ATLANTIC RECYCLING ECOPARK PAVING PROJECT

CQA VALIDATION REPORT

Report Number 1379r5v1d1115

Commissioned by

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1 INTRODUCTION

Atlantic Recycling Ltd (Atlantic) operates a waste transfer station on land at Newton Farm, Rhymney, Cardiff (Figure 1). Its associated company Neal Soil Suppliers operates a waste soil processing facility on adjacent land. Both activities require significant areas of land to be provided with infrastructure in order to reduce the risk of pollution to the protected watercourses that run through the sites. Environmental Permits require that areas used for storing non-hazardous and hazardous waste should be provided with an impermeable surface with a sealed drainage system. Until recently, small areas of the site met this requirement whilst large areas remained in need of paving.

This report describes the construction work and quality assurance monitoring carried out during the placement of a large cement bound aggregate pad measuring approximately 120 x 75m with associated drainage. This new impermeable surface with enclosed drainage system is located on the northern side of the Atlantic Waste site in an area known as Field 1, as shown on Figure 2. It is a continuation of a larger slab which was placed during the summer of 2015.

Prior to this current phase of construction the first phase of works covered an area of approximately 13,500m^2 and was documented in Geotechnology Report 1379r4v1d0815. In order to create a sealed drainage system Phase 2 has tied into the western edge of Phase 1. Although the drainage culvert on the downslope edge of the slab has been extended as part of Phase 2, both phases utilise a common outlet point and interceptor systems installed during Phase 1.

The construction of a third phase of works is due to commence to pave the remaining 6,700m^2 of Field 1. The third phase will tie-in to the existing phases in order to create a completely sealed drainage system and will utilise the outlet and interceptors already in place.

1.1 Project Organisation

The client for the contract is Atlantic Recycling Ltd.

The Principal Designer for the works is Geotechnology Ltd.

The Principal Contractor for the works is Neal Soil Suppliers Ltd.

The CQA Inspector for the works is Keir Thomas of Geotechnology Ltd.

Other Contractors involved in the project are:

- Construction of the Impermeable Slab – Darlow Lloyd and Sons Ltd.
- Construction of the Impermeable Slab – DCM Roadways
- Construction of Drainage Channel - Thames Valley Construction Ltd.
- Concrete Kerb Detail on Impermeable Slab – Thames Valley Construction Ltd.
- CBR Testing of Formation – Southern Ground Testing
- Coring for Testing of Impermeable Slab – Apex Testing Solutions

Laboratories used for validation testing were:

- Concrete Cube and PSD Testing - Apex Testing Solutions

1.2 CQA Plan and Specification

The construction of the impermeable surface and sealed drainage system was carried out in accordance with the Design and Specification (Geotechnology Report Ref: 1379r1v1d1114) and the Construction Quality Assurance (CQA) Plan (Geotechnology Ref: 1379r3v1d0615). This report should be read in conjunction with these two documents.

These reports provide the approach to be adopted for the approval of material suppliers, conformance testing of the materials supplied, and monitoring of all processes involved with the construction of the impermeable pad and sealed drainage system.

The CQA Plan was formally submitted to Natural Resources Wales for review and approval on 22 June 2015.

2 SUMMARY OF WORKS COMPLETED

2.1 Delays and Timescales

Works on formation preparation began in August 2015 and were completed by the end of the first week of September 2015. Once levels had been brought up to formation and CBR tests had been carried out, the 200mm thick layer of unbound aggregate was placed over the whole phase. This work was largely completed by 15 September 2015. Placement of the 300mm layer of material to be incorporated into the bound aggregate took place between 23 September 2015 and 28 September 2015 allowing the construction of 2 Trial Pads to take place on the 29 September 2015.

Having been allowed to cure for 6 days, a series of cores were taken from the 2 trial pads on 05 October 2015, a visual inspection of these cores then determined the method to be used for the construction of the pad. DLS were then able to begin constructing the slab on 6 October 2015. Some initial delays were encountered as a result of differing levels achieved by the GPS enabled dozer and the D&C bobcat utilising a spinning laser and prism. Once this issue was resolved, progress on the construction of the slab continued as expected and the pad was completed on 12 October 2015.

2.2 Design Changes

As seen in the previous phase it was not possible to mix as close to the edge of the culvert as specified in the design. Furthermore, the very edge of the prepared slab area was only loosely bound and did not present an impermeable surface. To remedy this, the edge material was cut away with a disk cutter and the excess material removed by hand. Neal Soil Suppliers Ltd then placed concrete to connect the slab edge to the concrete culvert. This resulted in a longer slope between the edge of the slab and the culvert than shown in the design.

For ease of construction, the remaining length of concrete culvert has been completed as part of this second phase. Much of this culvert will remain redundant until the construction of the third phase of the pad.

2.3 Preparatory Earthworks

Preparatory earthworks for the project consisted of the preparation of 3 distinct layers. The first layer is referred to as formation. The formation has been formed from cut and fill of the pre-existing ground at the site. The majority of the cut was at the southern edge of the slab footprint whilst the north was mostly filled. In order to meet the required surface, some additional material was also imported.

The second layer of preparatory earthworks was the placement of an unbound sub-base layer comprising a 200mm thick layer of aggregate. This aggregate was placed and compacted using method compaction.

The final layer was a 300mm thick aggregate layer, incorporated into the cement bound slab. The aggregate used for construction of both the unbound and bound layers needed to be either primary or secondary source aggregate.

Majority of earthworks were completed by 29 September 2015, with some additional grading to achieve the finished levels taking place over the following fortnight.

2.4 Concrete Works

The concrete works were carried out in three main stages. The first of these was the construction of a 1m wide concrete drainage culvert and headwall by TVC. The height of the headwall is variable along the culvert in order to reach a level of 6.8mAOD. This work was carried out throughout September and October 2015, using the traditional method of shuttering construction for a concrete pour.

The second stage of concrete works was the construction of the cement bound pad, which was carried out by DLS between 6 October 2015 and 12 October 2015. For this work to commence it was first necessary for TVC to complete the concrete culvert within Phase 2, so that DLS could follow the alignment.

The third phase of concrete works was the construction of the concrete kerb at the edge of the pad. To facilitate the construction of the kerb, DLS first laid a strip of concrete along the northern edge of the phase. It was then possible for TVC to continue with the construction of the kerb at the edges of the slab whilst placement of the remaining slab was ongoing. This work took place during the last week of October 2015.

2.5 Drainage

The culvert constructed to convey the surface drainage from Phase 2 connects into the outfall constructed during Phase 1, the details of which can be seen in Geotechnology Report 1379r4v1d0815.

3 EARTHWORKS

All earthworks for the site were carried out by the principle contractor working to levels and positions set out by Geotechnology. Geotechnology attended site intermittently during the earthworks phase to check levels and setting out positions. Several methods of setting out were used during construction.

Initially, a combination of level and alignment pins were installed along the edge of Phase 1 to allow the set up of a grading laser which was then used by the contractor to check cut and fill levels. These were replaced and moved as necessary as the works progressed. For more complex parts of the site, or where increased accuracy was required (such as the drainage culvert), Geotechnology set out specific points with a dGPS system and worked directly with an excavator driver to ensure correct levels were met. Finally, once the majority of the site had been brought up to approximate levels, a GPS enabled Dozer was utilised to grade the surface to finished levels using a digital terrain model (DTM) provided by Geotechnology.

All setting out and survey work was carried out to national ordnance datum and coordinates. For equipment without GPS, the principal survey station was STN1 located in the concrete pad surrounding the main office.

3.1 Existing Ground

Prior to the commencement of works, much of the site was occupied by a number of soil and aggregate stockpiles which were removed before work started. The natural ground beneath the site comprises clay and silt based tidal flat deposits. However, due to the nature of site use prior to the works, these have been largely covered by made ground comprising natural clay dominated materials mixed with construction/demolition rubble.

3.2 Formation Preparation

Preparation of the formation commenced during August 2015 once the site had been cleared of material stockpiles. Initial cut/fill was carried out by excavators and dozers working to a grading laser set up on pins installed by Geotechnology. As none of the equipment on site was set up for receiving a grading laser, a banksman carrying a staff with receiver, worked alongside excavators and dozers to reach design levels. The material cut from the southern side of the works area was then deposited to the north in order to build up levels. This material was placed using method compaction, and rolled repeatedly to provide a suitable formation surface.

A check survey has been carried out by Geotechnology using a dGPS system to confirm that levels are within tolerance of the design. This survey can be seen in Figure 3.

Following completion of the unbound layer aggregate placement, a series of trial pits were excavated through the stone to expose the formation layer. Additional survey points were then collected during the trial pitting. Ten trial pits were excavated across the site and California Bearing Ratio (CBR) Tests were carried out on the formation in the base of each pit. The location of each of these tests can be seen in Figure 3. The results of the testing are summarised in the Table 3-1 below and the test certificates are included in Appendix 1.

Table 3-1 CBR Testing Results

CBR Number	Test Depth	CBR Value (%)
1	0.3	18.8
2	0.3	11.8
3	0.4	14.7
4	0.3	20.4
5	0.4	15.2
6	0.25	23.7
7	0.3	7.2*
8	0.24	13.9
9	0.23	20.9
10	0.3	16.2

** Ground surrounding failed test removed and remediated by placement of granular fill*

The "Thickness Design & Specification for Paving Using HBM" report produced by John Kennedy and included as Appendix 2 of the CQA Plan states that the subgrade should have a CBR result not less than 8%. As can be seen from the table above, all of the results exceed 8% with the exception of CBR7. This test was carried out in the vicinity of the surface water outlet directly adjacent to a soft area identified and removed as part of the Phase 1 earthworks. This "soft spot" was brought to the attention of the contractor who removed the soft material and replaced it with granular fill.

3.3 Unbound Sub-Base (200mm) Layer

Above the formation a 200mm thick layer of sub-base was placed in accordance with the John Kennedy design assumptions described in Appendix 2 of the CQA Plan. The same methods of setting out and supervision were used for the unbound sub-base layer as for formation.

A topographic survey of the unbound layer is presented in Figure 4. This survey was carried out by Geotechnology following placement. Using the specialist survey software LSS it is possible to subtract one survey from another to generate an Isopachyte plan of thickness. An Isopachyte of the unbound layer has therefore been generated by subtracting the formation surface from the surface of the unbound layer, as shown in Figure 5. As illustrated by this figure, in the southeastern corner and along the western edge of the pad the unbound layer falls short of the required 200mm. To compensate for this shortfall, the 'bound' layer placed on top was thickened in these areas.

The material used in the placement of the unbound layer came from two differing aggregate sources, four samples were collected from each of these materials and sent for particle size distribution testing at Apex Testing Solutions. The test certificates for this testing can be seen in Appendix 2. It was required that these samples meet a 6F2 grading as specified in the Specification for Highways Works. As can be seen from the certificates, all bar one of the samples tested meet the specification. The sample taken from TP7, fails the grading by 1% over the specified percentage passing the 0.063mm sieve. This is not considered to be of significance to this project.

3.4 Bound (300mm) Layer

The bound 300mm thick layer of Aggregate was placed above the finished 200mm layer to raise levels to the finished level of the slab. It is this material that is incorporated into the finished cement bound surface so it is important that final levels on the placement of this material match the finished design levels as closely as possible. The grading of this aggregate was not determined to be important at the time of placement as it would be crushed as part of the cement mixing process.

Initial placement of the 300mm layer was carried out using a dozer in conjunction with a spinning laser and banksman with a staff and receiver. However, to achieve a finished surface as close to the design as possible, a GPS enabled dozer was employed which worked off the Geotechnology Base Station set at primary survey point STN1.

The material used for the 300mm layer consisted largely of demolition rubble comprising crushed concrete and bricks of highly variable sizes. In order to achieve the finished surface, a more finely graded material was brought in for the upper layer which allowed the GPS dozer to grade a smoother finish. This finished surface was then repeatedly tracked over by the dozer to provide compaction.

A visual inspection of the placed 300mm layer identified a generally uniformly graded material comprising crushed concrete and brick. However, some small quantities of contraries were also present including rebar and wood.

A full survey of the 300mm layer was not carried out at this time as it was expected that levels would change during crushing and mixing of the cement. A final survey of the pad surface was completed post construction and used to generate an Isopachyte plan of the layer shown in Figure 6.

As identified in this figure the thickness of this layer is variable and in most locations significantly exceeds the specified 300mm thickness. This exceedance was necessary to even out variability in the thickness of the unbound layer and retain the required falls on the final surface.

4 DRAINAGE CHANNEL CONSTRUCTION

4.1 Sub-base

Following preparation of the 200mm sub-base layer, a blinding layer of fine grained material was placed and compacted to provide a suitable working surface for the construction of the drainage channel and headwall. The dust was placed by a tracked excavator with a grading bucket following alignment and levels set out by a Geotechnology Engineer using a dGPS survey system. Following compaction by a vibrating roller, further levels checks were carried out and material was added or removed as necessary to meet survey tolerances.

Alignment pegs were driven into the sub-base by Geotechnology to mark the alignment of the drainage channel. These alignment pegs were also marked with levels for the top of the shuttering. During placement of the shuttering, in order to form the base of the drainage channel, a string line was run between the alignment pegs. The shuttering was then placed and localised high points were removed by hand as necessary by TVC in order to maintain falls.

4.2 Construction Detail

A polythene membrane was placed over the top of the dust binding before the concrete was poured to avoid water loss prior to curing. The culvert base incorporated an A393 mesh with 50mm cover and 12mm kinked dowels at 300mm centres. These dowels protruded vertically upwards on the southern side of the culvert and at a near horizontal angle from the northern side of the base.

During construction, Geotechnology staff made regular visits in order to set out the alignment of the channel and insure placement of the specified components. All visits found that TVC were compliant with the specification. Photographic evidence of the inclusion of reinforcement mesh and dowelling can be seen in Appendix 3.

4.3 Strength testing

In order to validate the strength of the concrete drainage channel and headwall a number of 150mm cubes were produced. The cubes were made by TVC using moulds provided by Atlantic Recycling. A cube was collected for each of the concrete pours required to form the drainage detail. The cubes were broken out of the moulds by TVC and taken by Geotechnology to Apex Testing Solutions for compressive strength testing after 7 and 28 day curing periods.

Table 4-1 summarises the results of the testing whilst the full laboratory certificates can be found in Appendix 4.

Table 4-1 TVC Concrete Cube Testing Results

Cube ID	Date Sampled	Date Tested	Maximum Load at Failure	Compressive Strength
TVC7A	10/09/2015	17/09/2015	586	26.0
TVC7B	10/09/2015	09/10/2015	930	41.3
TVC8A	15/09/2015	22/09/2015	472	21.0
TVC8B	15/09/2015	13/10/2015	778	34.6
TVC9A	18/09/2015	25/09/2015	486	21.6
TVC9B	18/09/2015	16/10/2015	762	33.9
TVC10A	22/09/2015	29/09/2015	602	26.8
TVC10B	22/09/2015	20/10/2015	887	39.4
TVC11A	29/09/2015	06/10/2015	273	12.1
TVC11B	29/09/2015	27/10/2015	557	24.8
TVC12	01/10/2015	29/10/2015	813	36.1
TVC13A	02/10/2015	09/10/2015	625	27.8
TVC13B	02/10/2015	30/10/2015	1021	45.4

5 SLAB CONSTRUCTION

Slab construction took place between 6 October 2015 and 12 October 2015. There were several elements to this work which were carried out by DLS and subcontractors in conjunction with TVC. Firstly, the slab was laid by DLS utilising an in-situ mixing method which lifted and crushed the upper part of the 300mm thick recycled aggregate layer whilst mixing-in cement powder and reinforcing fibres which had been placed on the surface of the aggregate. This mixture was then compacted and power floated in order to achieve a suitable finished surface.

Work commenced in the northwestern edge of the slab and progressed in strips running perpendicular to the slope from the top of the slab towards the drainage channel. On 12 October 2015 the slab was completed with a number of small strips to fill in the remaining area adjacent to the drainage culvert.

Following completion of the slab, a kerb detail was constructed along the northern edge starting at the edge adjoining Phase 1 and terminating at the edge of Phase 2. This kerb was constructed using shuttering and traditional concrete pouring techniques. The kerb was tied into the slab using dowels drilled at 300mm intervals.

Work was also carried out to connect the slab to the drainage culvert. This work was carried out by the principal contractor. In order to provide a continuous impermeable surface, it was first necessary to cut away a section of the slab which was only loosely bound in order to create a clean edge. This was achieved by first cutting a line with a disk cutter and then cleaning out the material between the newly cut edge and the drainage channel. All loose and excess material was removed by hand. Once this preparation work was complete the reinforcement bars protruding from the edge of the drainage channel were adjusted to the correct angle and concrete was poured into the gap. The concrete was then formed by Neal Soil Suppliers Ltd into a slope running from the edge of the slab into the drainage channel. This detail is can be seen in Figure 7.

5.1 Visual Inspection

Upon completion of the slab, a walkover and visual inspection has been carried out to determine the surface is of acceptable quality. Although some contraries were identified in the upper layer the general quality of the surface appears greatly improved compared to Phase 1.

During several days of rainfall during and post construction, water was seen to run off the surface of the pad towards the drainage channel. Following the rainfall however, shallow puddles of water were seen to hold on some parts of the slab. This is indicative of a minor backfall on some of the slab sections and the impermeability of the surface. Photographs of the finished surface can be seen in Appendix 3.

During the works carried out to connect the edge of the slab to the existing drainage culvert, an inspection of the edge of the slab cut away by the disk cutter was carried out. The depth to which the aggregate was bound varied significantly along the edge of the slab. As a result it was necessary for additional material to be cut and cleared away to create a reasonable edge to tie on to. Photographs of the variability of the slab edge can be seen in Appendix 3.

5.2 Particle Size Distributions

As part of the validation of the crushing process, 3 samples of crushed material were collected prior to mixing with cement powder. These samples were then tested for particle size distribution. When checked against the Grading Requirements for Acceptable Earthworks Materials as set out by the Specification for Highways Works, all three samples meet the required grading for Type 1A. The positions of each of the samples are identified on Figure 7 and the laboratory testing certificates can be seen in Appendix 2.

5.3 Strength testing

In order to determine the long term durability of the slab it was necessary to carry out compressive strength testing on the finished product. In standard concrete design this is achieved by making a series of concrete cubes for testing. These cubes are generally created by pouring a small amount of the concrete from each pour into a standard sized steel mould. Once set and having been given time to cure, these cubes are broken out of the mould and taken to a laboratory for testing.

During the construction of Phase 1, tests were carried out on cubes created by sampling the mixed in-situ material and compacting this material into cube moulds to form cubes. The results for cube compressive strengths showed highly variable values which was considered to indicate that the method of compacting the mix into the cubes was not entirely representative of in-situ compaction with a roller. In order to gain more reliable indication of in-situ slab strengths, the decision was made to core the slab at 15 locations to obtain cores for compressive strength testing.

Due to the unreliability of the cube testing from the last phase, no attempt was made to create cubes during this phase. Instead, core testing has been chosen as a method of verifying both the depth of the bound aggregate and the strength of the resultant material.

5.3.1 Core Testing

On 23 October 2015 Geotechnology set out 11 positions on the slab where Apex Testing Solutions drilled to obtain cores for testing of the in-situ bound material. Five additional positions were chosen on the day as a further check on the thickness of the bound material, all of these positions are identified on Figure 7. The cores were drilled down through the pad and into the unbound material beneath. All core holes were then backfilled with poured concrete by Neal Soil Suppliers Ltd on 7 November 2015 and inspected on 9 November 2015. Photographs showing examples of these backfilled holes can be seen in Appendix 3.

The cores were then taken to Apex Testing Solutions laboratory and tested for compressive strength on 6 November 2015. The results of this testing are summarised in Table 5-1 and the laboratory test certificates can be found in Appendix 5. Prior to testing, the lengths of the core were measured before the core was cut to the correct size for the test.

As can be seen from the results, 2 of the 9 cores fell short of the required 6MPa strength (5MPa and 3MPa).

The core samples were obtained by drilling into the slab prior to the cement achieving 28 day strength. The length of cores removed from the core holes were found to be variable, with some cracking so that the core stick lengths indicated on Table 5-1 are shorter than the depth of the core holes. The hole depths are also variable reflecting the difficulty in

sampling weakly bound (6MPa) aggregates by core drilling. Where holes were shorter than the slab thickness additional material was recovered from the base of the hole and this could be seen to contain cement powder, indicating that the cement based layer extends to the full depth measured by isopachyte survey (Section 3.4).

Table 5-1 Summary of Core Compressive Strength Test Results

Core ID	Hole Depth	Maximum Length (mm)	Compressive Strength (N/mm^2)	Saturated Density (kg/m^2)	Pass/Fail
BH1	240	Not tested for Compressive Strength			
BH2A	90	Not tested for Compressive Strength			
BH2B	60	Not tested for Compressive Strength			
BH3	300	208	3.0	2130	Fail
BH4	-	Not tested for Compressive Strength			
BH5	230	217	8.0	2190	Pass
BH6	140	130	5.0	2190	Fail
BH7	300	176	8.0	2160	Pass
BH8	150	Not tested for Compressive Strength			
BH9	290	273	9.0	2090	Pass
BH10	260	Not tested for Compressive Strength			
BH11	200	195	7.0	2230	Pass
BH12	330	331	7.5	2160	Pass
BH13	190	Not tested for Compressive Strength			
BH14	310	190	8.5	2190	Pass
BH15	210	210	6.0	2130	Pass

5.4 Finished Surface Topographic Survey

A final topographic survey of the slab and associated drainage details was completed on 6 November 2015 and is presented in Figure 7. In this figure it can be seen that the final surface meets the designed fall of 1:600 on the northern section with 1:100 fall down to the drainage channel in the south. The headwall on the drainage channel and return has a nominal elevation of 6.8mAOD allowing the slab to flood to that level when the shut off valve is closed. The northern edge of the slab is enclosed by a concrete kerb 200mm high and 300mm wide.

5.5 Temporary Bund

As the constructed slab represents the second phase of the larger slab, no permanent detail has been constructed to hold water on the western edge. In order to prevent surface water runoff from this edge of the slab in the short term, a clay bund has been constructed from suitably impermeable locally sourced clay. This bund is nominally 0.4m high and 1.5m wide and runs the length of the western slab edge.

The position of the temporary bund can be seen on the final topographic survey in Figure 7. Visual inspection of the bund during the survey has shown that it is successfully preventing runoff on the southwest edge of the slab. Photographs of the bund can be seen in Appendix 3.

6 OUTLET, SHUT-OFF VALVE AND INTERCEPTORS

The outlet which takes captured water from the slab through the headwall to the outfall comprises several components designed to control the flow of water and improve water quality before discharge to the ditch. These aspects of the scheme were installed during Phase 1 of the slab construction and details of this installation can be found in Geotechnology Report 1379r4v1d0815.

7 NON CONFORMANCES AND RECTIFYING ACTION

It has been shown that the slab is constructed over ground that provides more than adequate support (minimum CBR value 11.8% against a requirement of 8%). The fill materials meet the grading requirements of 6F2 and Type 1 and the full thickness of these layers has been confirmed by survey. Accordingly, the load bearing capacity of the slab is not in doubt. However, two core samples failed to meet the required strength and therefore indicate a less durable slab. Whilst visual evidence indicates that the slab is currently fit for purpose as an impermeable surface, regular inspection over the coming years will be needed to confirm it remains so in the future.

It is recommended that once the slab comes into use it should be subjected to regular (3 monthly) inspections focussing on the integrity of the slab and aiming to identify any cracking which could lead to increased permeability and a failure of the sealed system. Should such a problem be identified, then the requirement would arise for a new surface to be placed on top of the existing slab to maintain the effectiveness of the system or for the existing slab to be excavated and replaced.

In addition to visual inspection it is recommended that in approximately 6 months from completion of the slab additional cores are taken to determine the thickness and strength of bound material. Should this investigation find the material to be bound to greater depth and achieving adequate compressive strengths, then a case may be made for reducing the frequency of visual inspection.

8 VALIDATION STATEMENT

8.1 Earthworks

It is confirmed on the basis of the inspection and the testing reported that the earthworks were completed in accordance with the Specification.

8.2 Slab Construction

It is confirmed on the basis of site records and inspection that the slab construction has created an impermeable surface across the area.

8.3 Drainage

It is confirmed on the basis of the inspection reported that all components of the drainage system were installed in accordance with the general principles of the Specification.

8.4 Impermeable Surface with Sealed Drainage System

It is confirmed that the scheme constructed at Atlantic Recycling currently constitutes an impermeable surface with a sealed drainage system.

Figure 1 Site Location Plan

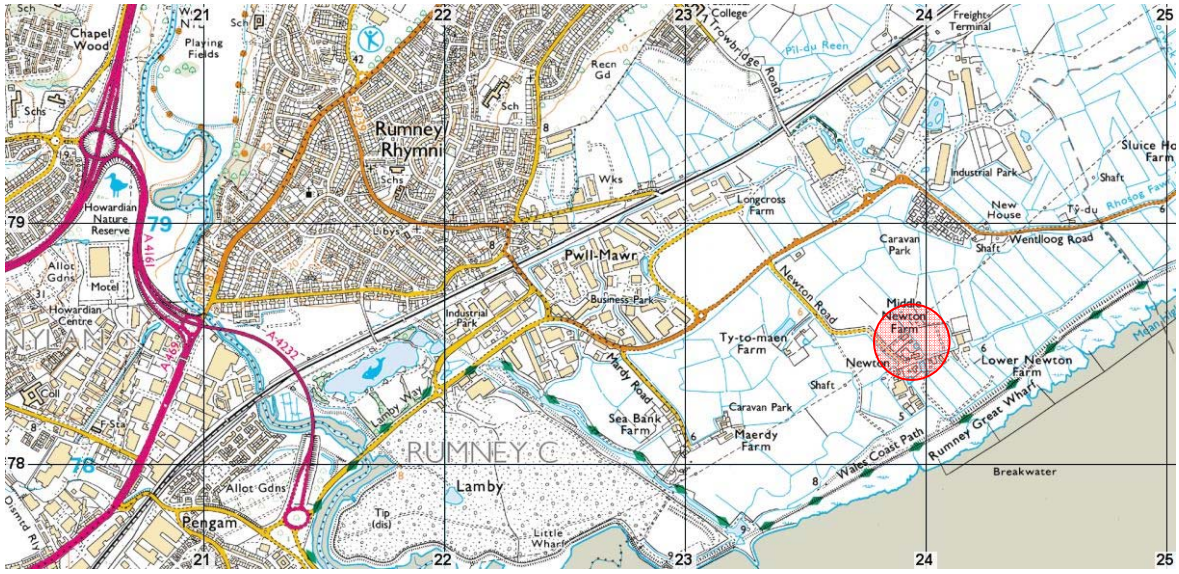

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Figure 2 Detailed Site Plan

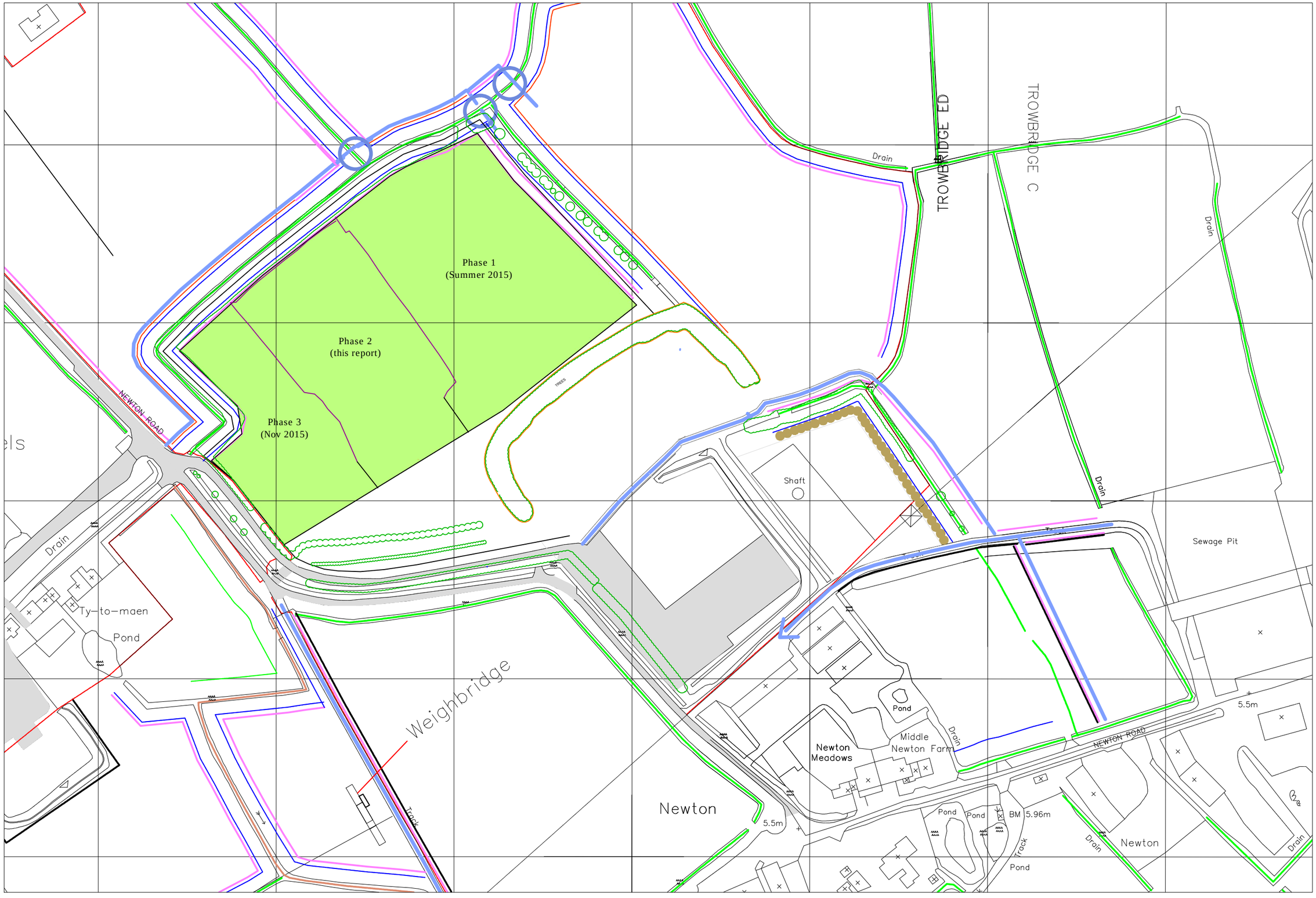


Figure 3 Formation Survey with CBR Testing Positions

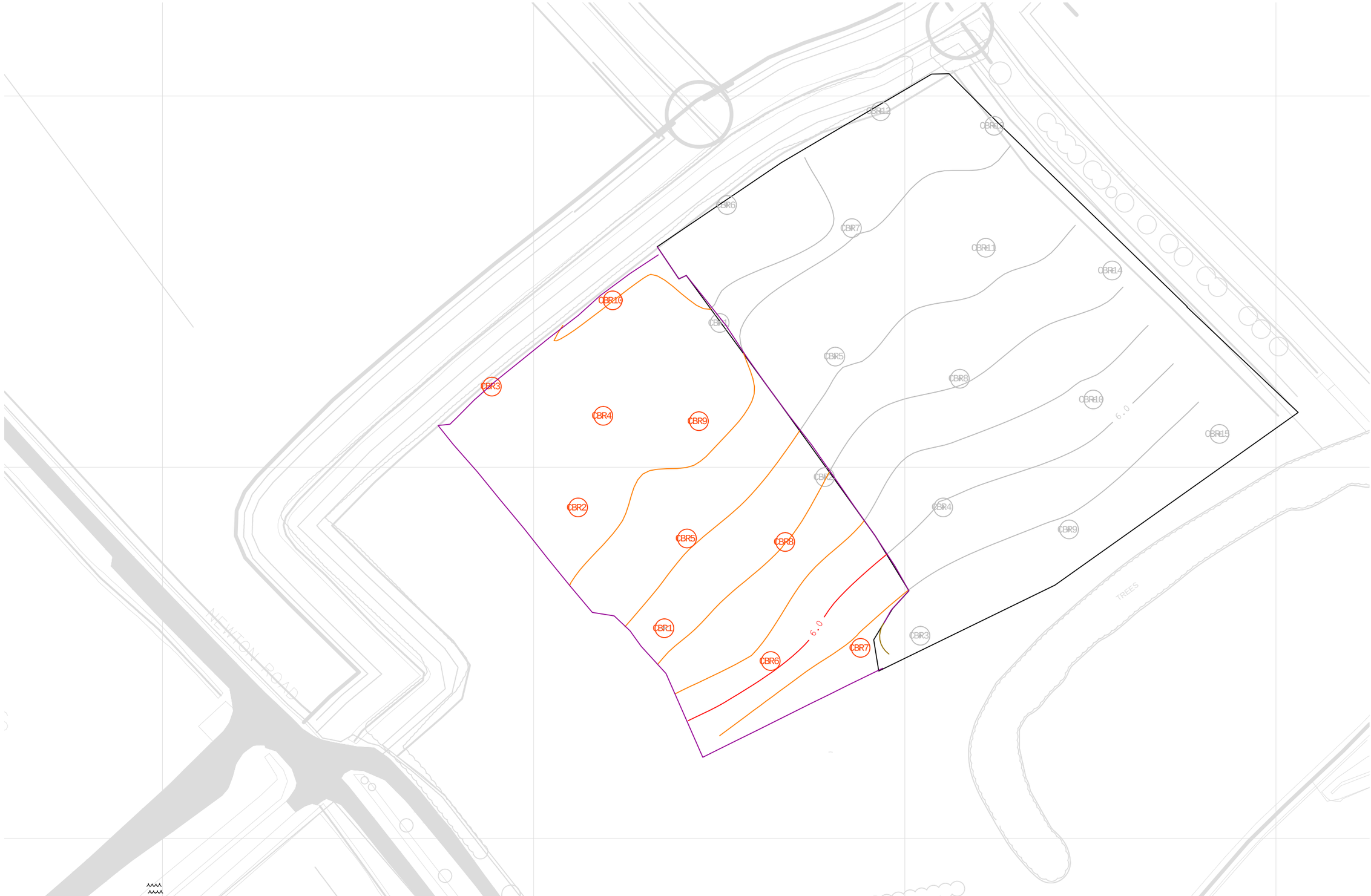


Figure 4 Unbound Layer Survey with Testing Positions

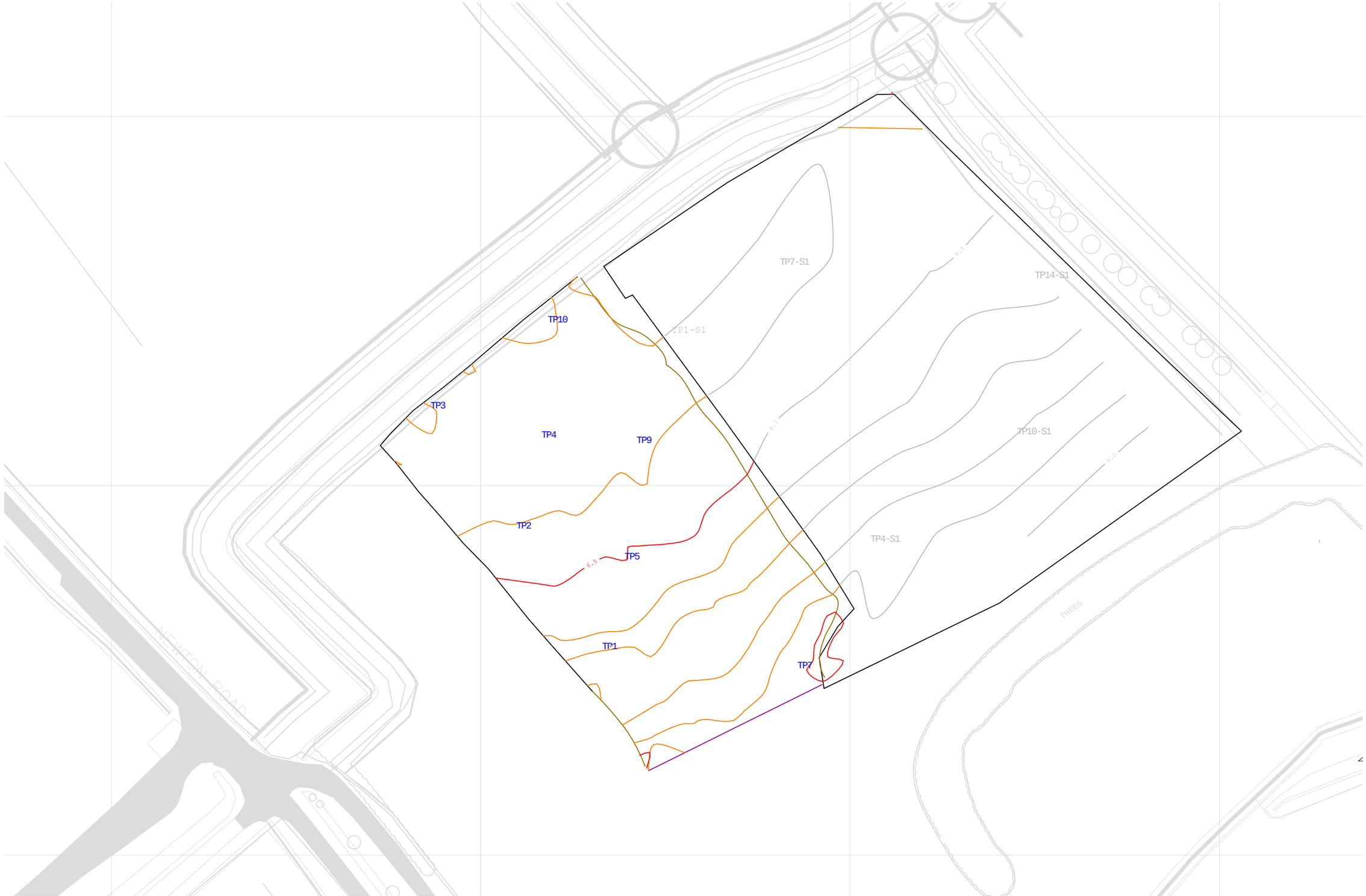


Figure 5 Unbound Layer Isopachyte Plan

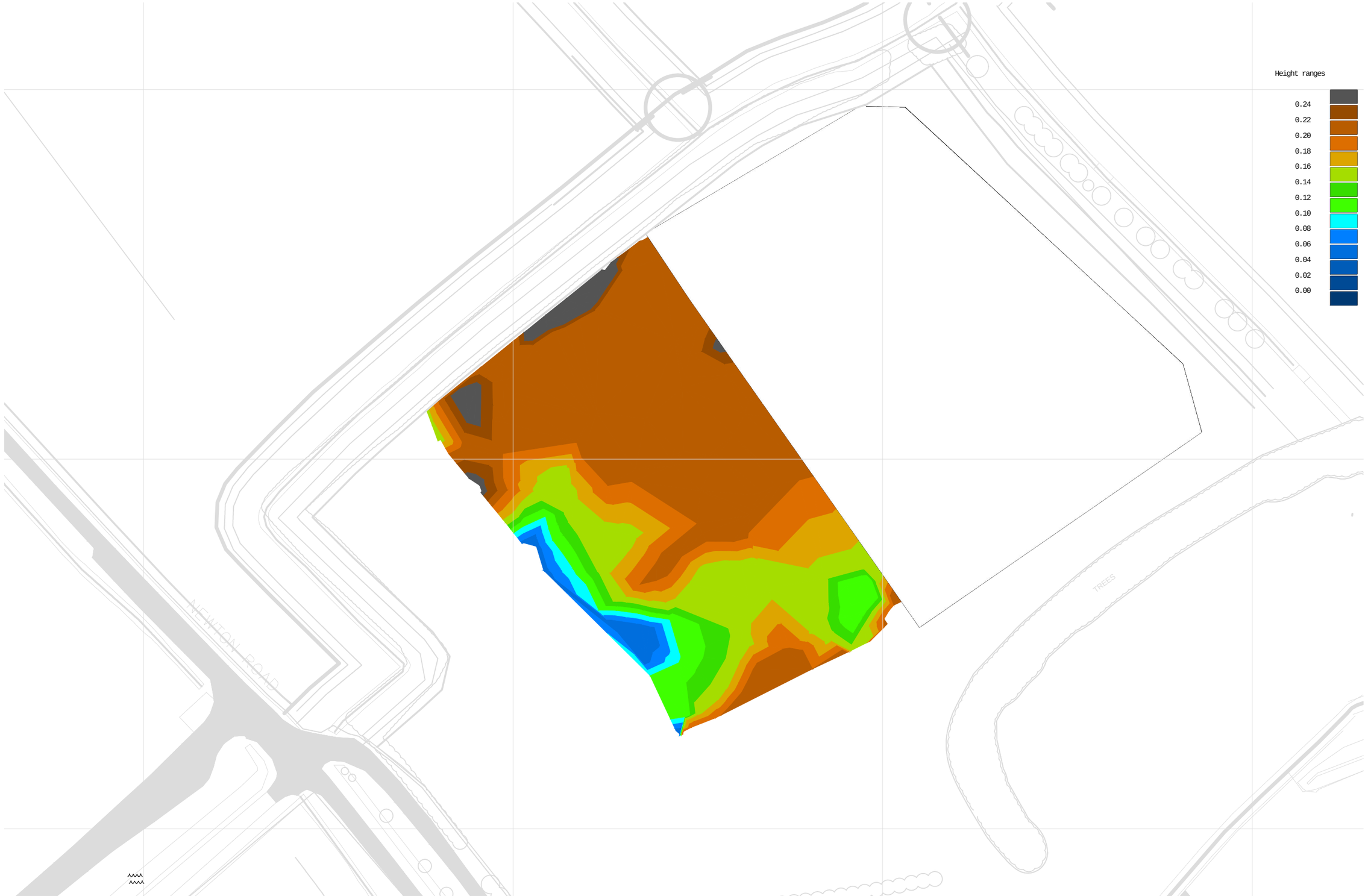


Figure 6 Bound Layer Isopachyte Plan

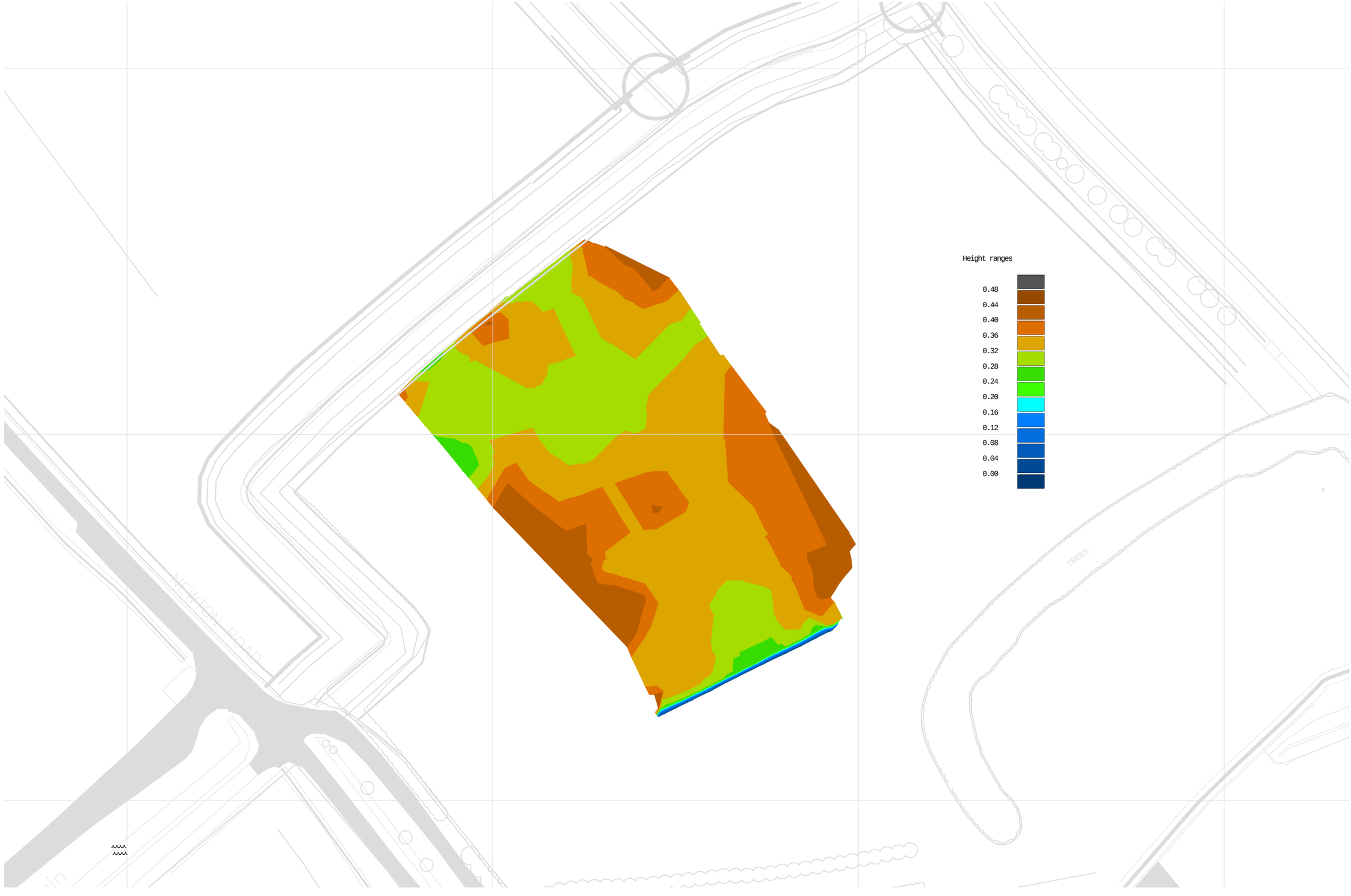


Figure 7 Final Topographic Survey of Slab with Bound Layer Testing Positions

ATLANTIC WASTE ECOPARK PAVING PROJECT

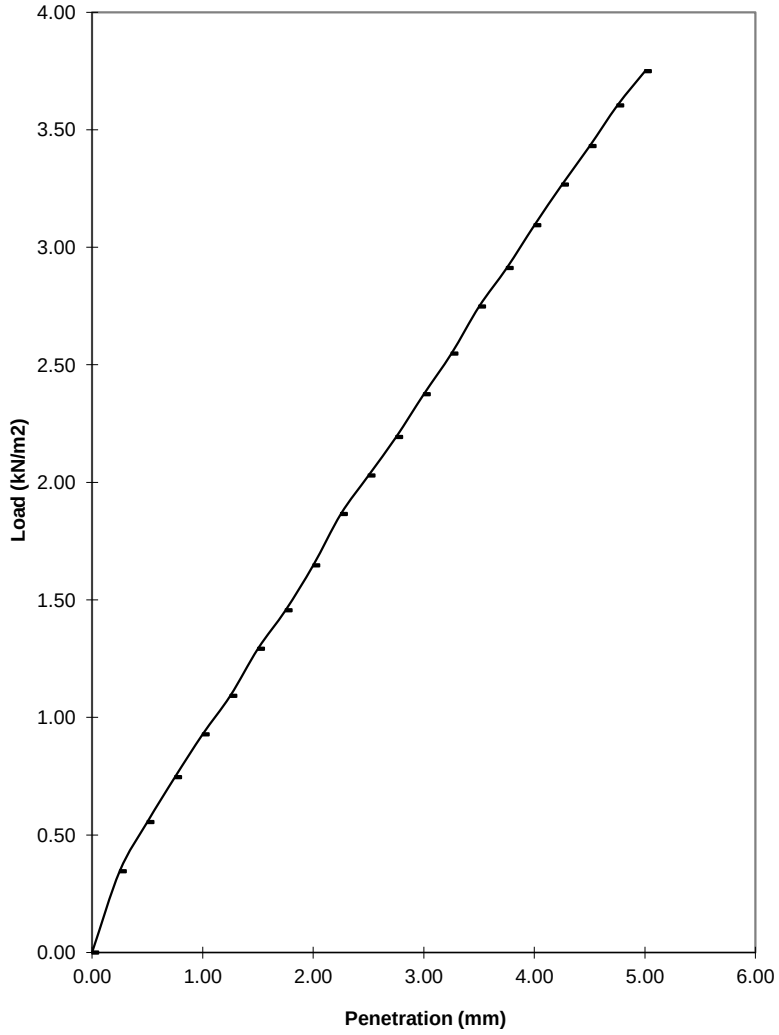
CQA VALIDATION REPORT

Appendix 1
CBR Test Certificates
Report Number 1379r5v1d1115

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	38	0.35
0.50	61	0.56
0.75	82	0.75
1.00	102	0.93
1.25	120	1.09
1.50	142	1.29
1.75	160	1.46
2.00	181	1.65
2.25	205	1.87
2.50	223	2.03
2.75	241	2.19
3.00	261	2.38
3.25	280	2.55
3.50	302	2.75
3.75	320	2.91
4.00	340	3.09
4.25	359	3.27
4.50	377	3.43
4.75	396	3.60
5.00	412	3.75



Test Depth: 0.30m.

Soil Description:Brown sandy Clay and demolition rubble

CBR at 2.50mm 15.33 %

Mass of Split Rings: 5Kg

CBR at 5.00mm 18.78 %

PR Factor: 9.1 N/Div

CBR Value: 18.8 %

Checked By: J.P.

REMARKS:

Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Atlantic Recycling, Cardiff.

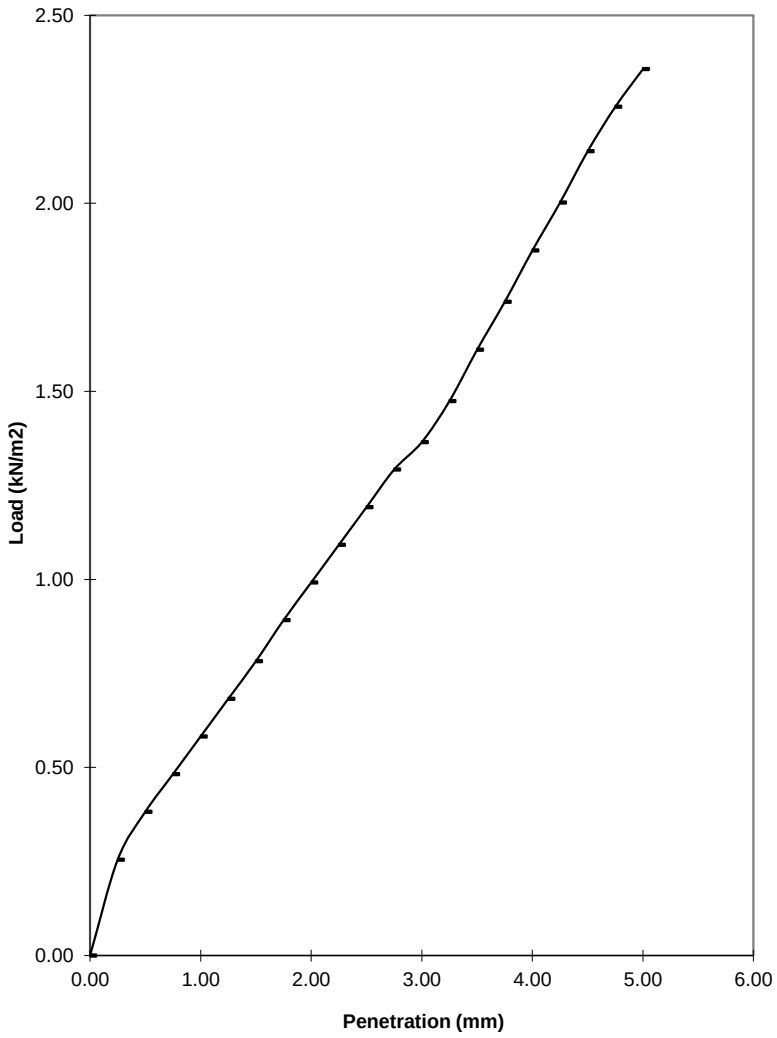
DATE: 23.09.15

TEST REFERENCE: 1

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	28	0.25
0.50	42	0.38
0.75	53	0.48
1.00	64	0.58
1.25	75	0.68
1.50	86	0.78
1.75	98	0.89
2.00	109	0.99
2.25	120	1.09
2.50	131	1.19
2.75	142	1.29
3.00	150	1.37
3.25	162	1.47
3.50	177	1.61
3.75	191	1.74
4.00	206	1.87
4.25	220	2.00
4.50	235	2.14
4.75	248	2.26
5.00	259	2.36



Test Depth: 0.30m.

Soil Description:Brown sandy Clay and demolition rubble

CBR at 2.50mm 9.00 %

Mass of Split Rings: 5Kg

CBR at 5.00mm 11.81 %

PR Factor: 9.1 N/Div

CBR Value: 11.8 %

Checked By: J.P.

REMARKS:

Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Atlantic Recycling, Cardiff.

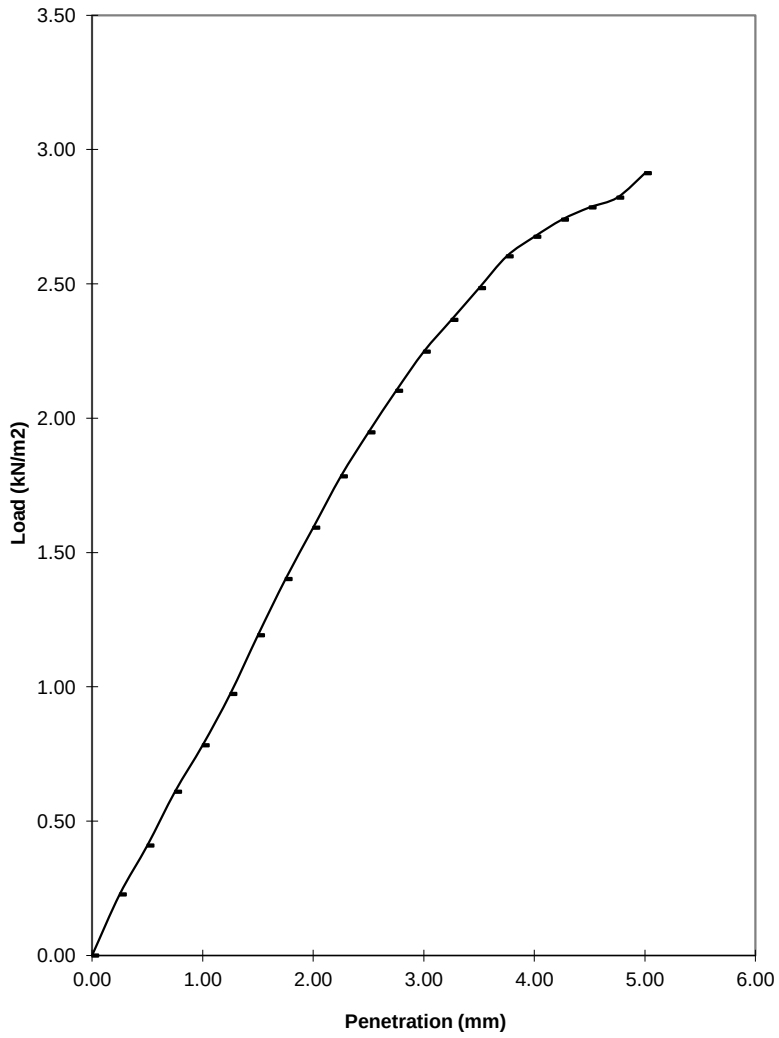
DATE: 23.09.15

TEST REFERENCE: 2

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	25	0.23
0.50	45	0.41
0.75	67	0.61
1.00	86	0.78
1.25	107	0.97
1.50	131	1.19
1.75	154	1.40
2.00	175	1.59
2.25	196	1.78
2.50	214	1.95
2.75	231	2.10
3.00	247	2.25
3.25	260	2.37
3.50	273	2.48
3.75	286	2.60
4.00	294	2.68
4.25	301	2.74
4.50	306	2.78
4.75	310	2.82
5.00	320	2.91

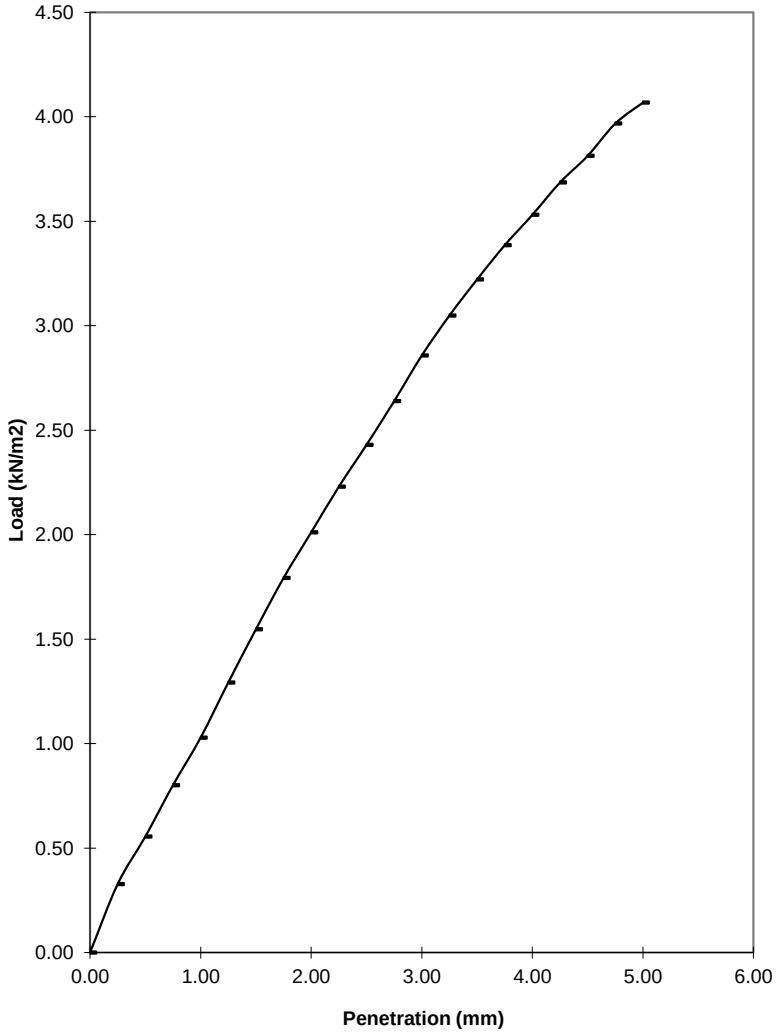


Test Depth: 0.40m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 14.71 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 14.59 %
PR Factor: 9.1 N/Div		**CBR Value: 14.7** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 3

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	36	0.33
0.50	61	0.56
0.75	88	0.80
1.00	113	1.03
1.25	142	1.29
1.50	170	1.55
1.75	197	1.79
2.00	221	2.01
2.25	245	2.23
2.50	267	2.43
2.75	290	2.64
3.00	314	2.86
3.25	335	3.05
3.50	354	3.22
3.75	372	3.39
4.00	388	3.53
4.25	405	3.69
4.50	419	3.81
4.75	436	3.97
5.00	447	4.07

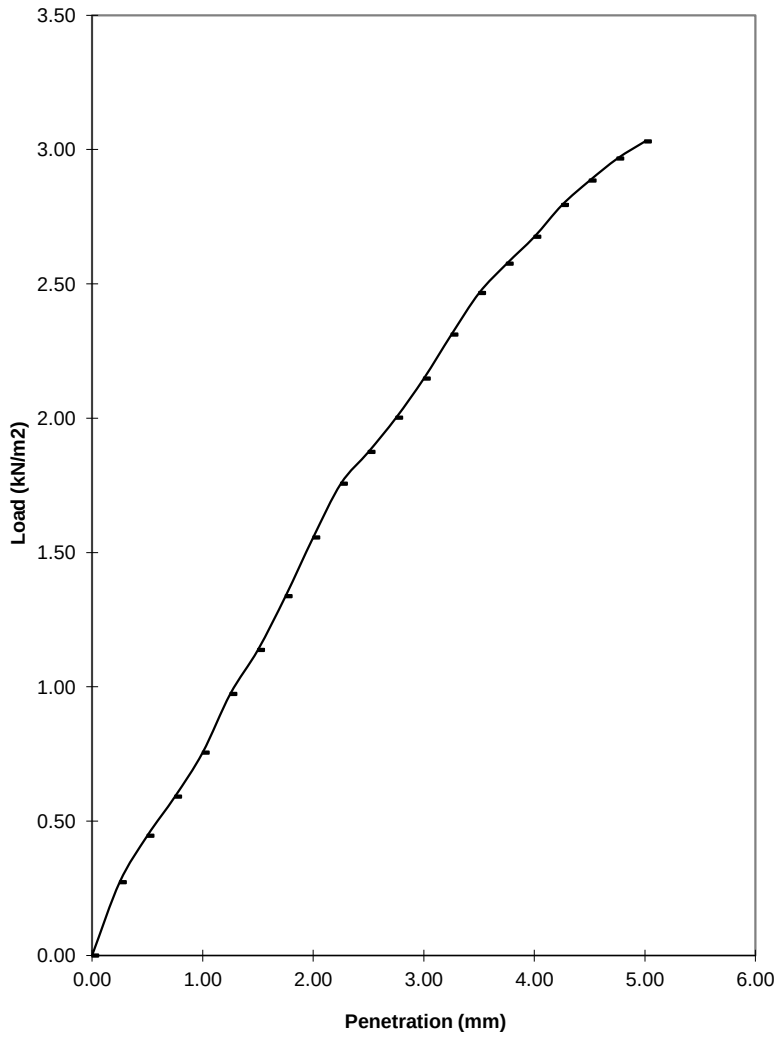


Test Depth: 0.30m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 18.35 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 20.38 %
PR Factor: 9.1 N/Div		**CBR Value: 20.4** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 4

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	30	0.27
0.50	49	0.45
0.75	65	0.59
1.00	83	0.76
1.25	107	0.97
1.50	125	1.14
1.75	147	1.34
2.00	171	1.56
2.25	193	1.76
2.50	206	1.87
2.75	220	2.00
3.00	236	2.15
3.25	254	2.31
3.50	271	2.47
3.75	283	2.58
4.00	294	2.68
4.25	307	2.79
4.50	317	2.88
4.75	326	2.97
5.00	333	3.03

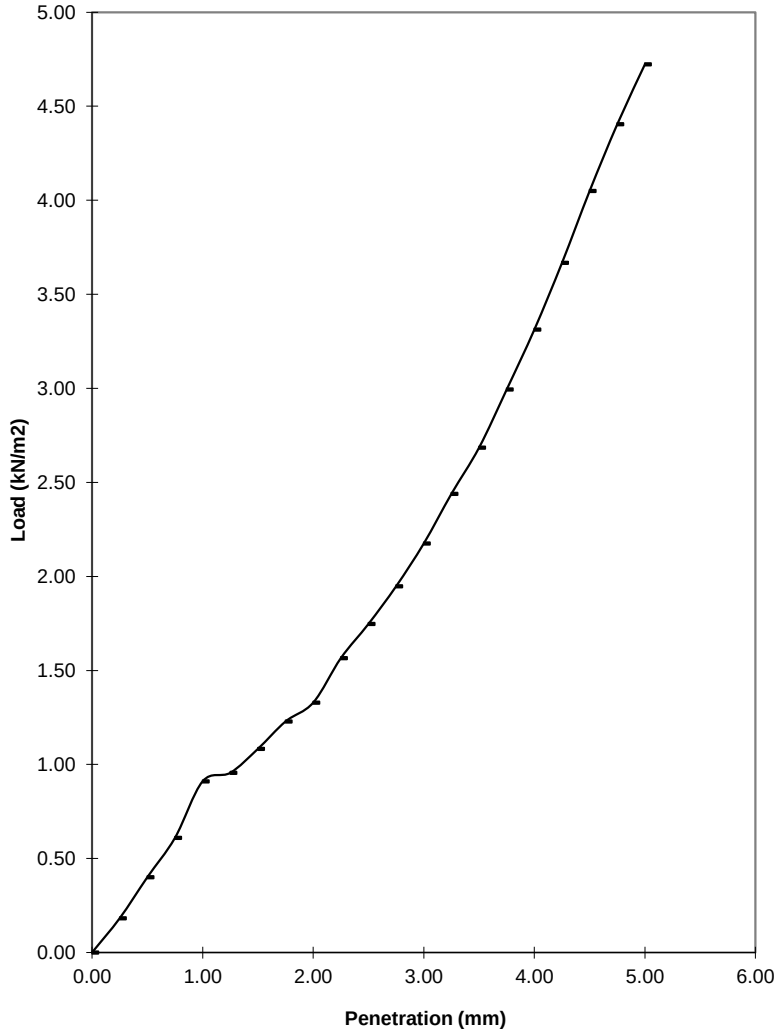


Test Depth: 0.40m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 14.16 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 15.18 %
PR Factor: 9.1 N/Div		**CBR Value: 15.2** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 5

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	20	0.18
0.50	44	0.40
0.75	67	0.61
1.00	100	0.91
1.25	105	0.96
1.50	119	1.08
1.75	135	1.23
2.00	146	1.33
2.25	172	1.57
2.50	192	1.75
2.75	214	1.95
3.00	239	2.17
3.25	268	2.44
3.50	295	2.68
3.75	329	2.99
4.00	364	3.31
4.25	403	3.67
4.50	445	4.05
4.75	484	4.40
5.00	519	4.72



Test Depth: 0.25m.

Soil Description:Brown sandy Clay and demolition rubble

CBR at 2.50mm 13.20 %

Mass of Split Rings: 5Kg

CBR at 5.00mm 23.66 %

PR Factor: 9.1 N/Div

CBR Value: 23.7 %

Checked By: J.P.

REMARKS:

Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Atlantic Recycling, Cardiff.

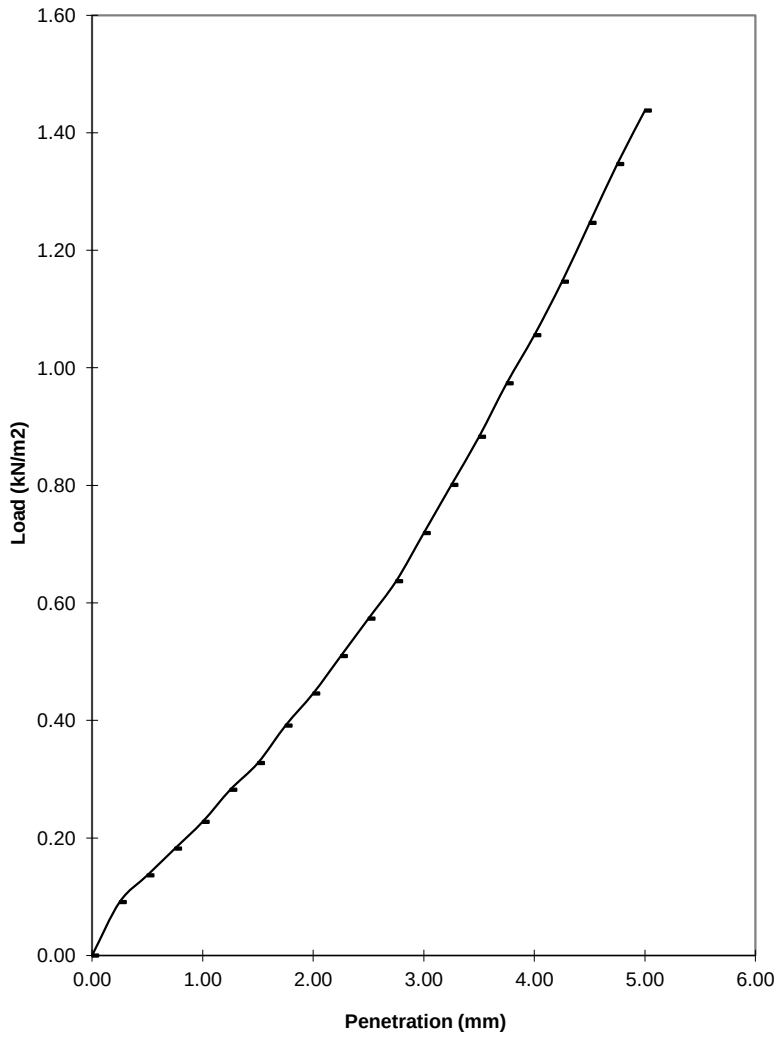
DATE: 23.09.15

TEST REFERENCE: 6

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	10	0.09
0.50	15	0.14
0.75	20	0.18
1.00	25	0.23
1.25	31	0.28
1.50	36	0.33
1.75	43	0.39
2.00	49	0.45
2.25	56	0.51
2.50	63	0.57
2.75	70	0.64
3.00	79	0.72
3.25	88	0.80
3.50	97	0.88
3.75	107	0.97
4.00	116	1.06
4.25	126	1.15
4.50	137	1.25
4.75	148	1.35
5.00	158	1.44

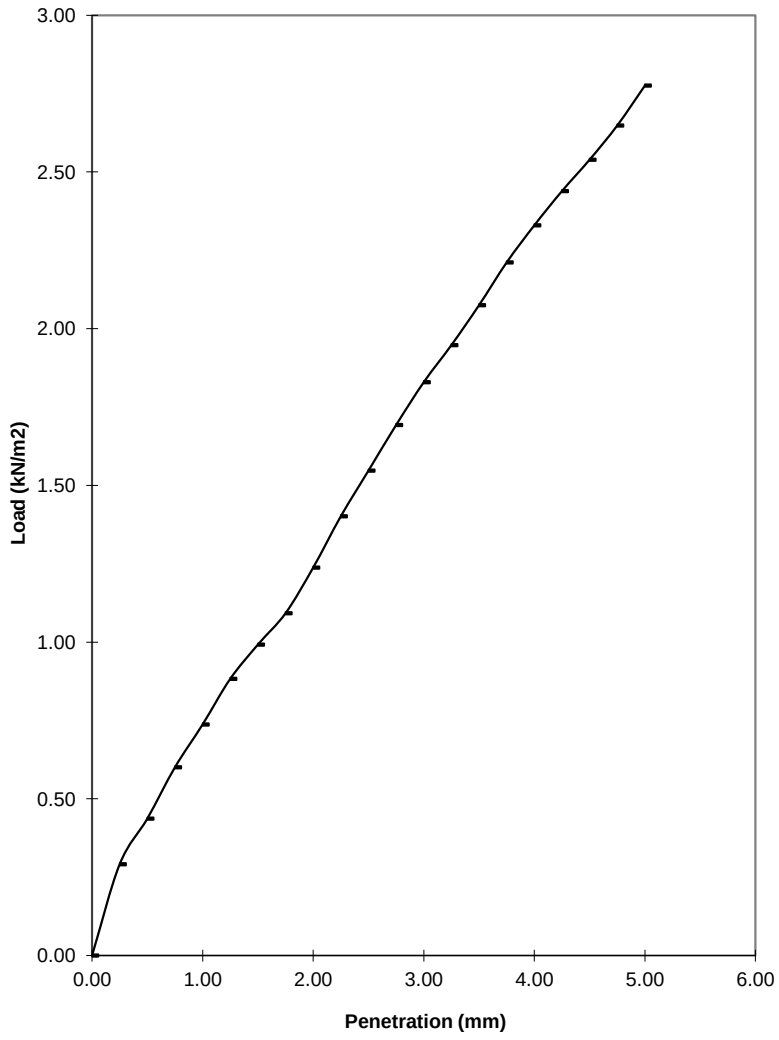


Test Depth: 0.30m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 4.33 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 7.20 %
PR Factor: 9.1 N/Div		**CBR Value: 7.2** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 7

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	32	0.29
0.50	48	0.44
0.75	66	0.60
1.00	81	0.74
1.25	97	0.88
1.50	109	0.99
1.75	120	1.09
2.00	136	1.24
2.25	154	1.40
2.50	170	1.55
2.75	186	1.69
3.00	201	1.83
3.25	214	1.95
3.50	228	2.07
3.75	243	2.21
4.00	256	2.33
4.25	268	2.44
4.50	279	2.54
4.75	291	2.65
5.00	305	2.78

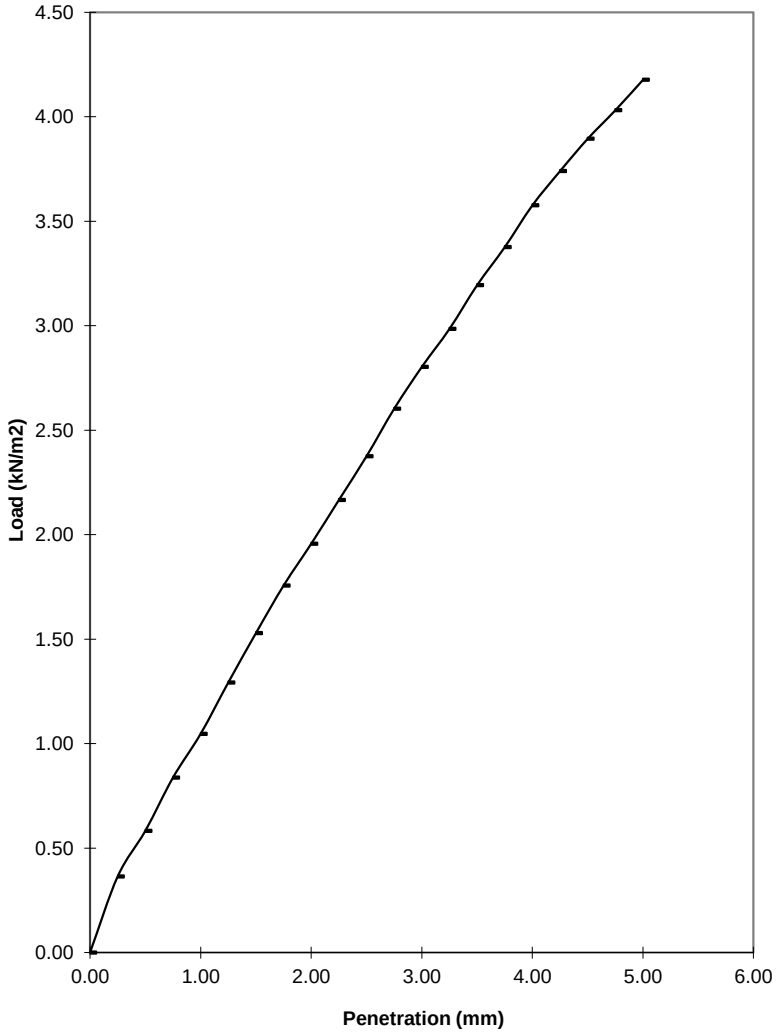


Test Depth: 0.24m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 11.68 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 13.91 %
PR Factor: 9.1 N/Div		**CBR Value: 13.9** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 8

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	40	0.36
0.50	64	0.58
0.75	92	0.84
1.00	115	1.05
1.25	142	1.29
1.50	168	1.53
1.75	193	1.76
2.00	215	1.96
2.25	238	2.17
2.50	261	2.38
2.75	286	2.60
3.00	308	2.80
3.25	328	2.98
3.50	351	3.19
3.75	371	3.38
4.00	393	3.58
4.25	411	3.74
4.50	428	3.89
4.75	443	4.03
5.00	459	4.18

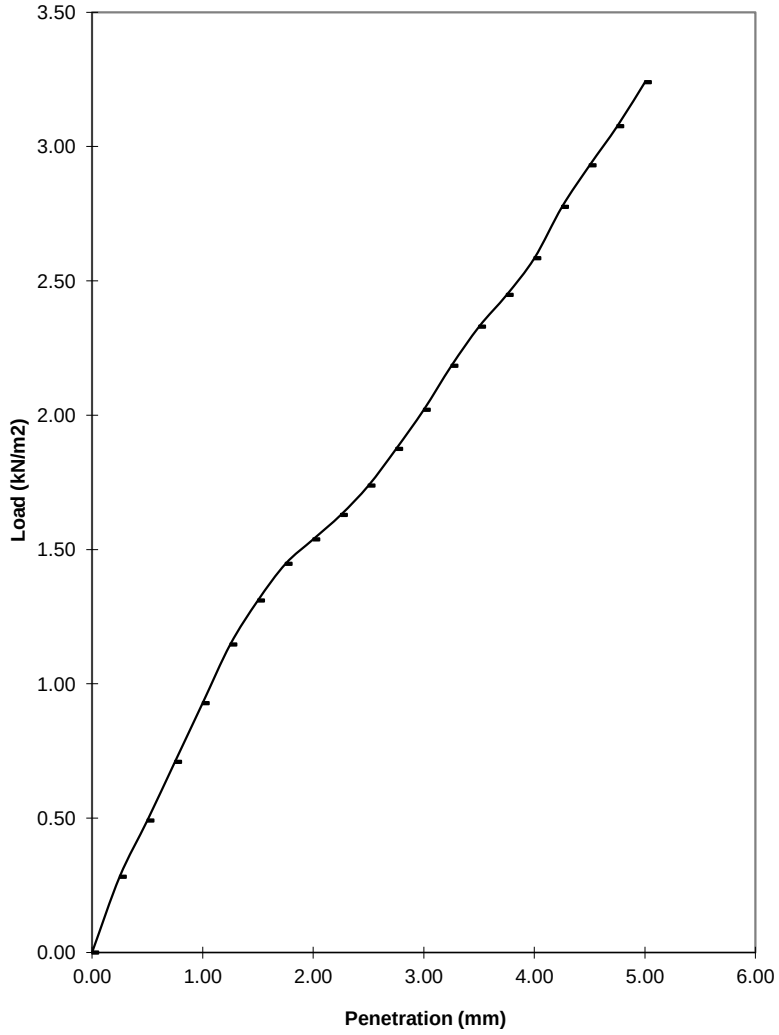


Test Depth: 0.23m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 17.94 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 20.93 %
PR Factor: 9.1 N/Div		**CBR Value: 20.9** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 9

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	31	0.28
0.50	54	0.49
0.75	78	0.71
1.00	102	0.93
1.25	126	1.15
1.50	144	1.31
1.75	159	1.45
2.00	169	1.54
2.25	179	1.63
2.50	191	1.74
2.75	206	1.87
3.00	222	2.02
3.25	240	2.18
3.50	256	2.33
3.75	269	2.45
4.00	284	2.58
4.25	305	2.78
4.50	322	2.93
4.75	338	3.08
5.00	356	3.24



Test Depth: 0.30m.	Soil Description:Brown sandy Clay and demolition rubble	CBR at 2.50mm 13.13 %
Mass of Split Rings: 5Kg		CBR at 5.00mm 16.23 %
PR Factor: 9.1 N/Div		**CBR Value: 16.2** %
		Checked By: J.P.
REMARKS:		Carried out in accordance with BS1377: Part 9: 1990, Test 4.3
CONTRACT: Atlantic Recycling, Cardiff.		DATE: 23.09.15 TEST REFERENCE: 10

ATLANTIC WASTE ECOPARK PAVING PROJECT

CQA VALIDATION REPORT

Appendix 2
Particle Size Distribution Laboratory Test Certificates
Report Number 1379r5v1d1115

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

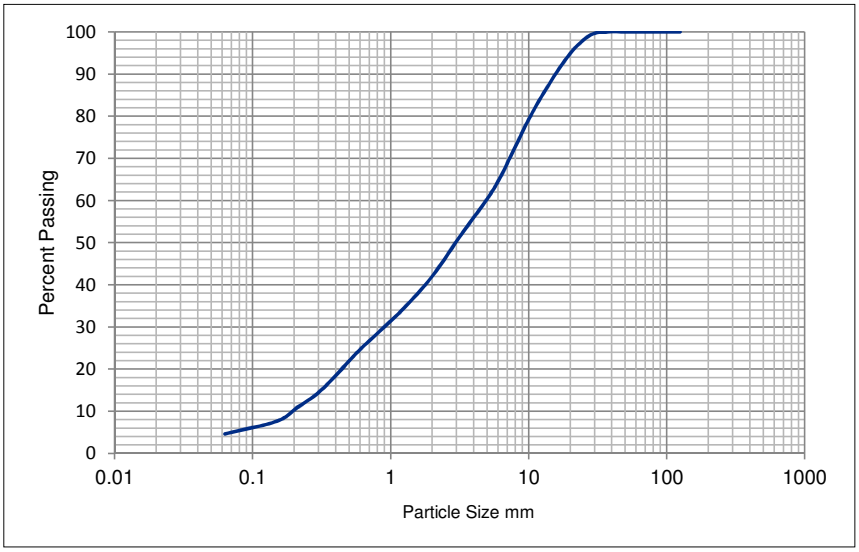
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7631		

Site Ref / Hole ID:	1	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	23 October 2015	**Date Tested:**	11 November 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	99
20	95
14	87
10	79
6.3	66
5.0	60
3.35	53
2.00	42
1.18	34
0.600	25
0.425	19
0.300	14
0.212	11
0.150	8
0.063	5

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	58		
Sand	37	**Dry mas of sample, kg**	
Silt / Clay	5	13.5	N/A

Remarks:

QA Ref.					
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver K Maid L Maiden, Laboratory Supervisor	Date 11/11/2015	Fig **PSD**

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

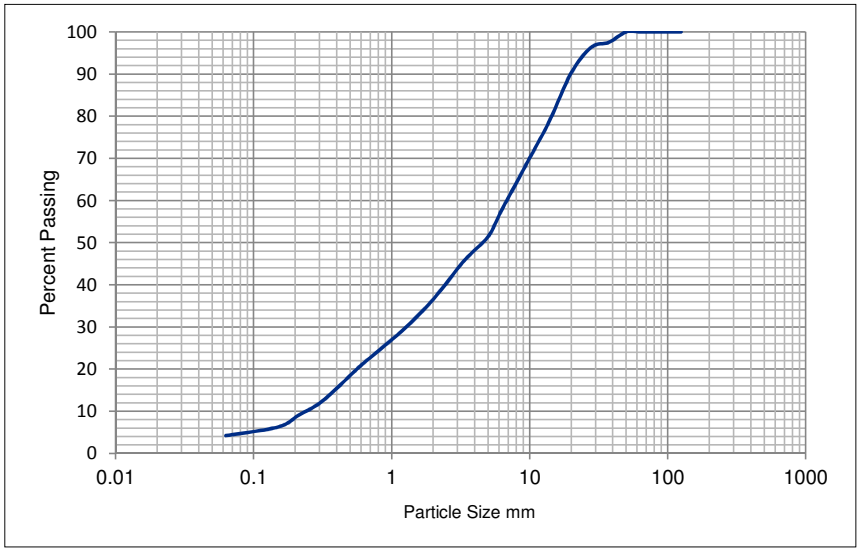
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7632		

Site Ref / Hole ID:	2	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	23 October 2015	**Date Tested:**	11 November 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	98
28	96
20	90
14	79
10	70
6.3	58
5.0	51
3.35	46
2.00	37
1.18	29
0.600	21
0.425	16
0.300	12
0.212	9
0.150	6
0.063	4

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	63		
Sand	33	**Dry mas of sample, kg**	
Silt / Clay	4	9.5	N/A

Remarks:

QA Ref.					
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver K Maid L Maiden, Laboratory Supervisor	Date 11/11/2015	Fig **PSD**

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

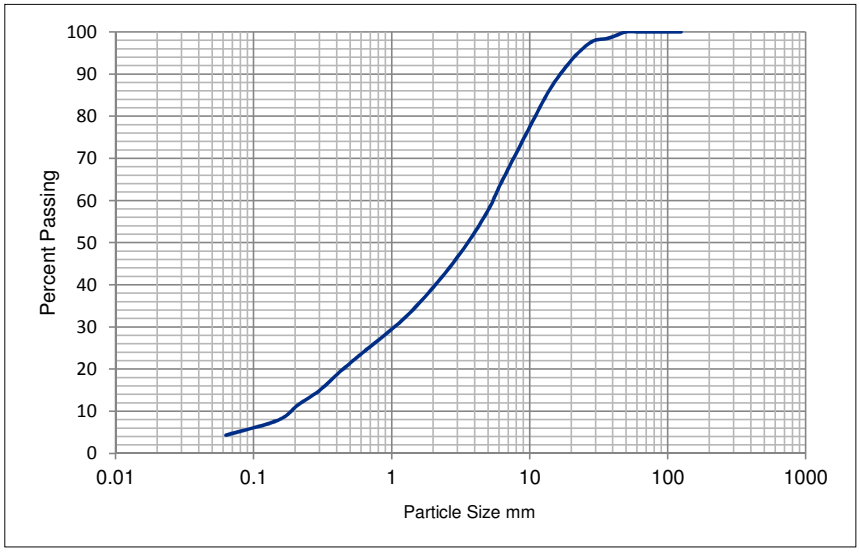
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7633		

Site Ref / Hole ID:	3	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey slightly silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	23 October 2015	**Date Tested:**	11 November 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	99
28	98
20	93
14	86
10	77
6.3	65
5.0	58
3.35	49
2.00	39
1.18	31
0.600	24
0.425	19
0.300	15
0.212	12
0.150	8
0.063	4

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	61		
Sand	35	**Dry mas of sample, kg**	
Silt / Clay	4	10.8	N/A

Remarks:

QA Ref.				
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: K Maid L Maiden, Laboratory Supervisor	Date: 11/11/2015	Fig: **PSD**

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

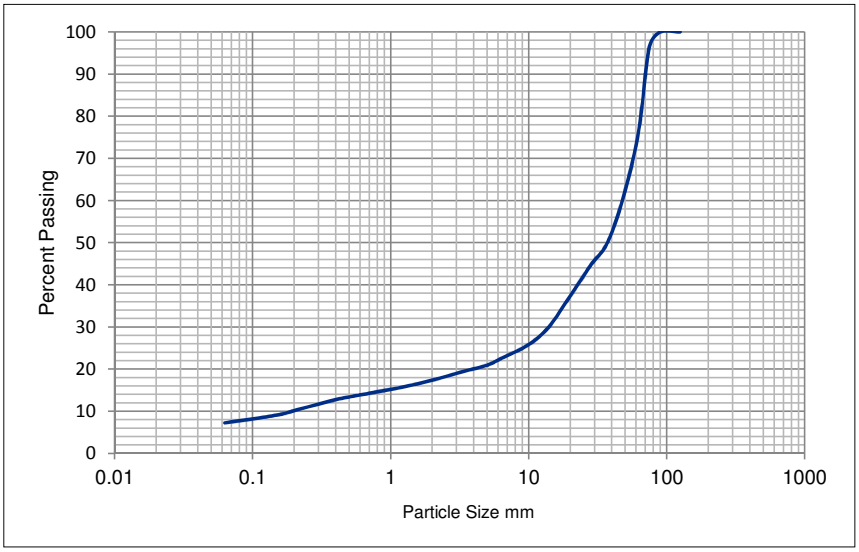
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7208		

Site Ref / Hole ID:	TP1	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown clayey sandy GRAVEL with high cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	97
63	77
50	62
37.5	50
28	45
20	37
14	30
10	26
6.3	22
5.0	21
3.35	19
2.00	17
1.18	16
0.600	14
0.425	13
0.300	12
0.212	10
0.150	9
0.063	7

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	23	N/A	D_{60} / D_{10}
Gravel	60		
Sand	10	**Dry mas of sample, kg**	
Silt / Clay	7	18.3	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

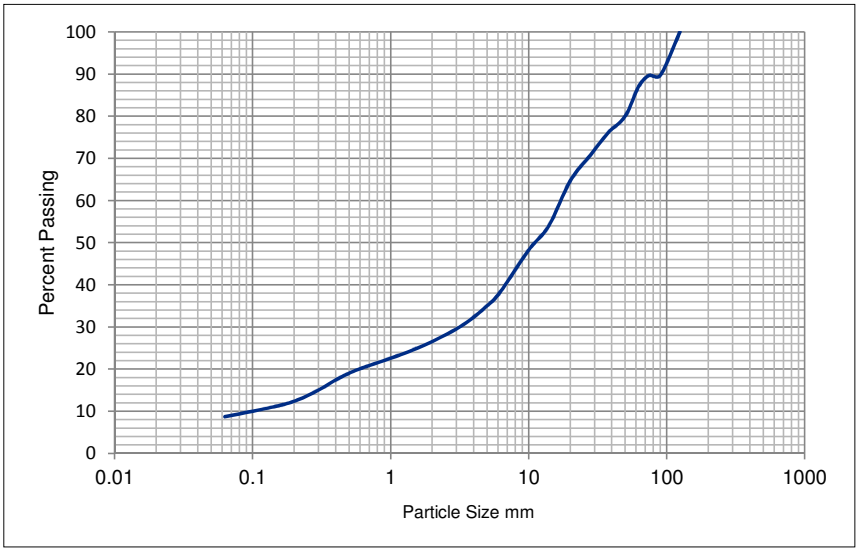
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7209		

Site Ref / Hole ID:	TP2	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown silty sandy GRAVEL with medium cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	90
75	90
63	87
50	80
37.5	76
28	71
20	65
14	54
10	48
6.3	39
5.0	35
3.35	31
2.00	27
1.18	23
0.600	20
0.425	18
0.300	15
0.212	13
0.150	11
0.063	9

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	13	N/A	D_{60} / D_{10}
Gravel	60		
Sand	18	**Dry mas of sample, kg**	
Silt / Clay	9	19.2	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

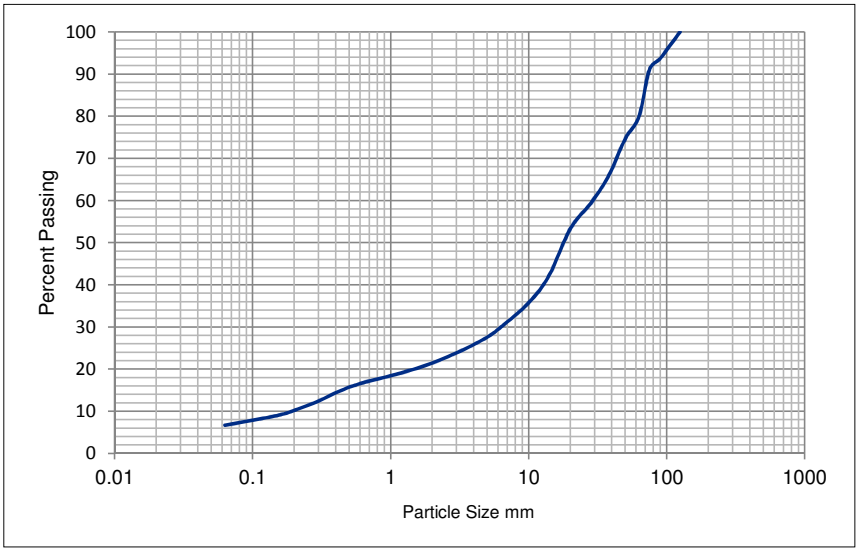
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7210		

Site Ref / Hole ID:	TP3	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown silty sandy GRAVEL with high cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	94
75	91
63	80
50	75
37.5	66
28	59
20	53
14	42
10	36
6.3	30
5.0	28
3.35	25
2.00	21
1.18	19
0.600	17
0.425	15
0.300	12
0.212	10
0.150	9
0.063	7

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	20	N/A	D_{60} / D_{10}
Gravel	59		
Sand	14	**Dry mas of sample, kg**	
Silt / Clay	7	20.0	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

QA Ref.			Approver	Date	Fig
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	K Maid	01/10/2015	**PSD 3**
			L Maiden, Laboratory Supervisor		

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

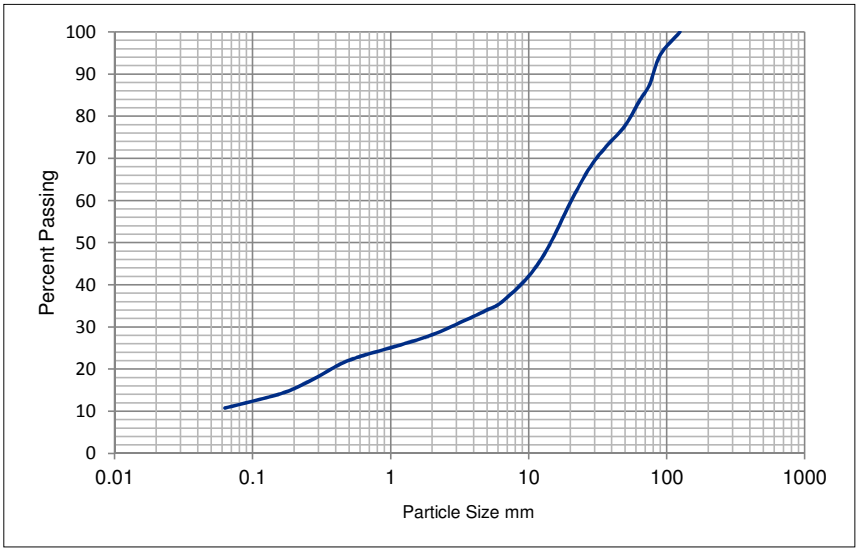
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7211		

Site Ref / Hole ID:	TP4	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown silty sandy GRAVEL with medium cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	95
75	87
63	83
50	78
37.5	73
28	68
20	59
14	49
10	42
6.3	36
5.0	34
3.35	31
2.00	28
1.18	26
0.600	23
0.425	21
0.300	18
0.212	16
0.150	14
0.063	11

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	17	N/A	D_{60} / D_{10}
Gravel	55		
Sand	17	**Dry mas of sample, kg**	
Silt / Clay	11	19.8	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

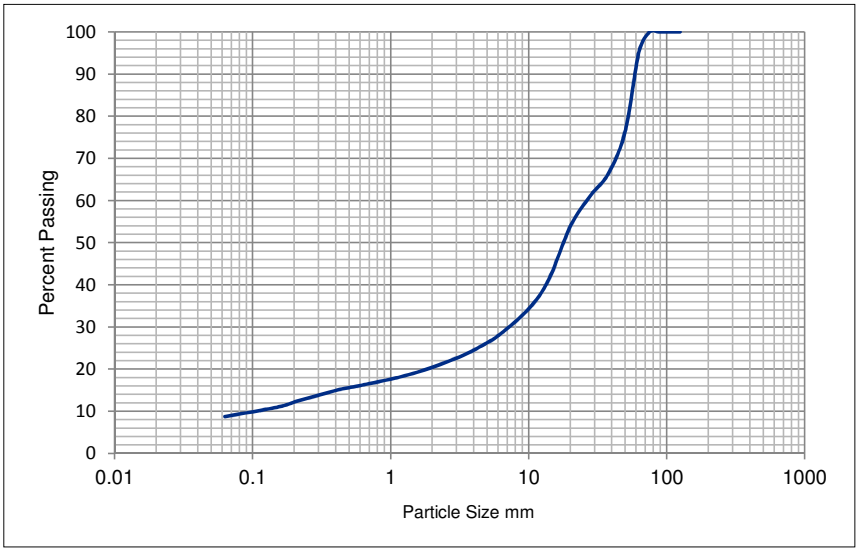
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7212		

Site Ref / Hole ID:	TP5	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown clayey sandy GRAVEL with low cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	95
50	76
37.5	66
28	61
20	54
14	41
10	34
6.3	28
5.0	26
3.35	23
2.00	20
1.18	18
0.600	16
0.425	15
0.300	14
0.212	12
0.150	11
0.063	9

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	5	N/A	D_{60} / D_{10}
Gravel	75		
Sand	11	**Dry mas of sample, kg**	
Silt / Clay	9	16.3	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

QA Ref.			Approver	Date	Fig
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	K Maid	01/10/2015	**PSD 5**
			L Maiden, Laboratory Supervisor		

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

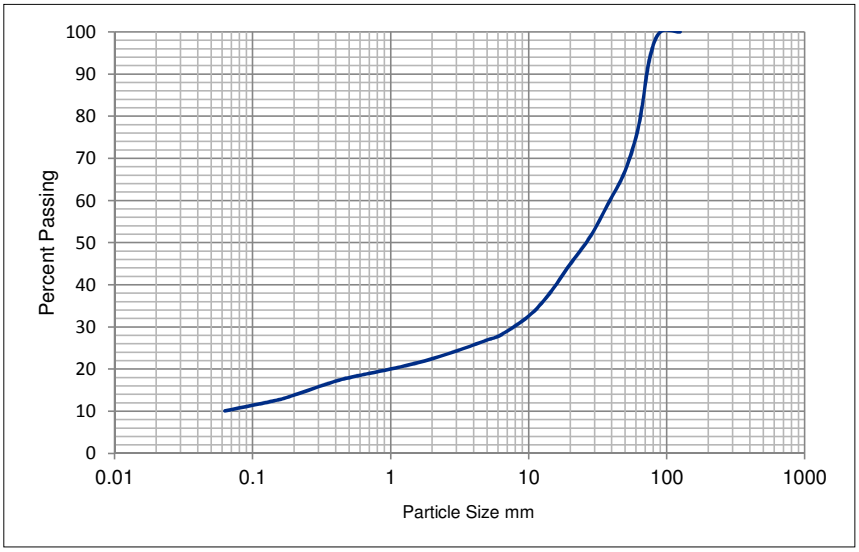
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7213		

Site Ref / Hole ID:	TP7	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown clayey sandy GRAVEL with high cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	93
63	78
50	67
37.5	59
28	51
20	45
14	38
10	33
6.3	28
5.0	27
3.35	25
2.00	22
1.18	21
0.600	19
0.425	17
0.300	16
0.212	14
0.150	13
0.063	10

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	22	N/A	D_{60} / D_{10}
Gravel	56		
Sand	12	**Dry mas of sample, kg**	
Silt / Clay	10	18.8	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

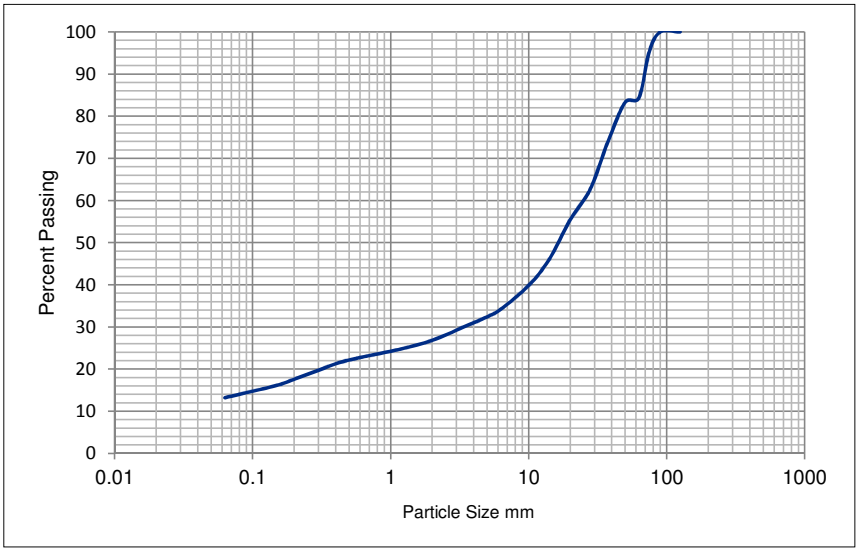
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7214		

Site Ref / Hole ID:	TP9	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown clayey sandy GRAVEL with medium cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	95
63	84
50	83
37.5	74
28	63
20	55
14	46
10	40
6.3	34
5.0	32
3.35	30
2.00	27
1.18	25
0.600	23
0.425	22
0.300	20
0.212	18
0.150	16
0.063	13

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	16	N/A	D_{60} / D_{10}
Gravel	57		
Sand	14	**Dry mas of sample, kg**	
Silt / Clay	13	18.4	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

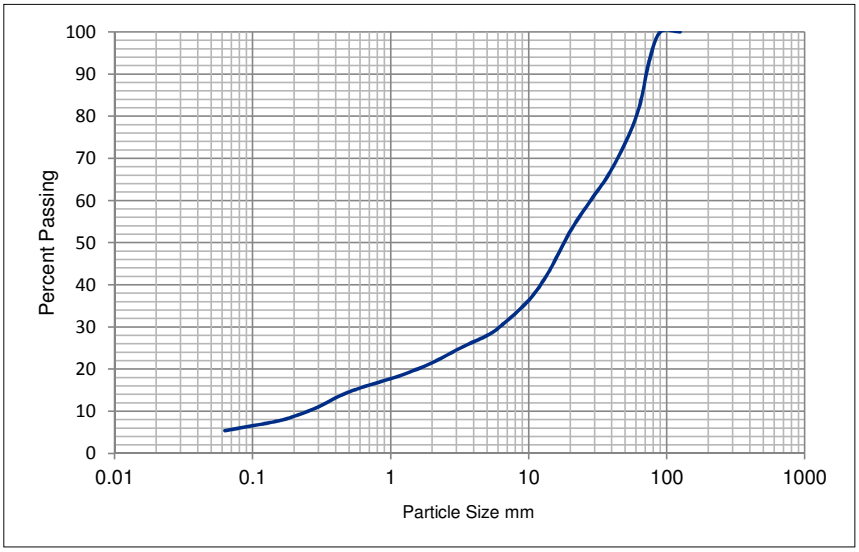
Project No:	D5234-15	**Client:**	Geotechnology Limited
Project Name:	1379 Atlantic	**Address:**	5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8HE
ATS Sample No:	7215		

Site Ref / Hole ID:	TP10	**Depth (m):**	
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey brown silty sandy GRAVEL with medium cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	24 September 2015	**Date Tested:**	30 September 2015

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	93
63	82
50	74
37.5	66
28	60
20	53
14	43
10	36
6.3	30
5.0	28
3.35	25
2.00	22
1.18	18
0.600	16
0.425	14
0.300	11
0.212	9
0.150	8
0.063	5

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	18	N/A	D_{60} / D_{10}
Gravel	60		
Sand	17	**Dry mas of sample, kg**	
Silt / Clay	5	18.6	N/A

Remarks: Sample all used. Insufficient material was supplied to provide a representative sample.
[Initial sample mass did not conform with BS1377: 1990: Part 2, Table 3]

QA Ref.			Approver	Date	Fig
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	K Maid	01/10/2015	**PSD 8**
			L Maiden, Laboratory Supervisor		

ATLANTIC WASTE ECOPARK PAVING PROJECT

CQA VALIDATION REPORT

Appendix 3
Photographic Record
Report Number 1379r5v1d1115

Single Layer Trial Pad - Core 1

Single Layer Trial Pad - Core 2

Single Layer Trial Pad – Core 3

Single Layer Trial Pad – Core 4

Single Layer Trial Pad – Core 5

Single Layer Trial Pad – Core 6

Double Layer Trial Pad – Core 1

Double Layer Trial Pad – Core 2

Preparation of subgrade for culvert

Shuttering for culvert base

Placement of 200mm unbound layer

Shuttering with reinforcement bars for culvert base

Culvert base with rebar upstands for headwall

Preparation of subgrade for final culvert section

Connection between Phase 1 & Phase 2 Culvert

200mm Unbound Aggregate Layer

CBR Testing on Formation

Trial Pad Construction

Shuttering for headwall

Power-floating to achieve finished surface

Power-floating to achieve finished surface

Finished Surface on Trial Pad

Bobcat with grading blade

Left: Crushing aggregate & mixing cement powder
Right: Placement of Cement Powder

Spinning laser for control of levels/leachate held on pad surface

Temporary bund & leachate held on pad surface

Fire waste placed on Phase 2

Crushing aggregate & mixing cement powder

Edge of pad to be cut away

Exposed edge of pad after 1st cut

Exposed edge of pad after 1st cut

Exposed edge of pad after 1st cut

Edge of pad after 2nd cut

Connection of pad to culvert

Backfilled borehole

Backfilled borehole

Phase 2 – Core 1

Coring of Phase 2 - Core 2

Coring of Phase 2 - Core 2

Phase 2 – Core 2A

Phase 2 – Core 2B

Phase 2 – Core 3

Coring of Phase 2 – Core 4A&B

Phase 2 – Core 5

Phase 2 – Core 6

Phase 2 – Core 7

Phase 2 – Core 8

Phase 2 – Core 9

Phase 2 – Core 10

Phase 2 – Core 11

Phase 2 – Core 12

Phase 2 – Core 13

Phase 2 – Core 14

Bound aggregate excavated from edge of pad

Phase 2 – Core 15

ATLANTIC WASTE ECOPARK PAVING PROJECT

CQA VALIDATION REPORT

Appendix 4
TVC Concrete Cube Laboratory Test Certificates
Report Number 1379r5v1d1115

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7078 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**TVC7 A + B TKT 2762**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**10/09/2015**
Location of placement in works	**Culvert**	Time sampled	**Unknown**
Specification as ordered	**C35**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref	A	B	C				
Condition at time of test	Water Saturated	Water Saturated					
Method of calculation	Water Displacement	Water Displacement					
Calculated Density	**2390**	**2400**					Kg/m^3

Curing

Date of receipt		15/09/2015	15/09/2015					
Date of test		17/09/2015	08/10/2015					
Age of specimen		**7**	**28**					Days
Curing conditions	min	18	18					℃
(since receipt)	max	22	22					

Compressive strength

Designated Size		150	150					mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150					
	Y_m	150	150					mm
	Z_m	150	150					
Surface condition		Surface Dried	Surface Dried					
		Checked	Checked					
Observations								
Adjustments/Preparation		None	None					
Maximum load at failure		586	930					KN
Failure type		Normal	Normal					
Compressive strength		**26.0**	**41.3**					Mpa (N/mm^2)

Remarks

QA Ref						
BSEN 12390	**Apex Testing Solutions**		Approver	Date	Fig.
Rev No 1	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	UKAS TESTING 7771	R. Anstee	16/10/2015	
19/05/2012	Tel: 01656 746762 Fax: 01656 749096		R Anstee, Laboratory Manager		

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7112 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**TVC8 A + B TKT 2763**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**15/09/2015**
Location of placement in works	**Culvert Pour 2**	Time sampled	**Unknown**
Specification as ordered	**C30**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref	A	B	C				
Condition at time of test	Water Saturated	Water Saturated					
Method of calculation	Water Displacement	Water Displacement					
Calculated Density	**2310**	**2310**					Kg/m^3

Curing

Date of receipt		18/09/2015	18/09/2015					
Date of test		22/09/2015	13/10/2015					
Age of specimen		**7**	**28**					Days
Curing conditions	min	18	18					℃
(since receipt)	max	22	22					

Compressive strength

Designated Size		150	150					mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150					
	Y_m	150	150					mm
	Z_m	150	150					
Surface condition		Surface Dried	Surface Dried					
		Checked	Checked					
Observations								
Adjustments/Preparation		None	None					
Maximum load at failure		472	778					KN
Failure type		Normal	Normal					
Compressive strength		**21.0**	**34.6**					Mpa (N/mm^2)

Remarks

QA Ref					
BSEN 12390	**Apex Testing Solutions**	Approver	Date	Fig.
Rev No 1	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ		16/10/2015	
19/05/2012	Tel: 01656 746762 Fax: 01656 749096	7771	R Anstee, Laboratory Manager	

TEST CERTI ICATE

Compressive Strength Density of Concrete Cubes (BS EN 12390-7 2009 BSEN 12390-3 2009)

Project No	**D5234-15**	Sample No	**7150 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**TVC9 A B T T 2764**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**18/09/2015**
Location of placement in works	**Culvert Pour 3**	Time sampled	**Unknown**
Specification as ordered	**C30**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref	A	B	C				
Condition at time of test	Water Saturated	Water Saturated					
Method of calculation	Water Displacement	Water Displacement					
Calculated Density	**2340**	**2340**					Kg/m^3

Curing

Date of receipt		24/09/2015	24/09/2015					
Date of test		25/09/2015	16/10/2015					
Age of specimen		**7**	**28**					Days
Curing conditions	min	18	18					°C
(since receipt)	max	22	22					

Compressive strength

Designated Size		150	150					mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150					
	Y_m	150	150					mm
	Z_m	150	150					
Surface condition		Surface Dried	Surface Dried					
		Checked	Checked					
Observations								
Adjustments/Preparation		None	None					
Maximum load at failure		486	762					KN
Failure type		Normal	Normal					
Compressive strength		**21.6**	**33.9**					Mpa (N/mm^2)

Remarks

QA Ref					
BSEN 12390	**Apex Testing Solutions**	Approver	Date	Fig.
Rev No 1	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ		18/10/2015	
19/05/2012	Tel: 01656 746762 Fax: 01656 749096	7771	R Anstee, Laboratory Manager	

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7151 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**TVC10 A + B TKT 2765**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**22/09/2015**
Location of placement in works	**Culvert Pour 4**	Time sampled	**Unknown**
Specification as ordered	**C30**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref	A	B	C				
Condition at time of test	Water Saturated	Water Saturated					
Method of calculation	Water Displacement	Water Displacement					
Calculated Density	**2380**	**2390**					Kg/m^3

Curing

Date of receipt		24/09/2015	24/09/2015					
Date of test		29/09/2015	20/10/2015					
Age of specimen		**7**	**28**					Days
Curing conditions	min	18	18					℃
(since receipt)	max	22	22					

Compressive strength

Designated Size		150	150					mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150					
	Y_m	150	150					mm
	Z_m	150	150					
Surface condition		Surface Dried	Surface Dried					
		Checked	Checked					
Observations								
Adjustments/Preparation		None	None					
Maximum load at failure		602	887					KN
Failure type		Normal	Normal					
Compressive strength		**26.8**	**39.4**					Mpa (N/mm^2)

Remarks

QA Ref						
BSEN 12390	**Apex Testing Solutions**		Approver	Date	Fig.
Rev No 1	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	UKAS TESTING 7771	R. Anstee	21/10/2015	
19/05/2012	Tel: 01656 746762 Fax: 01656 749096		R Anstee, Laboratory Manager		

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7256 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**29/09/15 A + B**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**29/09/2015**
Location of placement in works	**Unknown**	Time sampled	**Unknown**
Specification as ordered	**Unknown**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref		A	B				
Condition at time of test		Water Saturated	Water Saturated				
Method of calculation		Water Displacement	Water Displacement				
Calculated Density		**2290**	**2290**				Kg/m^3

Curing

Date of receipt		05/10/2015	05/10/2015				
Date of test		06/10/2015	27/10/2015				
Age of specimen		**7**	**28**				Days
Curing conditions	min	18	18				℃
(since receipt)	max	22	22				

Compressive strength

Designated Size		150	150				mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150				
	Y_m	150	150				mm
	Z_m	150	150				
Surface condition		Surface Dried	Surface Dried				
		Checked	Checked				
Observations							
Adjustments/Preparation		None	None				
Maximum load at failure		273	557				KN
Failure type		Normal	Normal				
Compressive strength		**12.1**	**24.8**				Mpa (N/mm^2)

Remarks

QA Ref BSEN 12390 Rev No 1 19/05/2012	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	UKAS TESTING 7771	Approver R Anstee, Laboratory Manager	Date 30/10/2015	Fig.

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7257 A**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**01/10/15 A**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**01/10/2015**
Location of placement in works	**Unknown**	Time sampled	**Unknown**
Specification as ordered	**Unknown**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref		A					
Condition at time of test		Water Saturated					
Method of calculation		Water Displacement					
Calculated Density		**2390**					Kg/m^3

Curing

Date of receipt		05/10/2015					
Date of test		29/10/2015					
Age of specimen		**28**					Days
Curing conditions	min	18					℃
(since receipt)	max	22					

Compressive strength

Designated Size		150					mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150					
	Y_m	150					mm
	Z_m	150					
Surface condition		Surface Dried					
		Checked					
Observations							
Adjustments/Preparation		None					
Maximum load at failure		813					KN
Failure type		Normal					
Compressive strength		**36.1**					Mpa (N/mm^2)

Remarks

QA Ref					
BSEN 12390 Rev No 1 19/05/2012	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	UKAS TESTING 7771	Approver R Anstee, Laboratory Manager	Date 30/10/2015	Fig.

TEST CERTIFICATE

Compressive Strength & Density of Concrete Cubes (BS EN 12390-7:2009 & BSEN 12390-3:2009)

Project No	**D5234-15**	Sample No	**7258 A - B**	Type	**Concrete**
Project Name	**Atlantic**	Client ID	**02/10/15 A + B**		
Client	**Geotechnology Limited**		**5 Ty Coed, Cefn-yr-Allt, Aberdulais, Neath, SA10 8 HE**		

Sampling

Type of sample	**Spot**	Date sampled	**02/10/2015**
Location of placement in works	**Unknown**	Time sampled	**Unknown**
Specification as ordered	**Unknown**	Delivery Number	**Unknown**
Sampling Remarks	**Cubes sampled and made by client**		

Density

Specimen Ref		A	B				
Condition at time of test		Water Saturated	Water Saturated				
Method of calculation		Water Displacement	Water Displacement				
Calculated Density		**2400**	**2410**				Kg/m^3

Curing

Date of receipt		05/10/2015	05/10/2015				
Date of test		09/10/2015	30/10/2015				
Age of specimen		**7**	**28**				Days
Curing conditions	min	18	18				℃
(since receipt)	max	22	22				

Compressive strength

Designated Size		150	150				mm
Actual Dimensions (mean) (if tested in accordance with Annex B)	X_m	150	150				
	Y_m	150	150				mm
	Z_m	150	150				
Surface condition		Surface Dried	Surface Dried				
		Checked	Checked				
Observations							
Adjustments/Preparation		None	None				
Maximum load at failure		625	1021				KN
Failure type		Normal	Normal				
Compressive strength		**27.8**	**45.4**				Mpa (N/mm^2)

Remarks

QA Ref BSEN 12390 Rev No 1 19/05/2012	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	UKAS TESTING 7771	Approver R Anstee, Laboratory Manager	Date 30/10/2015	Fig.

ATLANTIC WASTE ECOPARK PAVING PROJECT

CQA VALIDATION REPORT

Appendix 5
Slab Coring Laboratory Test Certificates
Report Number 1379r5v1d1115

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7580**		

Site Reference:	**Hole 3**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**208**
Minimum Length (mm):	**185**
Diameter:	**94**
Saturated Density (kg/m^3):	**2130**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**63 to 160**
Length/Diameter Ratio:	**1.03**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2140**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**3.0**
Type of Failure:	**Normal**

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

Remarks:

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7581**		

Site Reference:	**Hole 5**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**217**
Minimum Length (mm):	**188**
Diameter:	**94**
Saturated Density (kg/m^3):	**2190**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**65 to 160**
Length/Diameter Ratio:	**1.01**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2240**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**8.0**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7582**		

Site Reference:	**Hole 6**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**130**
Minimum Length (mm):	**113**
Diameter:	**94**
Saturated Density (kg/m^3):	**2190**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**7 to 105**
Length/Diameter Ratio:	**1.04**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2210**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**5.0**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7583**		

Site Reference:	**Hole 7**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**176**
Minimum Length (mm):	**160**
Diameter:	**94**
Saturated Density (kg/m^3):	**2160**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**35 to 137**
Length/Diameter Ratio:	**1.09**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2200**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**8.0**
Type of Failure:	**Normal**

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
EN 12504-1 Rev. 1.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	R. Anstee	09/11/2015	
		R Anstee, Laboratory Manager		

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7584**		

Site Reference:	**Hole 9**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**273**
Minimum Length (mm):	**259**
Diameter:	**94**
Saturated Density (kg/m^3):	**2090**

Visual Description:

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**40 to 138**
Length/Diameter Ratio:	**1.04**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2130**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**9.0**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7585**		

Site Reference:	**Hole 11**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**195**
Minimum Length (mm):	**178**
Diameter:	**94**
Saturated Density (kg/m^3):	**2190**

Visual Description:

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**30 to 125**
Length/Diameter Ratio:	**1.01**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2230**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**7.0**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7586**		

Site Reference:	**Hole 12**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**331**
Minimum Length (mm):	**298**
Diameter:	**94**
Saturated Density (kg/m^3):	**2160**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**90 to 187**
Length/Diameter Ratio:	**1.03**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2200**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**7.5**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7587**		

Site Reference:	**Hole 14**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**190**
Minimum Length (mm):	**163**
Diameter:	**94**
Saturated Density (kg/m^3):	**2190**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**30 to 125**
Length/Diameter Ratio:	**1.01**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2190**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**8.5**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

TEST REPORT

COMPRESSIVE STRENGTH CONCRETE CORES

BS EN 12504-1

Project No.:	**D5234-15**	Client:	**Geotechnology Limited**
Project Name:	**Atlantic**	Address:	**5 Ty Coed, Cefn-yr-Allt Aberdulais Neath SA10 8 HE**
ATS Sample No:	**7588**		

Site Reference:	**Hole 15**	Date Received:	**23 October 2015**
Location in works:	**Unknown**	Condition as Received:	**Dry**
		Cores Taken By:	**Apex Testing Solutions**
Mix Details:	**Unknown**	Direction of Drilling:	**Vertical**
Date Cast:	**Unknown**	Date of Drilling:	**23 October 2015**
Age at Test (days):	**Unknown**	Date Tested:	**06 November 2015**

TEST RESULTS

As Received

Maximum Length (mm):	**210**
Minimum Length (mm):	**184**
Diameter:	**94**
Saturated Density (kg/m^3):	**2130**
Visual Description:	

CBM containing 20mm aggregate with brick fragments. Aggregate evenly distributed with no segregation,

Size of Bar (mm)	Distance from centre of bar to the top of the core (mm)
None	

After Preparation

Method of End Preparation:	**Grinding**
Position Relative to Total Length (mm):	**60 to 155**
Length/Diameter Ratio:	**1.01**
Time in Water Before Test (days):	**1**
Saturated Density (kg/m^3):	**2160**
Surface Moisture Condition at Test:	**Wet**
Compressive Strength (N/mm^2)	**6.0**
Type of Failure:	**Normal**

Remarks:

Size of Bar (mm)	Distance from centre of bar to the nearest end (mm)
None	

QA Ref. EN 12504-1 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	Approver R. Anstee R Anstee, Laboratory Manager	Date 09/11/2015	Fig.