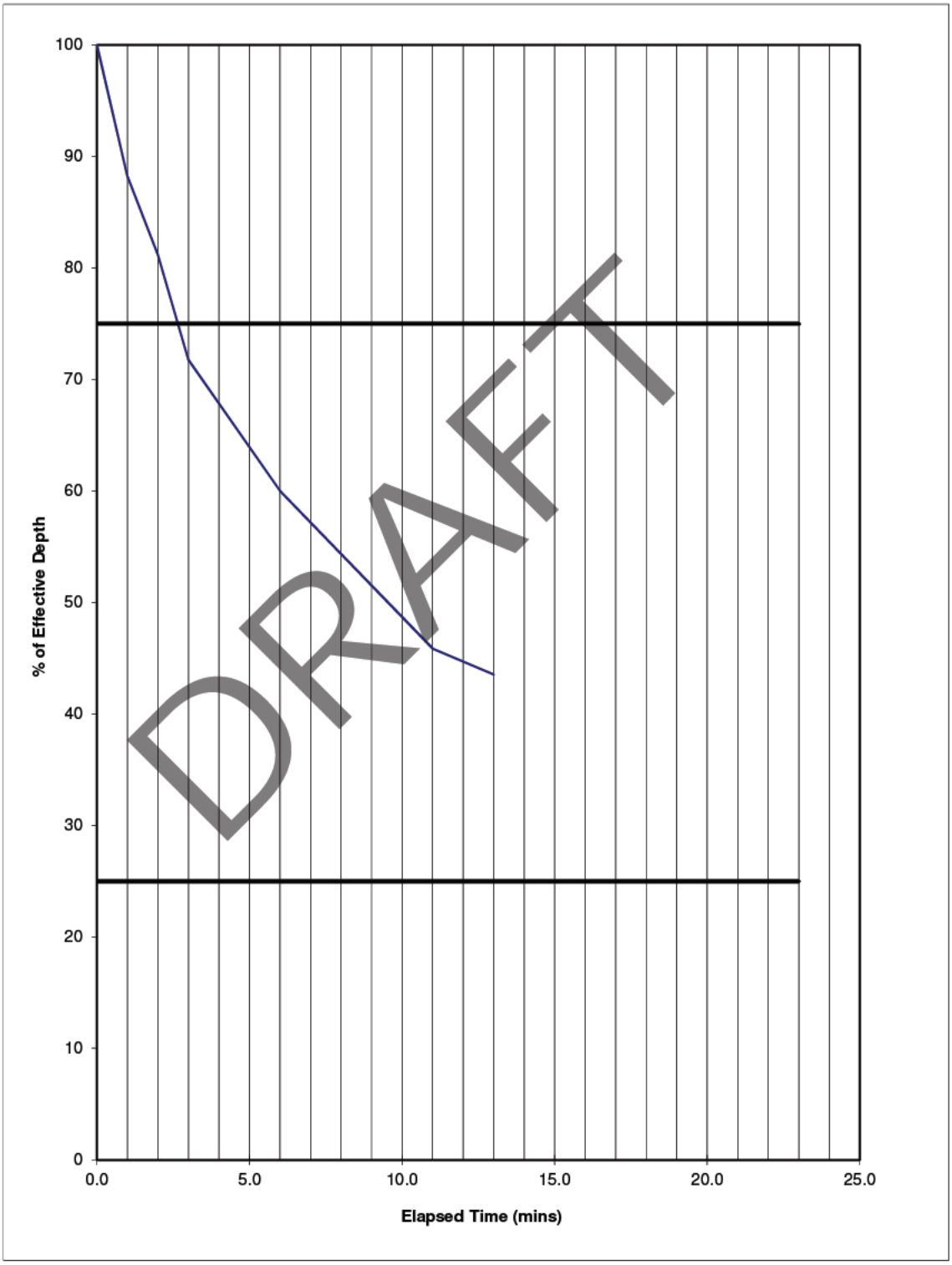
Initial depth from GL	=	0.750m	
% of effective depth	Head (m)	Depth from GL (m)	Time (mins)
75%	0.638	0.963	2.75
25%	0.213	1.388	25.00
Vp75-25	=	0.935	m3
ap50	=	4.920	m2
tp75-25	=	22.250	min
Soil Infiltration, f	=	**1.42E-04**	m/sec

Remarks Trial Pit collapsed prior to end of soakaway test. Infiltration Rate is approximate only based on extrapolated value.

INSITU TESTING - Soakaway Test

Form INS009 Rev 7

Project	Aquind Drainage Design Additional GI	Trial Pit	TP28
		Test No	2
		Project No	PE201667
Client	WSP UK Limited	Date	13/11/2020



DRAFT

tp75	=	2.75
tp25	=	25.00

Remarks Trial Pit collapsed prior to end of soakaway test. Infiltration Rate is approximate only based on extrapolated value.

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APPENDIX 10

Investigation Techniques and General Notes

INVESTIGATION TECHNIQUES

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

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GENERAL NOTES

1. *The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.*

2. *Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.*

3. *The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.*

4. *The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.*

5. *The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.*

6. *Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.*

7. *The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.*

8. *The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.*

9. *Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.*

10. *Any unavoidable variations from specified procedures are identified in the report.*

11. *Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated*

12. *All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.*

13. *Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.*

14. *The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.*

15. *Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.*

16. *The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.*

17. *Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.*

18. *Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.*

19. *Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.*

20. *Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.*

21. *The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.*

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