

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report
Report Number 1915r4v1d0722

Commissioned by
Tata Steel (UK) Limited
Port Talbot Works
Port Talbot
SA13 2NG



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1 INTRODUCTION

Geotechnology Ltd (Geotechnology) has been commissioned by Darlow Lloyd and Sons Ltd. on behalf of Tata Steel (UK) Ltd (Tata Steel) to provide site supervision and CQA validation during key stages of the construction of Biodegradable Sub-cell C, at Morfa Non-hazardous Landfill.

The cell construction has comprised the second half of Sub-cell C and this validation report references the constructed Cell as Cell C (B). The area of Cell C in its entirety is approximately 11980m² and the area constructed for Cell C (B) is approximately 7670m². The validation report for Cell C (A) was completed under report 1915r3v1d0221.

The location of the landfill is shown on Figure 1, and details of the constructed cell area on Figure 2.

This report documents and validates the construction of the cell, deployment of geosynthetic materials and placement of the leachate drainage layer.

1.1 Site Location

The centre of the site is located at National Grid Reference SS781 838, as shown on Figure 1. The site currently comprises a mixture of casually over-tipped land, landfills constructed in accordance with the current Landfill Directive since 2004 (MNHL and MHL), the unlined but capped MCL, partially excavated sand dunes and pristine dune fields.

The site is remote and located at the southern end of the Port Talbot Steel Plant. It is surrounded by land entirely owned by the company. The adjacent Margam Moors as far as the railway line to the east is owned by Tata Steel (UK) Ltd as is the site as far south as the River Kenfig. KNNR is located to the south of the River Kenfig and is bound by the southern bank of the River Kenfig.

There are no inhabited buildings within 1.9km and the nearest industrial buildings are close to 1km from the site. There are no public roads within 1km of the site and the adjacent beach is also under the private ownership of Tata Steel (UK) Ltd. There are no services crossing the site. One public footpath crosses the moors close to the site.

The footprint of the new Sub-cell lies entirely within the pre-existing Non-Hazardous Cell 1 and the edge of the Biodegradable Cells A & B, which are currently being restored.

1.2 Project Organisation

The Client for the contract is Darlow Lloyd and Sons Ltd (DLS) who were directly commissioned by Tata to complete the works.

The Designer for the Works is Mr Ewan Thomas of Geotechnology Ltd.

The Engineer for the Works is Geotechnology Ltd.

CQA inspectors for the works are Arwel Jones, Ben Rees and Keir Thomas of Geotechnology Ltd.

The Contractors involved with the project are listed below:

- Earthworks – DLS Ltd.
- Geomembrane Installer - Celtic Lining Ltd.
- Earthworks Testing Laboratory – Apex Testing Solutions Ltd. Geosite Testing Services Ltd.
- Geosynthetic Testing Laboratory - BICS Laboratories Ltd.

The following suppliers were involved with the works:

- GSE Ltd.- HDPE Liner Materials
- Geofabrics Ltd. - Protector Geotextile
- MGS Ltd. – Proprietary Gas Well Suppliers

1.3 CQA Plan and Specification

The installation of the lining system was carried out in accordance with the principles of the Construction Quality Assurance (CQA) Plan (Geotechnology Ref: 1915r1v1d0719) and Design and Specification (Geotechnology Ref: 1915r2v1d0719). These reports document the approach to be adopted for the approval of material suppliers, conformance testing of the materials supplied, approval of the lining system installer and monitoring of all processes involved with the installation, jointing and testing of the lining system. This report should be read in conjunction with these two documents.

2 OVERVIEW OF THE WORKS

2.1 Timescales

The main construction works for Cell C (A) were undertaken during the period March 2020 - January 2021. During this period a considerable amount of earthworks were also completed for Cell C (B). The majority of the earthworks were completed in the Autumn of 2021 and the main lining works in December 2021 and February 2022.

2.2 Timings and Construction Delay

The construction of Cell C (B) commenced in March 2020 with the excavation of materials from Non-Hazardous Cell 1. The 300mm 6F2 layer was placed by the end of October 2021. Work continued through November and December 2021 with placement of the 100mm dust regulating layer.

The HDPE was laid between 2 and 10 December and also on 7 and 8 February. The gap was due to additional geosynthetic material being ordered to complete the works. The geosynthetic materials were supplied from GSE Ltd and Geofabrics Ltd, through Celtic Lining Ltd. The material, as specified, comprised a Double Rough Sided 2mm HDPE. As per the CQA requirements, the material was tested under the conformance testing schedule set out in the Specification. All the conformance tests were satisfactory.

Leachate drainage stone placement started during the lining works to secure the geomembrane and protector geotextile. This work continued throughout December and was completed in April 2022. An initial survey undertaken on 22 March 2022 identified several thin areas of drainage stone which were remediated i.e. extra stone placed. A re-survey undertaken on in April confirmed adequate thickness of the remediated areas.

2.3 Design Changes

The design of Biodegradable Sub-cell C has an approximate total plan footprint of 11980m².

The actual as-built footprint of Cell C (B) is approximately 7670m², which constitutes (65%) of the original total.

The protector geotextile was down-graded to a HPS17 from the HPS19 specified as a result of a successful cylinder test result.

2.4 Preparatory Earthworks

The preparatory earthworks commenced in early 2020 with the excavation of waste materials from Non-Hazardous Cell 1. This work was completed on the October 2021 with the removal of several soft spots identified at formation level. Formation level was reinstated with coarse aggregate immediately following removal of the soft materials in accordance with the specification.

2.5 Regulating Layers

Regulating layer placement commenced at the end of October 2021 with the placement of the 6F2. The 100mm dust layer was placed onto the 6F2 in preparation for the HDPE flexible membrane liner.

2.6 Flexible Membrane Liner

A 2mm High Density Polyethylene (HDPE) Geomembrane was installed directly above the regulating layer. The Specification document required the use of 2mm double textured geomembrane for the entire cell footprint.

The HDPE terminates in an anchor trench on the crest of the northwest slope to provide anchorage to both the geomembrane and overlying protector geotextile. The HDPE on the southeast side of the Cell abuts and is directly joined onto Biodegradable Sub-cells A& B.

Manufacturers Quality Control data for the lining membrane delivered to site was supplied by GSE Limited, who manufactured the rolls. Samples of the received materials were taken by Celtic Lining Ltd. The samples were sent to BICS Laboratories Limited for conformance testing.

Each deployed panel was assessed for flaws in the geomembrane and seaming. Non-destructive testing was undertaken on all seams and destructive samples collected from a selection of seams. All flaws and areas from which destructive samples were taken were repaired prior to deployment of the protector geotextile.

2.7 Protector Geotextile

A protector geotextile was placed directly onto the HDPE geomembrane to provide protection from the overlying leachate drainage layer. The protection geotextile terminates in the same anchor trench as the geomembrane.

Geofabrics Limited, the protector geotextile manufacturer, supplied quality control data for the geotextile rolls delivered to site. Samples were also taken by the lining contractor of the received materials and sent to BICS Laboratories Ltd for conformance testing.

The protection geotextile was installed in accordance with the Specification and CQA Plan.

2.8 Aggregate Leachate Drainage Layer

The drainage blanket was installed in the cell to a nominal minimum thickness of 300mm above the protector geotextile. The leachate drainage stone was placed in the cell by a low pressure excavator working off a thickened roadway to minimise damage to the protector geotextile and underlying HDPE.

The aggregate used was a nominal 10-30mm aggregate and comprised recycled slag aggregates obtained by mining of the wastes within Non-Hazardous Cell 1 itself.

3 SITE PREPARATION

3.1 Preparatory Earthworks

The preparatory earthworks commenced in early 2020 with the excavation of waste materials from Non-Hazardous Cell 1. This material was transported to a processing area within Non-Hazardous Cell 2 where it was screened for aggregate production and scrap metal recovery. DLS Limited utilised a grading laser set up on control points established by Geotechnology using a dGPS survey instrument to achieve the correct formation levels.

Upon completion of this operation Geotechnology staff undertook an inspection of the formation surface in September 2021. The inspection identified some very minor soft spots at formation level. The soft materials were removed and replaced by suitable coarse aggregate and thoroughly compacted. A topographic survey of the final formation surface was carried out following reinstatement of the soft spots. The contour plan of the Formation surface is shown on Figure 3.

The final formation surface was inspected by Geotechnology and approved for acceptance of the overlying regulating layers.

4 REGULATING LAYERS

The regulating layer aggregate comprises screened slag recovered from the excavation of Non-Hazardous Cell 1. These materials were stored close to the processing area in the adjacent Non-Hazardous Cell 2. The aggregate was transported from the storage area by A25 Volvo dumpers for immediate placement in the new cell. Photographs of the placed 6F2 are included in Appendix 1.

The regulating layers comprise a 6F2 material placed to a nominal thickness of 300mm and a 100mm thick “dust” layer on top to accept the overlying HDPE.

4.1 Placement

Prior to placement of the regulating layer the formation surface was visibly inspected to ensure that the formation did not contain coarse particles or significant protrusions that could potentially compromise the lining system or soft spots which would result in excessive settlement.

Regulating layer thickness control was achieved using a spinning laser set up with control points installed by Geotechnology using a dGPS survey instrument. The final thickness of laid Regulating Layer is shown on Figure 4 as an isopachyte. All thicknesses across the base achieved the minimum 300mm required as per the Specification. One localised area on the side slope fails to meet the required thickness. However, a visual inspection of this area showed no protuberances and due to the location minimal waste loading is expected.

In many parts of the cell the thickness of the Regulating Layer greatly exceeds the 300mm specification requirement for the 6F2 and the 100mm of dust specified. The final levels of the placed regulating layer are shown on Figure 5.

4.2 Testing

In accordance with the Specification, conformance and compliance testing was completed on the regulating layer materials. Conformance testing comprised 3 tests in advance of the works and compliance testing at a rate of 1 per 1000 tonnes delivered to the project stockpiles. Testing comprised solely of particle size distributions. Testing was completed by Apex Testing Solutions Ltd.

The laboratory test results of the regulating layers are included in Appendix 2.

6F2 Test Results

A total tonnage of approximately 4870 tonnes of 6F2 was manufactured and delivered to the cell. A total of 3 conformance and 10 compliance tests were completed in accordance with the Specification and the required testing frequency. The laboratory results are included in Appendix 2.

Table 4-1 below shows the range of results obtained and the Specification requirement:

Table 4-1 6F2 Test Results

BS TEST SIEVE(mm)	REQUIRED TYPICAL PERCENTAGE PASSING (%)	Sample Number												
		22234	22235	22236	22237	22238	26400	26401	26402	26403	26404	26405	26406	26407
125	100	100	100	100	100	100	100	100	100	100	100	100	100	100
90	80-100	100	100	100	100	100	100	100	100	100	100	100	100	100
75	65-100	100	100	100	100	100	100	100	100	100	100	100	100	100
37.5	45-100	84	84	79	82	83	89	87	99	91	95	93	94	92
10	15-60	35	30	29	30	24	38	41	50	49	48	52	51	46
5	10-45	15	15	13	14	13	26	28	37	36	32	35	37	29
0.6	0-25	4	4	4	4	3	14	13	19	18	15	15	18	13
0.063	<10	2	2	2	2	2	5	6	6	7	5	6	6	6

An approximate tonnage of 1500 tonnes of dust was manufactured and delivered to the cell C (B). A total of 3 conformance and 5 compliance tests were completed which meets and exceeds the Specification in terms of frequency. The laboratory results are included in Appendix 2 and are summarised on Table 4-2 below.

Table 4-2 Dust Test Results

BS TEST SIEVE (mm)	REQUIRED TYPICAL PERCENTAGE PASSING (%)	Sample Number							
		21862	22823	22824	22825	23174	23175	23176	23177
10	100	100	100	100	100	100	100	100	100
2	85	82	78	55	75	87	75	77	83
0.063	<10	9	13	4	9	7	9	9	8

4.3 Test Results Observations

The results of the regulating layers show that the 6F2 material was generally in accordance with the Specification. A slight partition in results is observed and the 26400 sample series lie slightly outside the 10mm sieve. This will have no effect on the performance and integrity of the 6F2 regulating layer.

However, the dust material lies outside the specification and with respect to the design, gradings are in parts non-compliant. This was also the case with Cell C (A).

Considerable difficulty was observed in manufacturing and achieving the fine grained material below the 85% at the 2mm sieve size. Some results were satisfactory, but the majority were observed to be below. On-site observation of the dust material once placed did, however, show that it provided a smooth and unyielding surface to place the HDPE on. Photographs of the dust surface are shown in Appendix 1.

Geotechnology considers that the final regulating layer surface was entirely suitable for deployment of HDPE.

5 FLEXIBLE MEMBRANE LINER

In combination, the CQA records provided in Appendix 3 to 6, document the complete deployment and satisfactory testing of the HDPE lining system.

5.1 Geomembrane Materials

The geomembrane used in the works comprised only 2mm double textured High Density Polyethylene (HDPE) on the slopes and base of the sub-cell. A total of 18 rolls were delivered for the project. This includes an additional 2 rolls delivered in January 2022. A log of the geomembrane received is presented in Appendix 3. Photographs of the delivery are included in Appendix 1 of the first validation report 1915r3v1d0221.

5.2 Geomembrane Manufacture and Supply

The geomembrane was manufactured and supplied by GSE Ltd. and Solmax who also provided the specification sheets for the material and the relevant reel certificates for each individual roll. Copies of the manufacturer's quality control test data are included in Appendix 3, demonstrating compliance with the Specification.

13 rolls of double textured HDPE membrane were used in the project for Cell C (B).

5.3 Geomembrane Conformance Testing

A total of 4 conformance samples were taken from the textured rolls delivered to site during the first Phase and an extra 1 was taken for the additional HDPE delivery in January 2022. These results are included in Appendix 4 along with the conformance test results. As the total area lined was 11980m², this testing frequency considerably exceeds the required rate of 1 per 5000m² stated in the Specification. The exceedance is in part due to considerable differences in the material batches delivered.

HDPE samples were submitted for conformance testing to BICS Laboratories Ltd, Brighouse, West Yorkshire. Laboratory conformance test certificates are presented in Appendix 4 and a summary of results provided in Table 5-1. These indicate that the new materials delivered met the required performance specification. The results of the other conformance tests referred to above are all shown to be satisfactory.

Table 5-1 Textured 2.0mm HDPE Membrane Properties

Property	Test Method	Specif. Req.	Conformance Result - 420072346	Conformance Result - 420072344	Conformance Result - 1005-048078	Conformance Result - 1005-048017	Conformance Result - 101013
Thickness (mm) • Lowest individual for 8 out of 10 values • Lowest individual for any of the 10 values	D5199	nom. 2mm (-5%) - -10% - -15%	2.03	1.97	1.98	2.02	2.04
Asperity Height mils	GRI/M12	0.25 mm	0.79	0.73	0.54	0.53	0.53
Density	D1505-10	0.940 g/cc	0.944	0.942	0.944	0.944	0.949
Tensile Properties • Yield strength • Break strength • Yield elongation • Break elongation	D 6693 Type IV	29 N/mm 21 N/mm 12% 100%	MD/CD 42.4/43.6 41.7/43.6 17/16 500/338	MD/CD 43.1/41.7 45.2/37.5 16/15 536/432	MD/CD 41.7/44.2 48.1/47.3 17/16 510/518	MD/CD 39/40.8 50.0/41.6 17/16 566/542	MD/CD 39.9/40.7 44.2/42.4 16/16 550/536
Tear Resistance	D 1004	249 N	338/326	326/331	295/336	315/325	328/329
Puncture Resistance	D 4833	534 N	828	798	801	825	800
Carbon Black Content (range)	D 1603	2.0 – 3.0%	2.49	2.37	2.73	2.75	2.49
Carbon Black Dispersion	D5596	1-2	1	1	1	1	1

NOTE: Machine Direction (MD) / Cross Machine Direction (CMD) *

5.4 Geomembrane Deployment

The geomembrane was installed in accordance with the requirements set out in the Specification following acceptance of the mineral liner. The geomembrane was installed on 2,3,9 and 10 December 2021 and on 7 and 8 February 2022, as confirmed by the records in Appendix 5.

The geomembrane was installed as a series of panels, numbered sequentially in order of deployment. In order to distinguish between Cell C (A) panels, the panels on Cell C (B) have the suffix B. The rolls were manoeuvred into place with a 360 degree tracked excavator fitted with a spreader bar. The geomembrane deployment was monitored and inspected by the Engineer ensuring compliance with the details set out in both the CQA plan and Specification.

The HDPE CQA data and the lining contractor's daily records for the deployment of the geomembrane are included in Appendix 5. The HDPE panel layout for the geomembrane is shown on Figure 6.

5.5 Geomembrane Seaming

The CQA data for the seaming activities in connection with the installation of the geomembrane is provided in Appendix 5. In combination, the records provided in Appendix 5 confirm that all seams shown on Figure 6 were tested.

5.5.1 Trial Seams

Trial seams were carried out at the start of each seaming period and for each machine used.

Trial seams, with a minimum length of 1.50m were prepared from fragment pieces of geomembrane liner. Sample specimens 25mm wide were cut from trial seams, approximately 200mm apart. The samples were tested in the field for peel and shear strength. If any samples failed, machinery adjustments were made and the testing repeated.

5.5.2 Fusion Welding

Fusion welding was performed on the geomembrane for the lining works.

The Engineer inspected fusion welds in accordance with the CQA Plan. The CQA field seam records for the fusion welds are presented in Appendix 5.

The CQA data for the fusion welds completed are shown in Appendix 5.

5.5.3 Extrusion Welding

Extrusion welding was only undertaken in areas where it was not possible to use fusion welders. These included the tie-in to Biocells A & B, beaded repairs, three way joints and all patched repairs. Extrusion welds and repairs are identified on Figure 6.

The CQA data for the extrusion welds completed are shown in Appendix 5.

5.5.4 HDPE Walkover Inspection

Prior to the panels being covered over by the protector Geotextile, a walkover inspection was undertaken by the Engineer.

5.5.5 HDPE Repairs

Repairs to the geomembrane were undertaken during the liner installation. All defects noted were repaired in accordance with the Specification and CQA plan.

A total of 15 repairs were undertaken on the HDPE. Photographs of repairs are provided in Appendix 5 and the locations shown on Figure 6. Destructive samples were taken in sacrificial areas where repairs would not be required.

5.6 Seam Testing

5.6.1 Air Pressure Testing

Fusion seams were subjected to air pressure testing in accordance with the Specification. The CQA Data for the air testing of the fusion seams is included in Appendix 6.

5.6.2 Vacuum Box Testing

Extrusion welds were only undertaken in areas that required a repair and on the long extrusion weld joining Sub-cell C (B) to Biocells A & B, these were vacuum box tested. All vacuum box testing was observed to be satisfactory.

5.6.3 Destructive Testing

Samples were cut from installed seams to provide a method of obtaining quantitative results for the seam strength. Sample locations were selected at a frequency of approximately 1 test per 143m for fusion seams, exceeding the requirement of 1 per 200m. Approximately 120m of extrusion welding was completed, but 3 extrusion seam destructive tests were taken to test the effectiveness of the extrusion welding as dummy welds. This also exceeds the requirement of 1 test per 150m. These tests are included in Appendix 6 and summarised in Table 5-2 below. The destructive samples were completed by BICS Laboratories Ltd.

Table 5-2 Destructive Laboratory Test Results

Sample ID	Seam Reference	Weld Type	Peel (N/mm)		Shear (N/mm)	
			Mean	Lowest	Mean	Lowest
DS-1	P3B/P4B	Fusion	29.1	28.0	33.7	33.1
DS-2	P4B/P6B	Fusion	29.2	28.0	34.0	33.3
DS-3	P9B/P11B	Fusion	27.4	25.9	33.8	25.5
DS-4**	P14B/P15B	Fusion	25.7/29.8	18.7/28.1	35.7/33.8	35.4/33.1
DS-5	Dummy	Extrusion	23.0	19.3	32.8	30.0
DS-6	P15B/P17B	Fusion	27.4	25.6	35.7	35.2
DS-7**	P19B/P20B	Fusion	25.0/30.5	19.6/28.2	35.3/33.9	35.3/33.7
DS-8	Dummy	Extrusion	24.1	20.6	34.4	32.5
DS-9	P22B/P24B	Fusion	25.5	24.1	35.1	34.6
DS-10	P26B/P27B	Fusion	25.7	24.8	35.2	34.7
DS-11	Dummy	Extrusion	23.3	20.0	34.7	33.2

** original and re-test peel and strength values included

Note: Required Parameters - Peel Value = 21.2N/mm (fusion) 18.2N/mm (extrusion) , Shear Value = 28N/mm (fusion and extrusion)

It was noted that of the 10 individual tests completed as part of each destructive test, some 1-2 peel separation failures were noted in DS4 and DS7. The failures did not affect the overall (mean) peel and shear strength requirements for the seam. Geotechnology requested that a sub-sample acquired from each seam was re-tested to see if further (and more extensive) failure occurrences were present. The results of the re-testing of DS4 and DS7 indicated that the results were satisfactory. It is considered that based on the fact that the sub-sample re-test and the original site field tests were also observed to be satisfactory, no further remedial works are required. This is also based on the location of the seam and context of the lining system.

All results are included in Appendix 6.

6 PROTECTOR GEOTEXTILE

6.1 Geotextile Works

The geotextile protection layer was placed directly onto the geomembrane to protect it from the overlying drainage layer blinding aggregate.

6.2 Cylinder Test

Prior to commencement and acquisition of the protector Geotextile, discussions were held with Geofabrics Ltd. and a decision made to test two HPS material types for suitability. Both HPS17 and HPS19 were tested.

A cylinder test was undertaken in accordance with Environment Agency Guidance and the Specification to determine the suitability of the geotextile protection layer. The results of this cylinder test are provided in Appendix 7 and showed that the HPS17 was suitable for use. A product data sheet for HPS17 is also included in Appendix 7.

6.3 Manufacture and Supply

The geotextile used was HPS17 which is a non-woven polypropylene needle punched fibre manufactured by Geofabrics Ltd. The manufacturers' quality control certificates for delivered HPS17 are included in Appendix 8. Two deliveries totalling 40 Rolls were made to site on 27 November and 1 December. A third delivery of 4 rolls was made on the 22 January 2022. The delivery notes are included in Appendix 8.

A log of the protector geotextile (inventory) received is also presented in Appendix 8.

6.4 Conformance Testing

Three samples of the as delivered protector geotextile were taken for conformance testing at a rate of 1 per 6000m². Results are included in Appendix 9.

The samples for conformance testing were sent to BICS Laboratories Ltd. in accordance with the Specification. The test certificates provided in Appendix 9 and the summary in Table 6-1 indicate that the samples met the requirements of the revised Specification based on the cylinder test for the HPS17.

Table 6-1 Protector Geotextile Testing

Property	Unit	Typical Mean Value	Allowable tolerance to 95% confidence limits	Conformance Test 23525/013	Conformance Test 23525/022	Conformance Test 25184/016
Static CBR Puncture resistance	kN	17	-10%	20.59	20.95	20.59
Plunger Displacement	mm	65	n/a	81	82	80
Tensile strength (md)	kN/m	90	-10%	101.4	95.0	94.6
Tensile strength (cmd)	kN/m	90	-10%	142.8	141.4	135.4
Tensile Elongation (md)	%	80	+/-30%	123.5	126.9	98.2
Tensile Elongation (cmd)	%	80	+/-30%	119.6	109.8	85.3
Cone Drop	mm	0	+3mm	0	0	0
Thickness @ 2kPa	mm	8.8	n/a	9.32	9.70	10.74

6.5 Deployment and Seaming

The geotextile protection layer was deployed by positioning the rolls with an excavator then hand rolling down the slopes to avoid damage to the geomembrane. The geotextile was installed as a series of panels. Adjacent panels were overlapped and secured by heat seaming. Six panels were run perpendicular to the slope in order to reduce manual handling of the rolls where excavator access was no longer possible. A series of small panels were required to complete the join in to the existing Biocell A and B.

Figure 7 shows the as-laid Geotextile Panel Layout.

6.6 Geotextile Walkover Inspection

A visual inspection of the geotextile protection layer was made after deployment. No compliance testing is specified for the placed geotextile other than a detailed inspection during a walk-over. It can be confirmed that all seams were heat fused to the required overlap. Photographs of the as-laid Protector Geotextile are presented in Appendix 1.

7 LEACHATE DRAINAGE AGGREGATE

7.1 Supply and Importation

The aggregate for the drainage layer was generated by screening and recovery of waste materials removed during the excavation of Non-Hazardous Cell 1 to the design formation. The aggregate was stockpiled near to the processing area in Non-Hazardous Cell 2, before being transported to the new sub cell C (a) via dumper for immediate placement.

7.2 Conformance and Compliance Testing

The placed drainage layer aggregate was tested for particle size distribution in accordance with BS EN 933-1 1997. Tests results from the three samples tested are provided in Appendix 10 while Table 7-1 provides a comparison of the results with the Specification. The testing shows that the material generally satisfies the Specification. There are some minor non-compliance issues, specifically with regards to the material being 1-3% outside some sieve sizes. One sample lies significantly outside the specification on the 20mm sieve and is discussed further below. These are unlikely to affect the performance of the manufactured slag aggregate.

Table 7-1 Leachate Drainage Layer Particle Size Distribution

British Standard Sieve Size (mm)	Specification (%)	Sample Number						
		21863	22826	22827	22828	23231	23232	23233
63	-	100	100	100	100	100	100	100
40	100	100	100	100	100	100	100	100
31.5	98 to 100	100	100	100	100	100	100	100
20	80 to 99	58	100	98	98	99	100	100
14	20 to 70 (+/- 15)	33*	73*	73*	74*	54	59	64
10	0 to 20	11	13	11	13	16	18	19
4	0 to 5	2	4	3	5	6	8	8

*Completed on 16mm sieve

In addition, it should be noted that the conformance samples were completed using a 16mm sieve and not the 14mm, hence the higher retained values. It is believed that these would be within the tolerance provided for the Specification i.e. 20-70 (+/-) 15%. The results are very similar to the ones obtained for Cell C (A), which (as a drainage blanket) is performing satisfactorily.

One sample notably sample No.21863 lies outside the specification on the 20mm sieve, in that a significant portion is retained at this sieve size. Importantly the sample material all passes the 31.5mm sieve and is therefore compliant with the maximum permissible. It is compliant with all the other sieve sizes. The sample is coarser than all the other samples and is considered to be an outlier and may well be a result of sampling error. Visual examination of the drainage blanket in-situ confirms the homogenous nature of the drainage blanket in line with the specification.

The drainage aggregate fines values of the 3 samples required (and tested) are all in excess of the required 100kN, and are therefore considered to be satisfactory. The laboratory certificate for this result is also included in Appendix 10.

7.3 Placement

The leachate drainage aggregate comprised a free draining 10 - 30mm sized, slag aggregate which was placed in a single layer onto the protection geotextile.

This drainage layer was placed by backhoe excavator to a nominal thickness of 300mm though CQA monitoring revealed this was variable and typically exceeded. When placing the drainage stone onto the fabric the machine swivelled as little as possible. The layer placement was controlled by laser level based on set out control points.

An isopachyte of the drainage aggregate thickness is shown on Figure 8 which shows a thickness of 300mm is achieved throughout. The final as-built levels of the drainage layer are shown on Figure 9.

8 GAS WELL INSTALLATION

8.1 Delivery

The gas wells delivered and installed are larger in diameter than that specified, mainly due to the smaller diameter no longer being manufactured. The gas wells installed are 327mm in internal diameter. This exceeds the Specification and is considered to be satisfactory. A copy of the as-supplied delivery note is included in Appendix 11.

8.2 Installation

Geotechnology visited the site to examine the installed gas wells and can confirm that the base plates on all six and initial pipe sections on two of the gas wells have been satisfactorily installed. The gas well locations have also been surveyed as per the table below. Photographs of the installed wells are included in Appendix 11 and the gas well locations are shown on Figure 10.

Table 8-1 Gas Well Installation

Gas Well No.	Eastings	Northings	Base Plate Elevation mAOD
GA25	183999.4	278251.1	*
GA26	184007.8	278234.1	14.077
GA27	184019.9	278209.2	16.827
GA28	184019.9	278209.2	*
GA29	184024.6	278265.3	12.502
GA30	184033.0	278247.3	14.157
GA31	184046.2	278222.7	*
GA32	184049.3	278275.8	12.899
GA33	184056.4	278258.4	14.392

*Base plate and first pipe length already installed – base plate level not obtained. Co-ordinates surveyed adjacent to gas well. This information can be used to update the monitoring register for the site.

9 CERTIFICATION

9.1 Earthworks

It is confirmed on the basis of the inspection reported that the earthworks, including the removal of soft spots and placement of the regulating layers were completed in accordance with the principles of the Specification.

9.2 Flexible Membrane Liner

It is confirmed on the basis of the inspection and testing, completed and reported, that the HDPE lining geomembrane has been installed in accordance with the Specification and CQA Plan.

9.3 Protector Geotextile

A revision has been made to the as specified protector geotextile as a result of a successful cylinder test to use HPS17 as opposed to HPS19.

It is confirmed on the basis of the inspection and testing completed and reported that the protector geotextile has been installed in accordance with the Specification and CQA plan.

9.4 Drainage Layer

It is confirmed based on the testing that the material used in the drainage layer is acceptable and has been placed in accordance with the Specification and CQA Plan.

9.5 Gas Wells

The base plates for each well have been installed and in the case of gas wells GA25, 28 and 31, the first length of pipe installed.

9.6 Verification

Based on the CQA inspection and testing undertaken at the site and the records available, it is confirmed that the development and associated lining works undertaken at Morfa Non-Hazardous Landfill Sub-cell C (B) has been completed in accordance with the principles of the Specification and CQA Plan.

Signatures

I can confirm that I am satisfied that the Works have been constructed in accordance with the Design Specification and CQA Plan.

A handwritten signature in black ink, appearing to read 'A.W. Jones', written in a cursive style.

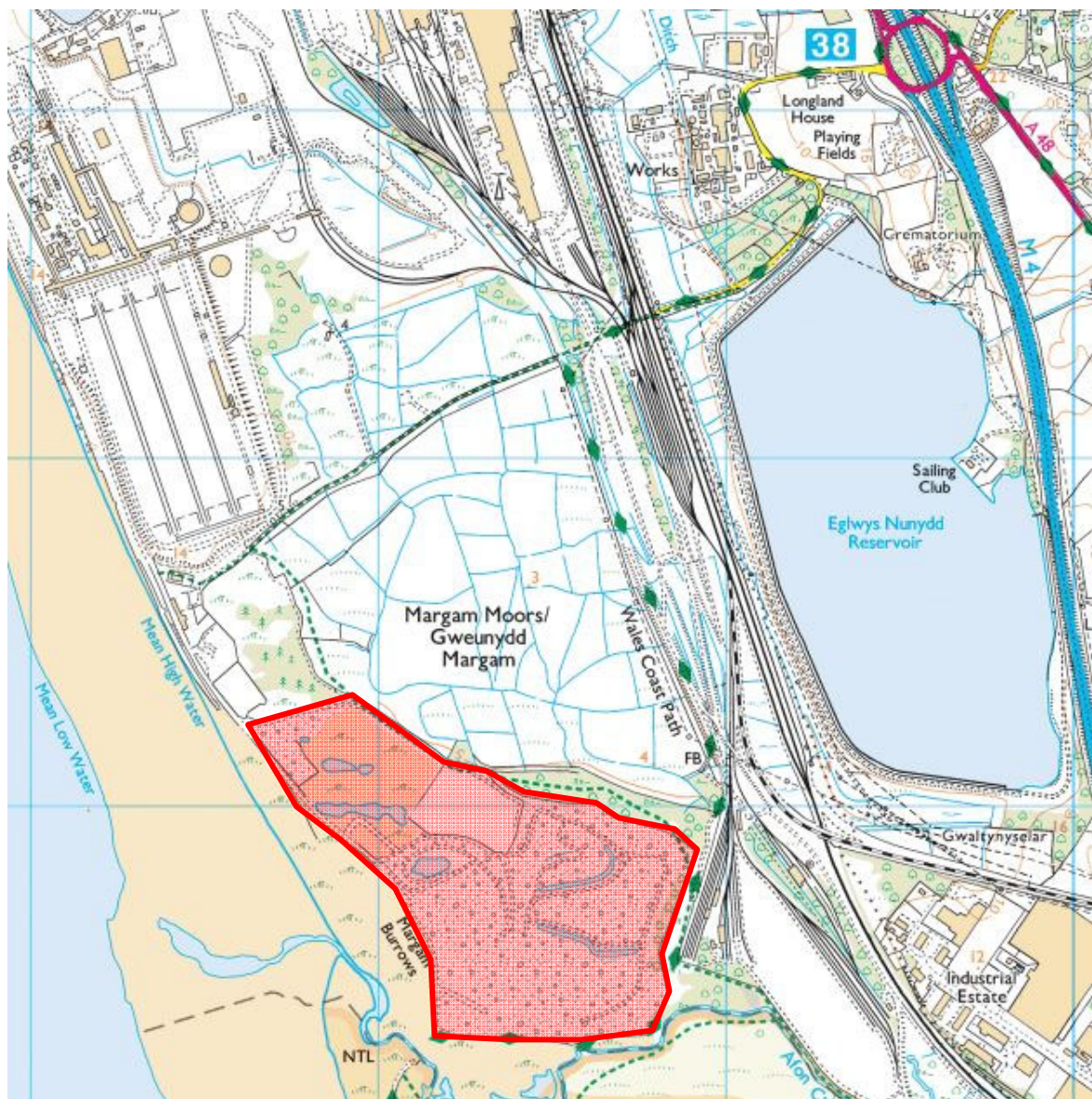
A.W Jones, CQA Consultant

I can confirm that on the basis of the records within this report and my site visits I am satisfied that the Works have been constructed in accordance with the Design Specification and CQA Plan.

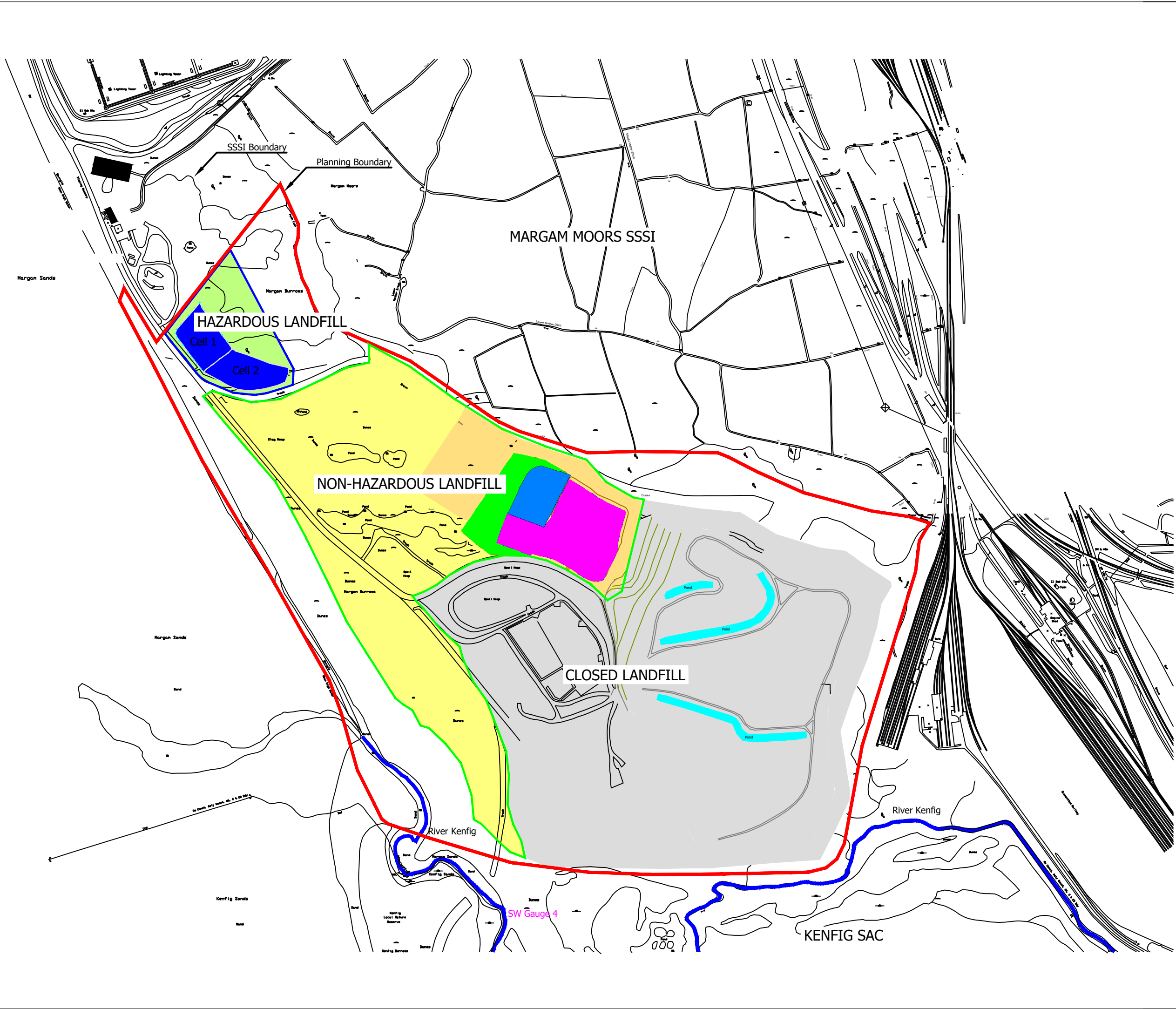
A handwritten signature in black ink, appearing to read 'E. Thomas', written in a cursive style with a horizontal line underlining the name.

E. Thomas, Designer

Figure 1 Site Location Plan



Reproduced from the Ordnance Survey Land Ranger Map
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Drawing Number 1915r4/2

Legend

- Undeveloped Part of MHL
- Developed Part of MHL
- Developed Part of MNHL
- Undeveloped Part of MNHL
- Restored MCL
- BioCell and Extension Area
- Cell C (B) Area
- 1973 Planning Permission Boundary

Notes

Rev	Date	Status/Ammendments
-----	------	--------------------

CLIENT		
Tata Steel (UK) Ltd.		

PROJECT		
Morfa Biocell Extension Cell C (B)		

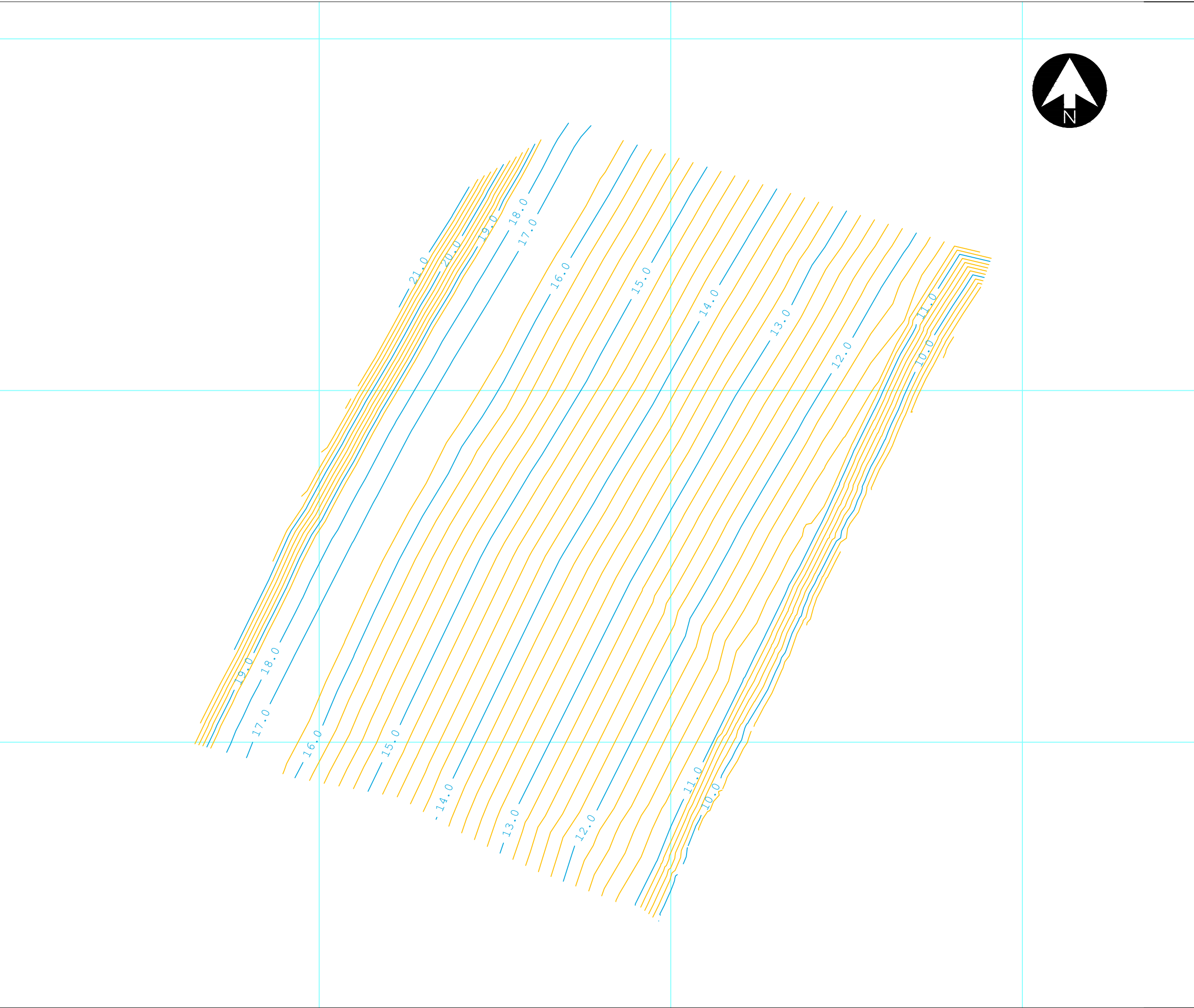
TITLE		
Morfa Non-Hazardous Landfill Location		

DRAWING NUMBER		REVISION
1915r4/2		0

DATE	DRAWN	CHECKED	SCALE AT A3
07.22	AWJ		NTS

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Drawing Number 1915r4/3

- Legend
-  Normal Contour (0.5m)
 -  Prominent Contour (2.5m)
 -  Spot Level
 -  Soft Spot (Removed)

Notes

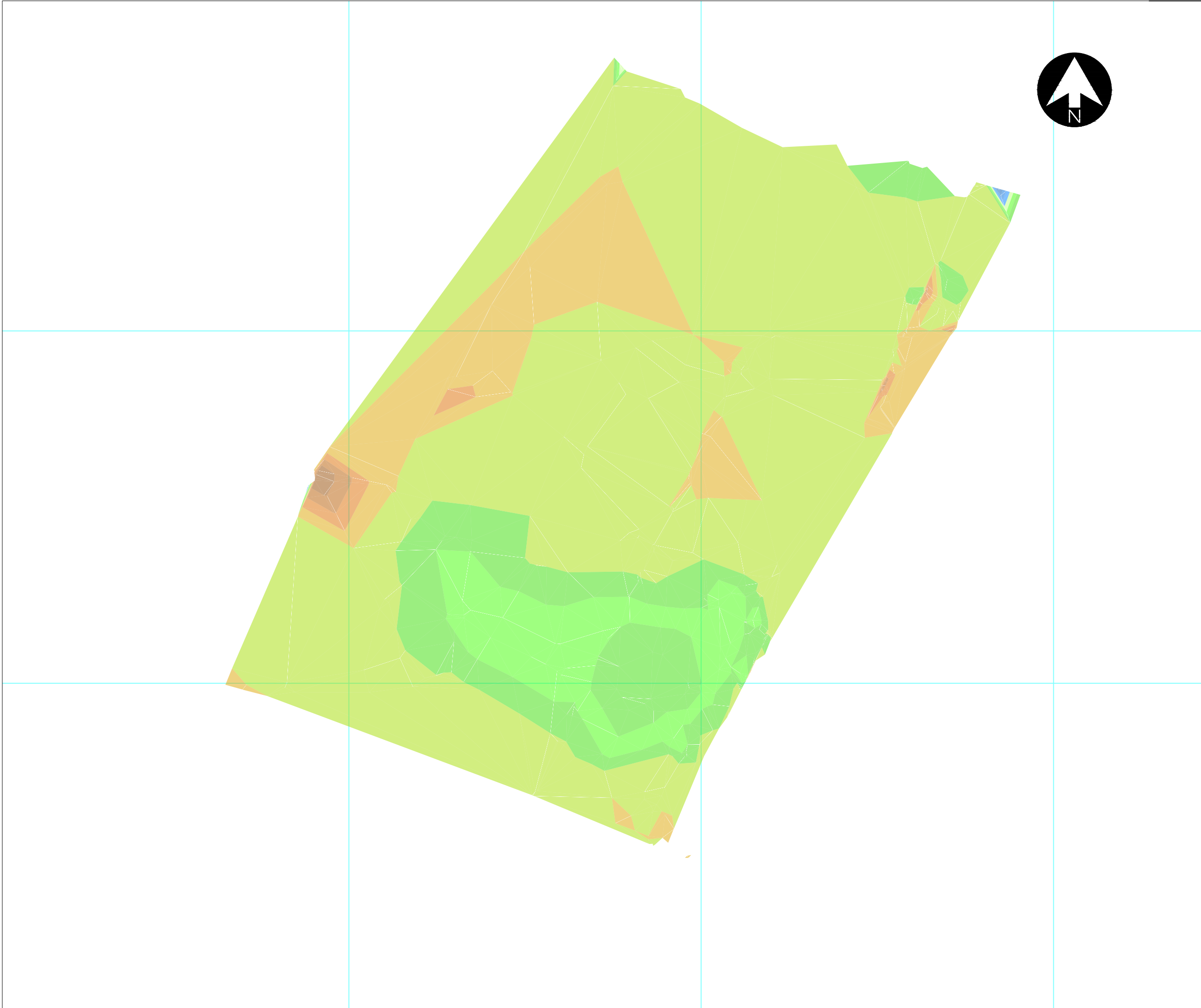
Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 January 2021.

Formation surveyed with Topcon Hiper SR dGPS Network Rover during construction.

Rev	Date	Status/Ammendments
CLIENT		
Tata Steel (UK) Ltd.		
PROJECT		
Morfa Biocell Extension Cell C (B)		
TITLE		
As Built Formation Levels		
DRAWING NUMBER		REVISION
1915r4/3		0
DATE	DRAWN	CHECKED
07.22	KJT	
		SCALE AT A3
		1:500

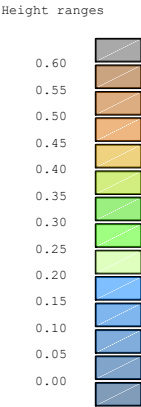
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Drawing Number 1915r4/4

Legend

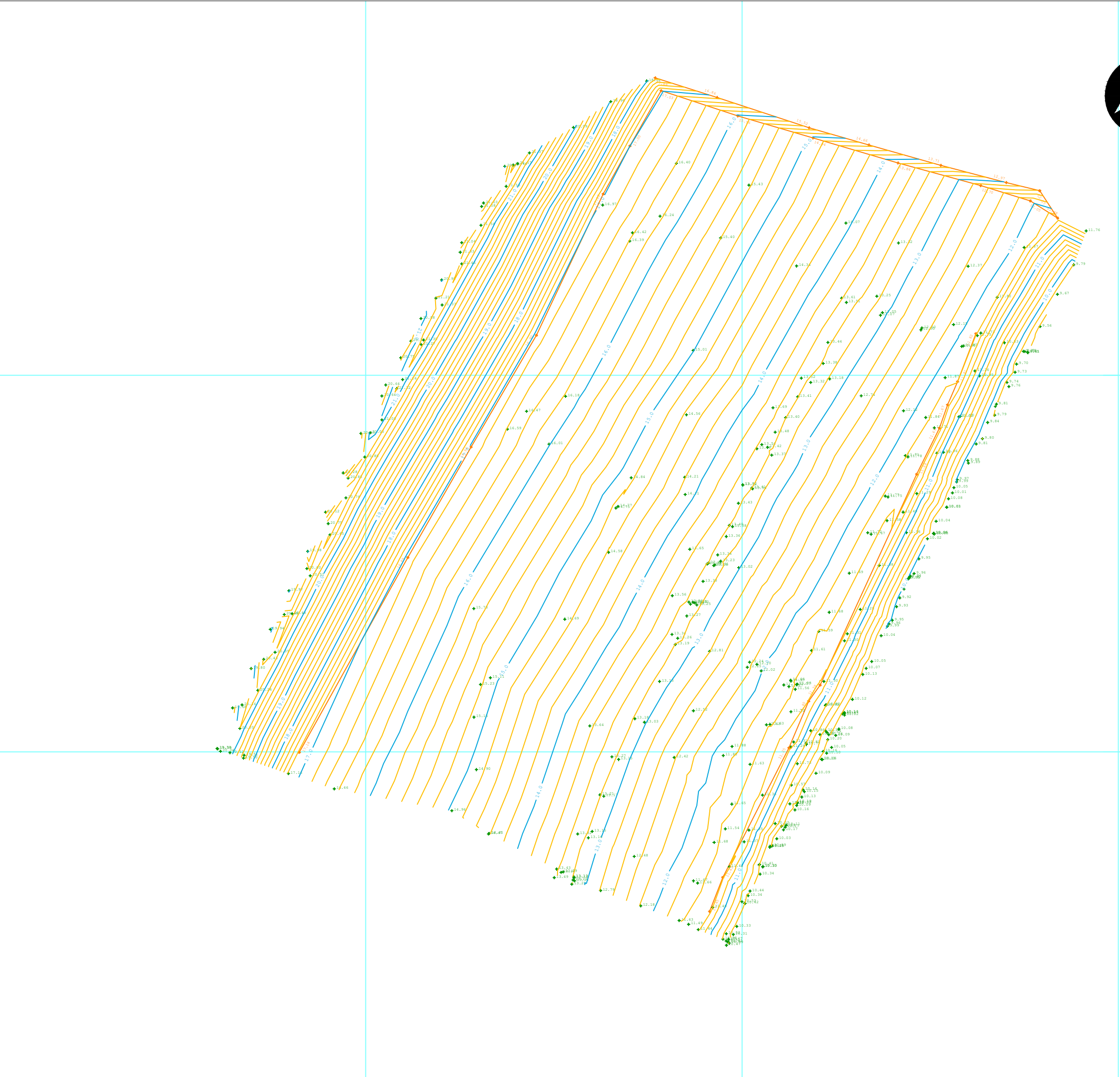


Notes

Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 January 2021.

Regulating layer and Formation surveyed with Topcon Hiper SR dGPS Network Rover during construction.

Rev	Date	Status/Ammendments
CLIENT		
Tata Steel (UK) Ltd.		
PROJECT		
Morfa Biocell Extension Cell C (B)		
TITLE		
As-Built Regulating Layer Isopachyte		
DRAWING NUMBER		REVISION
1915r4/4		0
DATE	DRAWN	CHECKED
07.22	KJT	
		SCALE AT A3
		1:500
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Drawing Number 1915r4/5

- Legend
-  Normal Contour (0.5m)
 -  Prominent Contour (2.5m)
 -  Spot Level
 -  Top of Bank
 -  Bottom of Bank

Notes

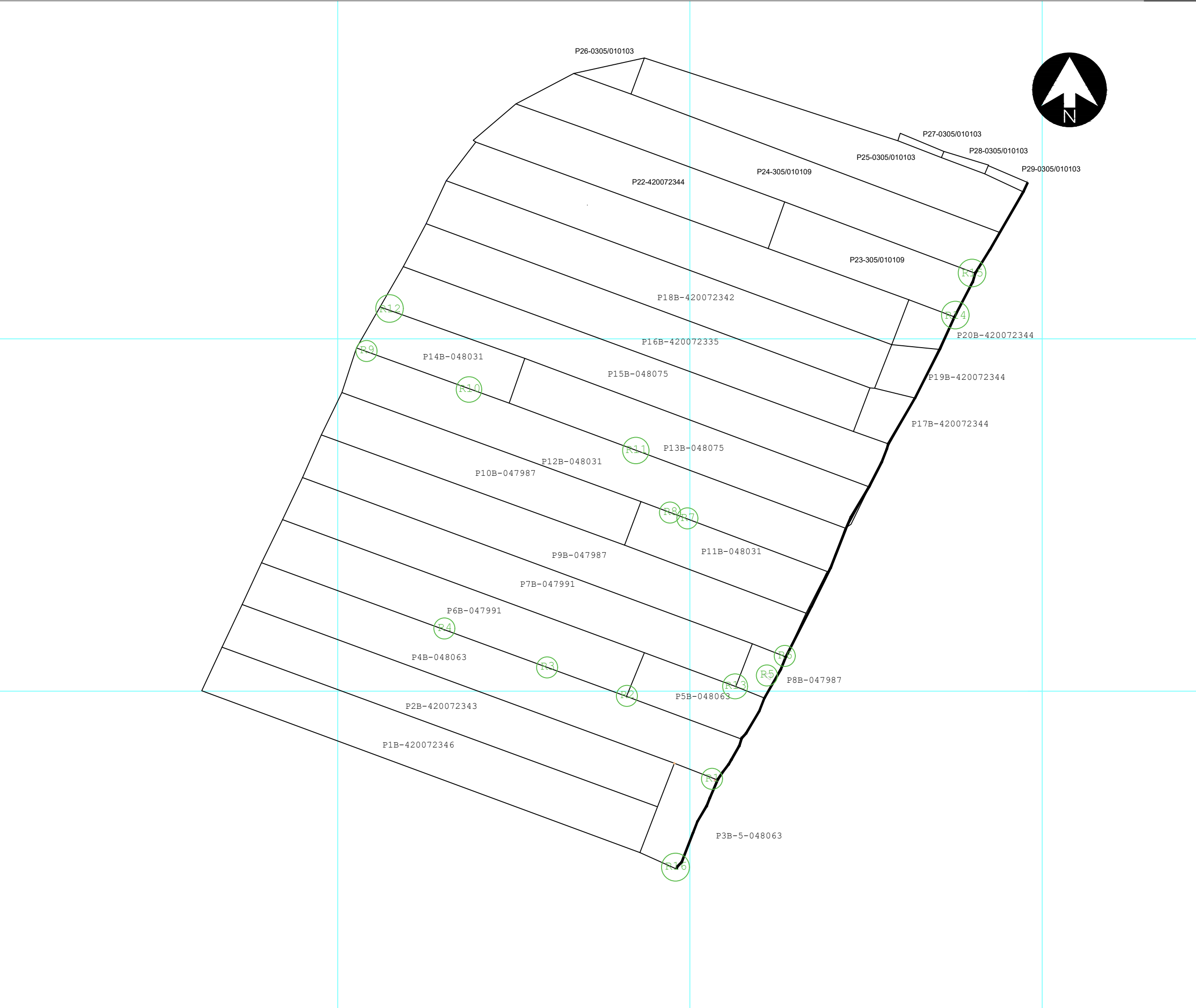
Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 January 2021.

Formation surveyed with Topcon Hiper SR dGPS Network Rover during construction.

Rev	Date	Status/Ammendments
CLIENT		
Tata Steel (UK) Ltd.		
PROJECT		
Morfa Biocell Extension Cell C (B)		
TITLE		
As-Built Regulating Layer Levels		
DRAWING NUMBER		REVISION
1915r4/5		0
DATE	DRAWN	CHECKED
07.22	KJT	
		SCALE AT A3
		1:500

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Drawing Number 1915r4/6			
Legend P15B-048075 Panel / Roll Number Repair / Extrusion Weld			
Notes Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 January 2021. Panel layout surveyed with Topcon Hiper SR dGPS Network Rover during construction.			
Rev	Date	Status/Ammendments	
CLIENT			
Tata Steel (UK) Ltd.			
PROJECT			
Morfa Biocell Extension Cell C (B)			
TITLE			
As-Built HDPE Panel Layout and Repairs			
DRAWING NUMBER			REVISION
1915r4/6			0
DATE	DRAWN	CHECKED	SCALE AT A3
07.22	AWJ		1:500
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/



Legend

Notes

Panel layout surveyed with Topcon Hiper SR
dGPS Network Rover during construction.

Rev	Date	Status/Ammendments

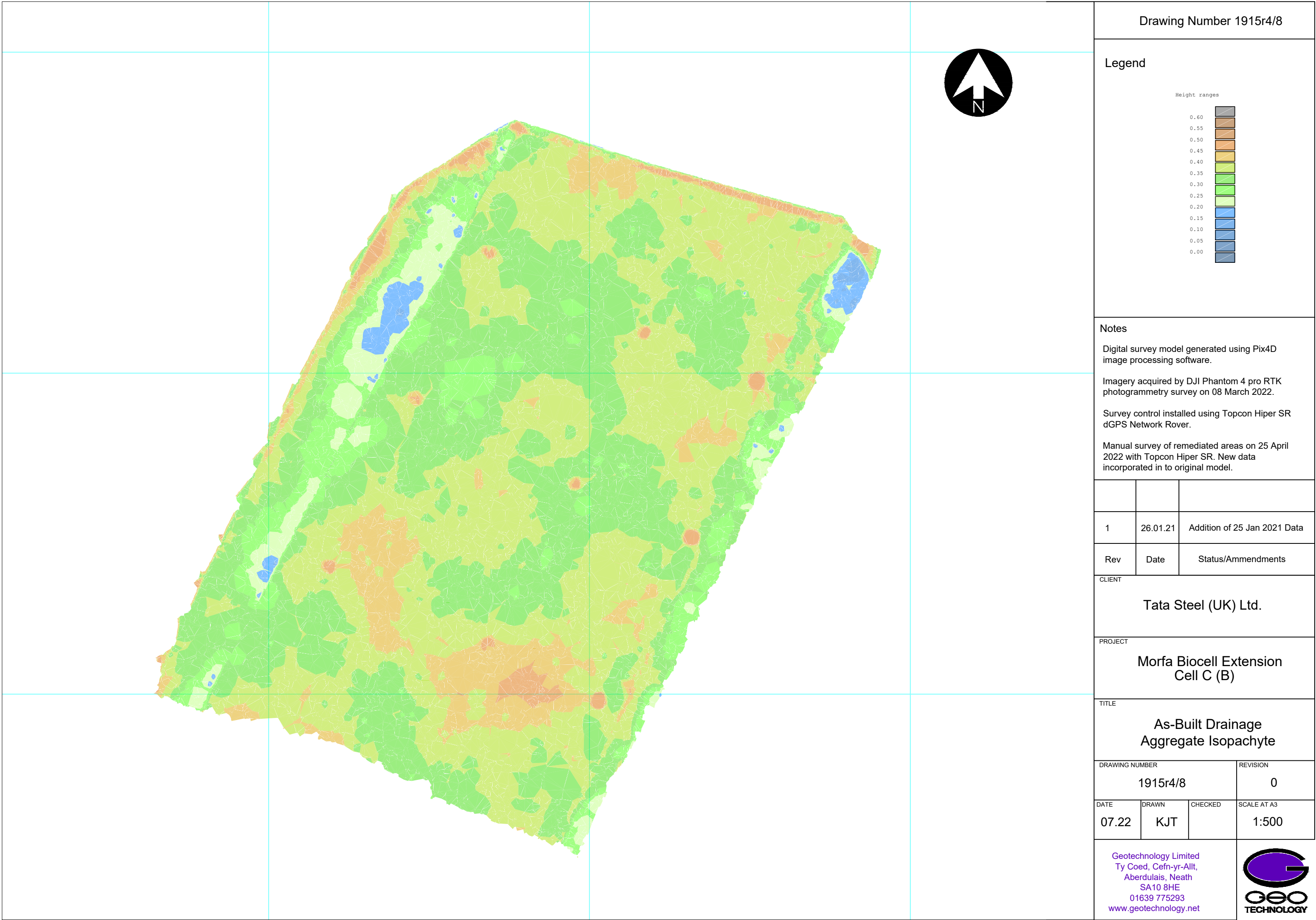
Tata Steel (UK) Ltd.

Morfa Biocell Extension
Cell C (B)

As-Built Protector Geotextile Panel Layout

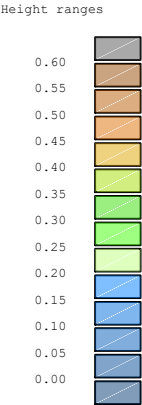
DRAWING NUMBER			REVISION
1915r4/7			0
DATE	DRAWN	CHECKED	SCALE AT A3
07.22	AWJ		1:500





Drawing Number 1915r4/8

Legend



Notes

Digital survey model generated using Pix4D image processing software.

Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 March 2022.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

Manual survey of remediated areas on 25 April 2022 with Topcon Hiper SR. New data incorporated in to original model.

1	26.01.21	Addition of 25 Jan 2021 Data
Rev	Date	Status/Ammendments

CLIENT

Tata Steel (UK) Ltd.

PROJECT

Morfa Biocell Extension
Cell C (B)

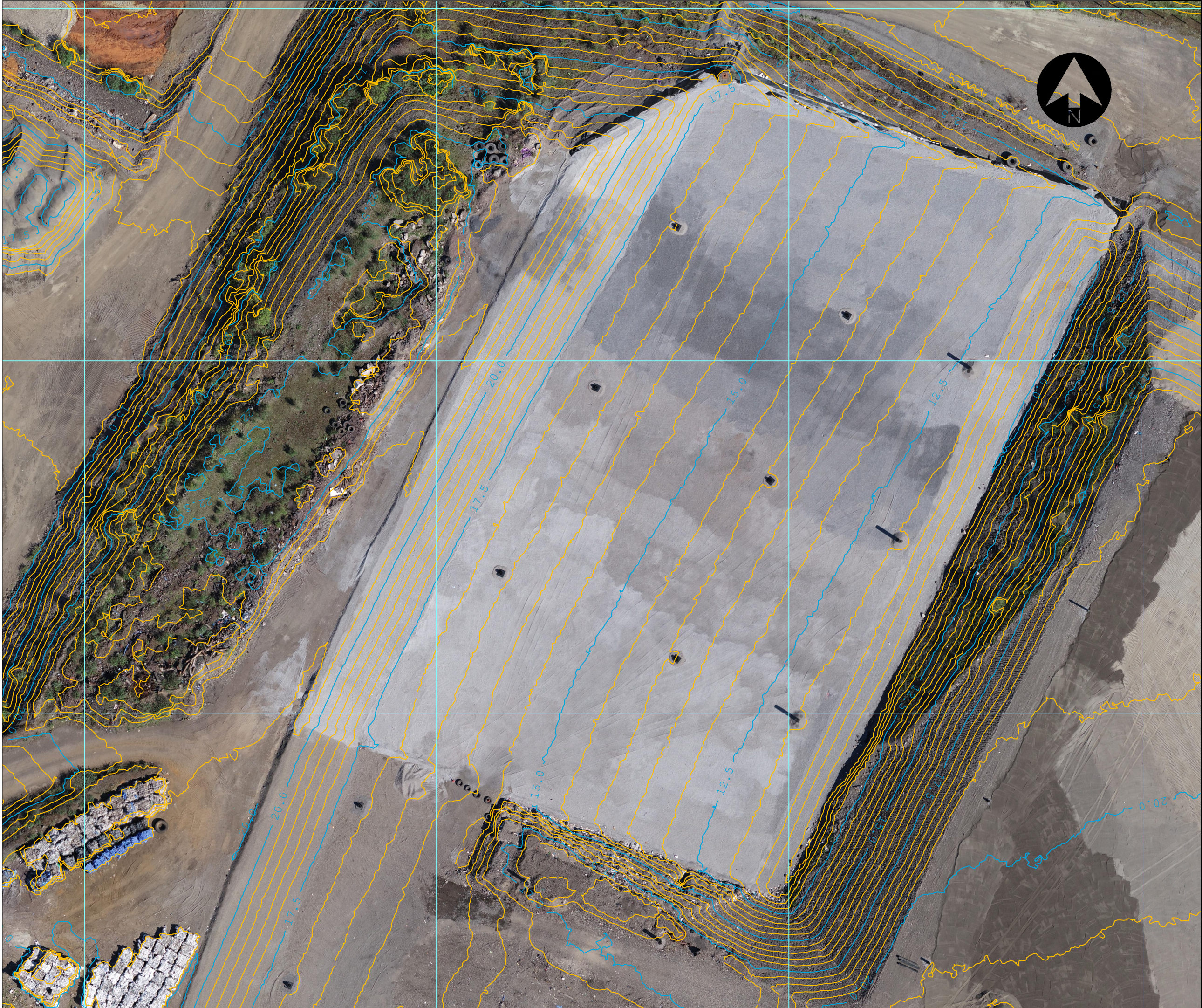
TITLE

As-Built Drainage
Aggregate Isopachyte

DRAWING NUMBER			REVISION
1915r4/8			0
DATE	DRAWN	CHECKED	SCALE AT A3
07.22	KJT		1:500

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Drawing Number 1915/4/9

Legend

-  Normal Contour (0.5m)
-  Prominent Contour (2.5m)

Notes

Digital survey model generated using Pix4D image processing software.

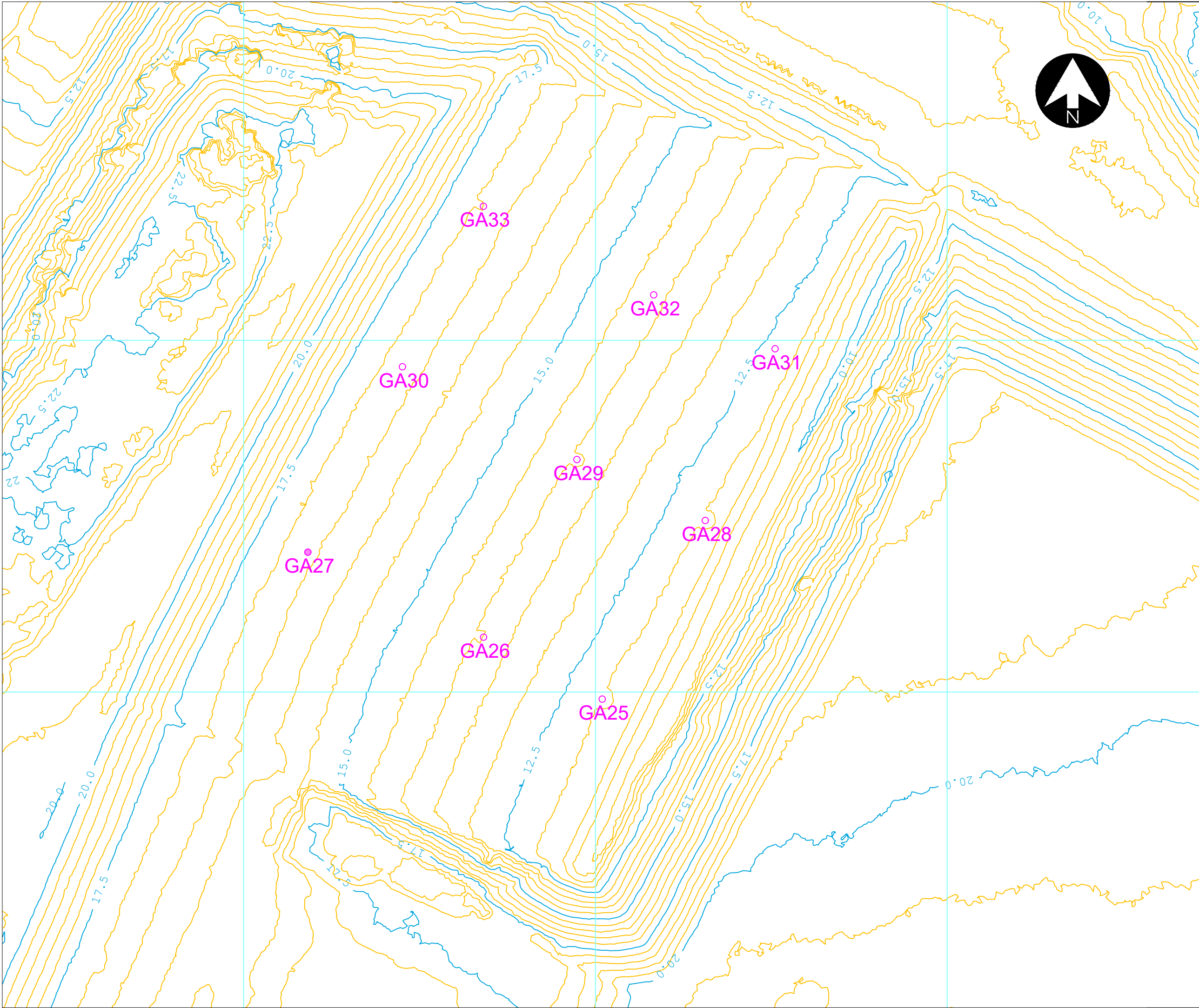
Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 26 April 2022.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

Rev	Date	Status/Ammendments
CLIENT		
Tata Steel (UK) Ltd.		
PROJECT		
Morfa Biocell Extension Cell C (B)		
TITLE		
As-Built Leachate Drainage Layer		
DRAWING NUMBER		REVISION
1915/4/9		0
DATE	DRAWN	CHECKED
06.22	KJT	
		SCALE AT A3
		1:500

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Drawing Number 1915/4/10			
Legend  Normal Contour (0.5m)  Prominent Contour (2.5m)  Gas Well Location and Number			
Notes Digital survey model generated using Pix4D image processing software. Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 26 April 2022. Survey control installed using Topcon Hiper SR dGPS Network Rover.			
Rev	Date	Status/Ammendments	
CLIENT			
Tata Steel (UK) Ltd.			
PROJECT			
Morfa Biocell Extension Cell C (B)			
TITLE			
As-Built Gas Well Locations			
DRAWING NUMBER		REVISION	
1915/4/10		0	
DATE	DRAWN	CHECKED	SCALE AT A3
07.22	AWJ		1:500
Geotechnology Limited Ty Coed, Cefn-yr-Allt, Aberdulais, Neath SA10 8HE 01639 775293 www.geotechnology.net			

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 1
Site Photographs
Report Number 1915r4v1d0722



Excavation of Formation



Placement of 6F2



Placement of Dust Regulating Layer



Placement of HDPE



Extrusion welding at toe of slope



Vacuum Box Testing



Toe connection with Biocells A & B



Eastern edge of Cell C (B)



Completed drainage layer with base gas wells in-situ

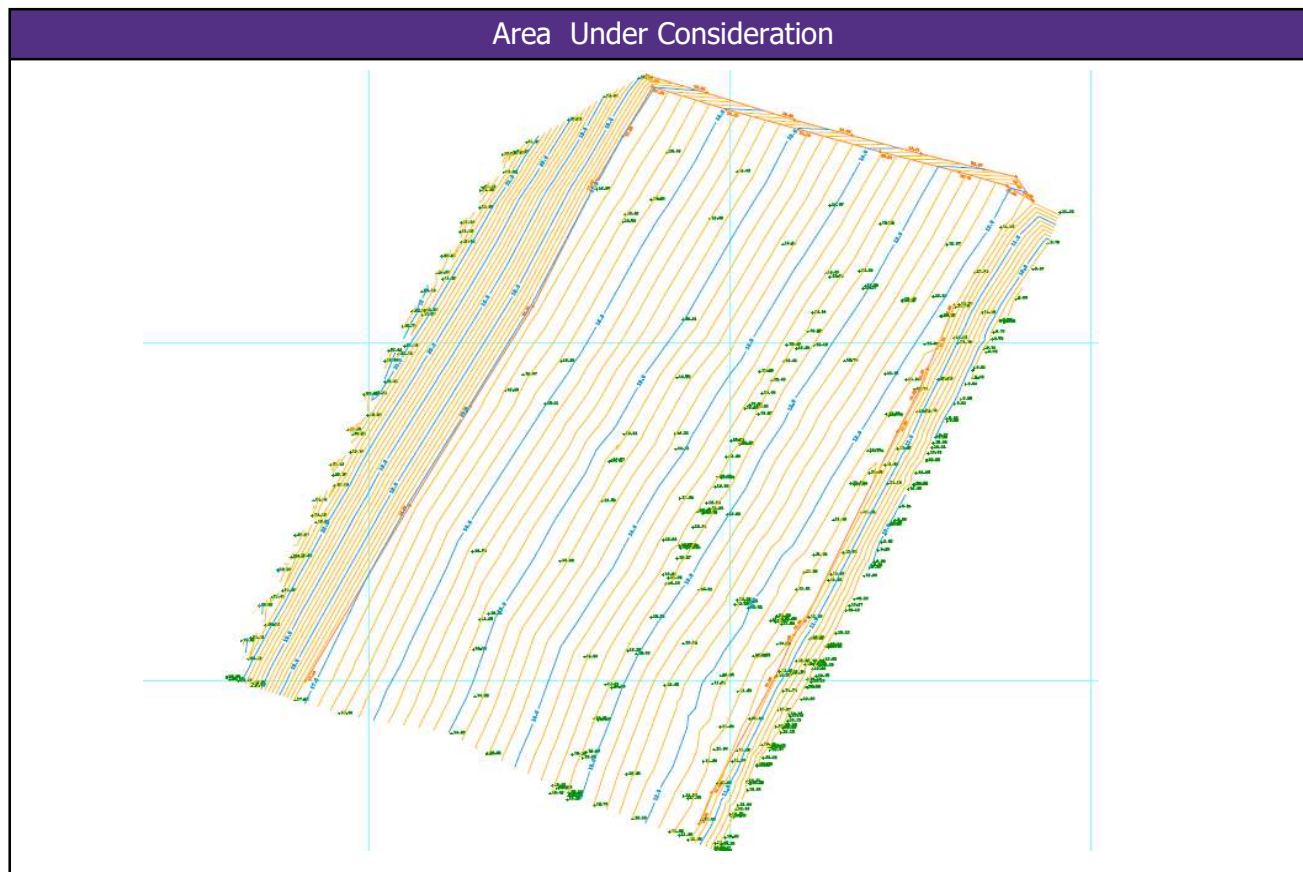
**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 2
Regulating Layers Records
Report Number 1915r4v1d0722

Site	Morfa Biocell Extension Phase 2	Material	Regulating Layer	Date	02/12/2022
------	---------------------------------	----------	------------------	------	------------



The subgrade for the geosynthetic elements has been prepared in accordance with the Specification and its surface has been inspected visually. Testing has confirmed that this part of the subgrade has an acceptably smooth finish and survey work has shown the surface has been prepared to the correct line and level. There is no evidence of soft spots, ponded water, ice, snow, frozen ground, peat, vegetation, stones, rocks or any protrusions.

Both the CQA Engineer and the Contractors Representative consider that the area is suitable for lining works to proceed and the Contractor accepts responsibility to maintain the subgrade in this condition until covered with lining materials.

The area of geosynthetic material has been visually inspected by the geomembrane installer and the CQA Engineer and is acceptable. All field and laboratory test results are complete, and the results are satisfactory.

Engineer	Arwel Jones (Geotechnology)	Signature	
----------	-----------------------------	-----------	--

Contractor	Dyfed Jones (Celtic Lining)	Signature	
------------	-----------------------------	-----------	--

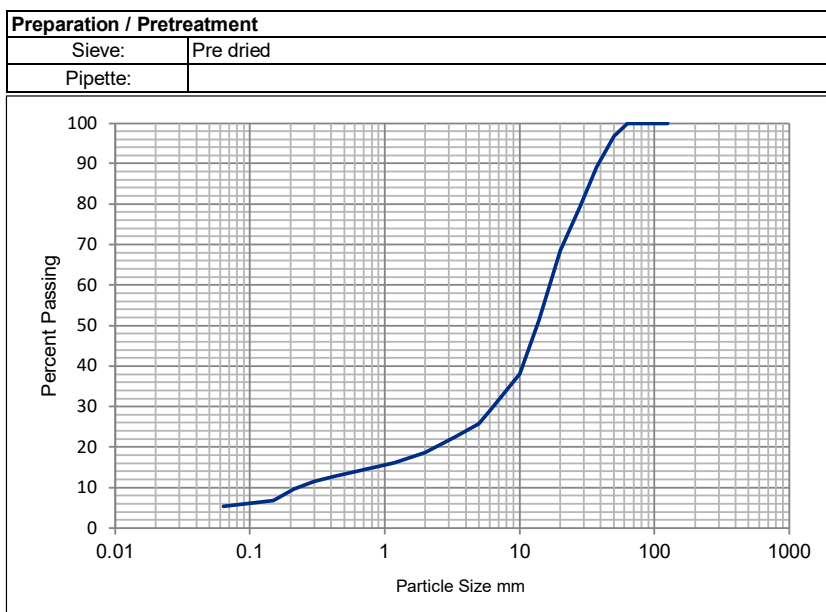
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26400	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-4	Depth (m): -
Sample No: 0-10	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	97	
37.5	89	45-100
28	79	
20	68	
14	51	
10	38	15-60
6.3	30	
5.0	26	10-45
3.35	23	
2.00	19	
1.18	16	
0.600	14	0-25
0.425	13	
0.300	12	
0.212	10	
0.150	7	
0.063	5	0-12



Sample Portions		Particle Density Mg/m ³	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	81		
Sand	13	Dry mass of sample, kg	
Silt / Clay	5	15.1	N/A

Remarks: Sample complies with 6F2 grading specification.

QA Ref.		Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 19/11/2021	Fig PSD
BS1377 - 2 Rev 3.0						

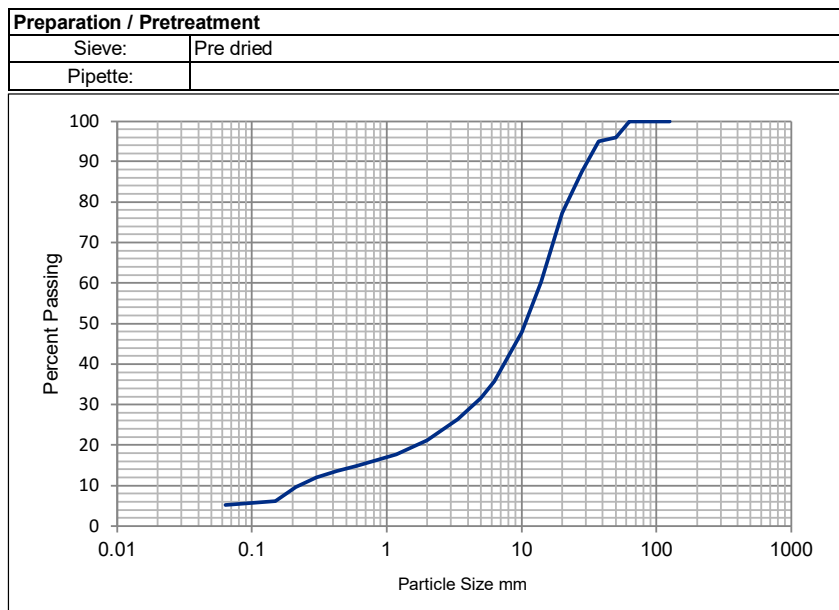
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26404	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-8	Depth (m): -
Sample No: 0-10	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	96	
37.5	95	45-100
28	87	
20	77	
14	60	
10	48	15-60
6.3	36	
5.0	32	10-45
3.35	26	
2.00	21	
1.18	18	
0.600	15	0-25
0.425	14	
0.300	12	
0.212	10	
0.150	6	
0.063	5	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	0	N/A	
Gravel	79		
Sand	16	Dry mass of sample, kg	
Silt / Clay	5	7.4	n/a

Remarks: Sample complies with 6F2 grading specification.

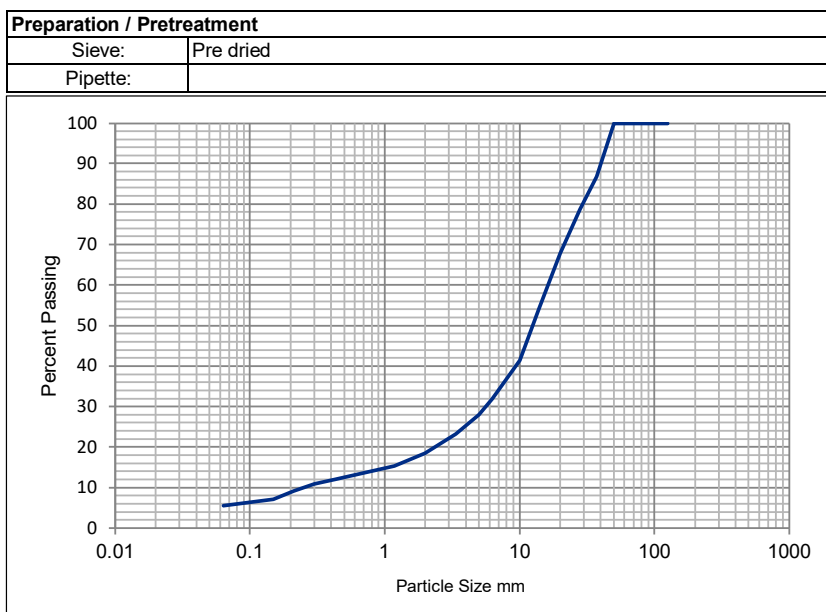
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26401	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-3	Depth (m): -
Sample No: 25-10	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 19 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	100	
37.5	87	45-100
28	79	
20	68	
14	54	
10	41	15-60
6.3	32	
5.0	28	10-45
3.35	23	
2.00	18	
1.18	15	
0.600	13	0-25
0.425	12	
0.300	11	
0.212	9	
0.150	7	
0.063	6	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	0	N/A	
Gravel	82		
Sand	13	Dry mass of sample, kg	
Silt / Clay	6	7.2	N/A

Remarks: Sample complies with 6F2 grading specification.

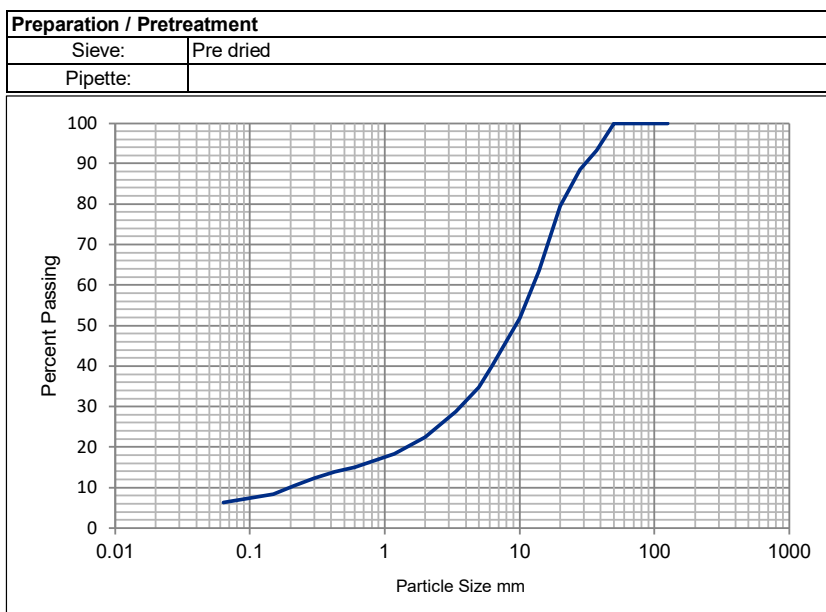
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26405	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-7	Depth (m): -
Sample No: 25-10	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	100	
37.5	93	45-100
28	88	
20	80	
14	64	
10	52	15-60
6.3	40	
5.0	35	10-45
3.35	29	
2.00	22	
1.18	18	
0.600	15	0-25
0.425	14	
0.300	12	
0.212	10	
0.150	8	
0.063	6	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	0	N/A	
Gravel	78		
Sand	16	Dry mass of sample, kg	
Silt / Clay	6	7.3	n/a

Remarks: Sample complies with 6F2 grading specification.

QA Ref.		Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 22/11/2021	Fig PSD
BS1377 - 2 Rev 3.0						

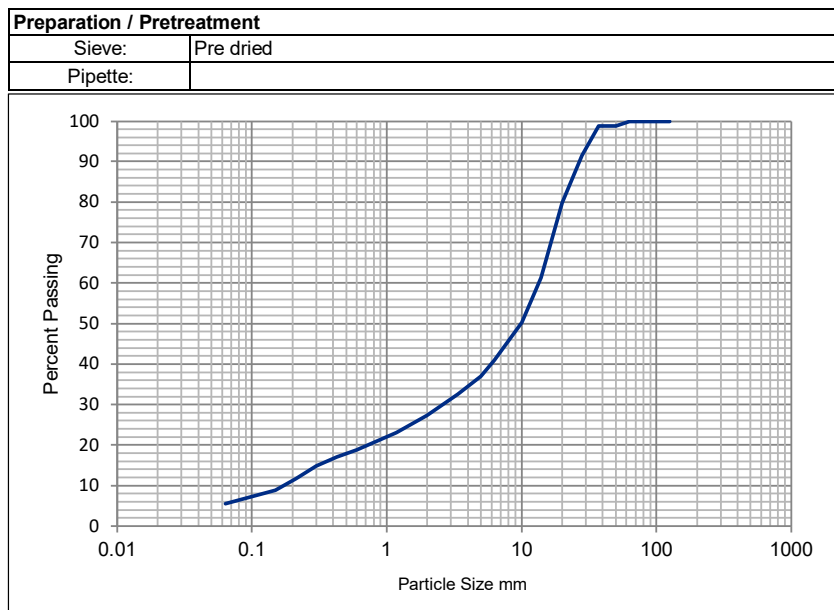
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26402	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-2	Depth (m): -
Sample No: 45-25	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	99	
37.5	99	45-100
28	91	
20	80	
14	61	
10	50	15-60
6.3	41	
5.0	37	10-45
3.35	32	
2.00	27	
1.18	23	
0.600	19	0-25
0.425	17	
0.300	15	
0.212	12	
0.150	9	
0.063	6	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	0	N/A	
Gravel	73		
Sand	22	Dry mass of sample, kg	
Silt / Clay	6	14.4	N/A

Remarks: Sample complies with 6F2 grading specification.

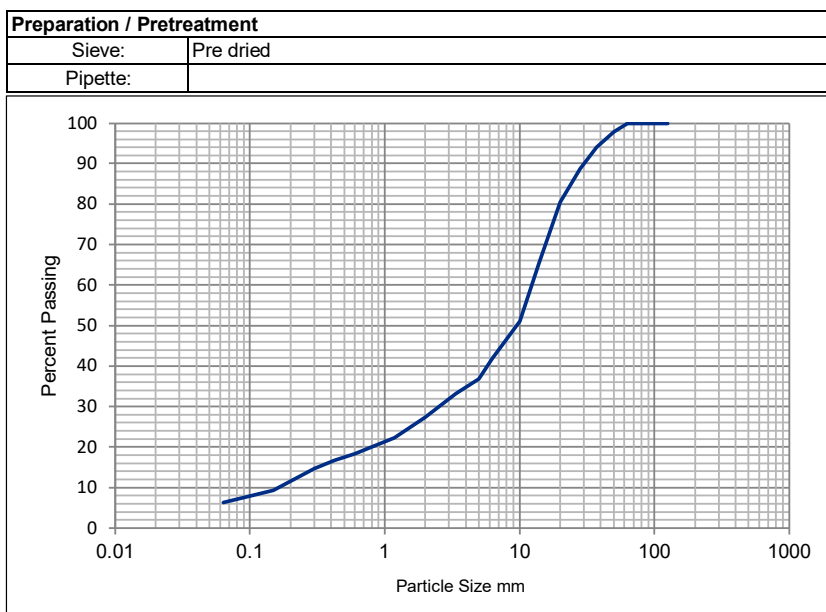
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26406	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-6	Depth (m): -
Sample No: 45-25	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	98	
37.5	94	45-100
28	89	
20	80	
14	65	
10	51	15-60
6.3	42	
5.0	37	10-45
3.35	33	
2.00	27	
1.18	22	
0.600	18	0-25
0.425	17	
0.300	15	
0.212	12	
0.150	9	
0.063	6	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	73		
Sand	21	Dry mass of sample, kg	
Silt / Clay	6	15.3	N/A

Remarks: Sample complies with 6F2 grading specification.

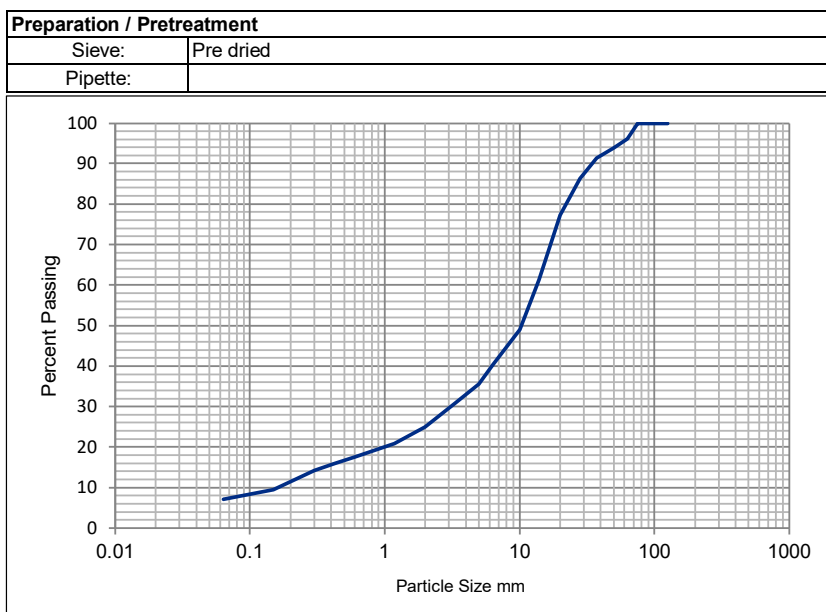
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26403	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-1	Depth (m): -
Sample No: 80-0	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL with low cobble content
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 18 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	96	
50	94	
37.5	91	45-100
28	86	
20	77	
14	61	
10	49	15-60
6.3	40	
5.0	36	10-45
3.35	31	
2.00	25	
1.18	21	
0.600	18	0-25
0.425	16	
0.300	14	
0.212	12	
0.150	9	
0.063	7	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	4	N/A	
Gravel	71		
Sand	18	Dry mass of sample, kg	
Silt / Clay	7	9.3	n/a

Remarks: Sample complies with 6F2 grading specification.

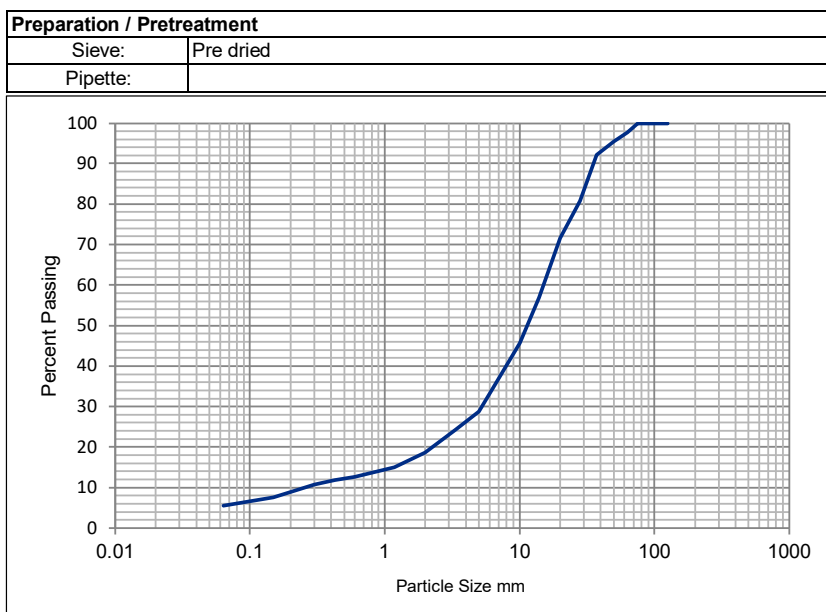
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No: 26407	

Site Ref / Hole ID: LF-BR-13-11-21-80-0-5	Depth (m): -
Sample No: 80-0	Sample Type: Bulk
Sampling Certificate Received: Yes	Material Description: Black sandy GRAVEL with low cobble content
Location in Works: Landfill (BOS Refuse)	Material Source: Site Generated
Date Sampled: 11 November 2021	Material Supplier: Site Generated
Sampled By: J Davis	Specification: SHW Series 600
Date Received: 12 November 2021	Date Tested: 22 November 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	98	
50	95	
37.5	92	45-100
28	81	
20	72	
14	57	
10	46	15-60
6.3	34	
5.0	29	10-45
3.35	24	
2.00	19	
1.18	15	
0.600	13	0-25
0.425	12	
0.300	11	
0.212	9	
0.150	8	
0.063	6	0-12



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	2	N/A	
Gravel	79		
Sand	13	Dry mass of sample, kg	
Silt / Clay	6	14.5	n/a

Remarks: Sample complies with 6F2 grading specification.

QA Ref.		Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 23/11/2021	Fig PSD
BS1377 - 2 Rev 3.0						

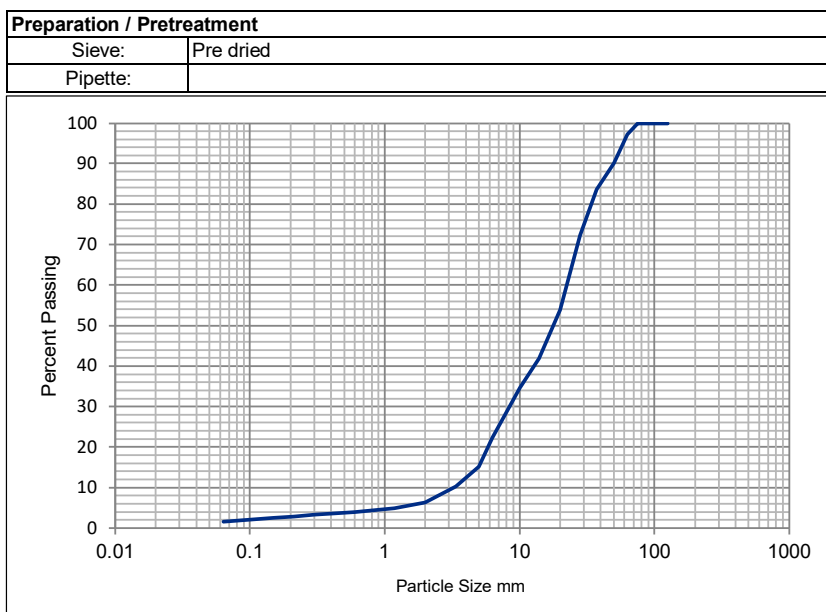
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D20135	Client:	Darlow Lloyd & Sons Ltd
Project Name:	TATA Aggregates	Address:	Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No:	23234		

Site Ref / Hole ID:	N/A	Depth (m):	-
Sample No:	N/A	Sample Type:	Bulk
Sampling Certificate Received:	Yes	Material Description:	Grey slightly silty sandy GRAVEL with low cobble content
Location in Works:	Landfill Bio Cell	Material Source:	Site Generated
Date Sampled:	26 January 2021	Material Supplier:	Site Generated
Sampled By:	J Davis	Specification:	6F2 SHW Series 600
Date Received:	26 January 2021	Date Tested:	29 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	97	
50	90	
37.5	84	45-100
28	72	
20	54	
14	42	
10	35	15-60
6.3	22	
5.0	15	10-45
3.35	10	
2.00	6	
1.18	5	
0.600	4	0-25
0.425	4	
0.300	3	
0.212	3	
0.150	3	
0.063	2	<10



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	3	N/A	
Gravel	91		
Sand	5	Dry mass of sample, kg	
Silt / Clay	2	14.4	N/A

Remarks:

QA Ref.		Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 01/02/2021	Fig PSD
BS1377 - 2 Rev 3.0						

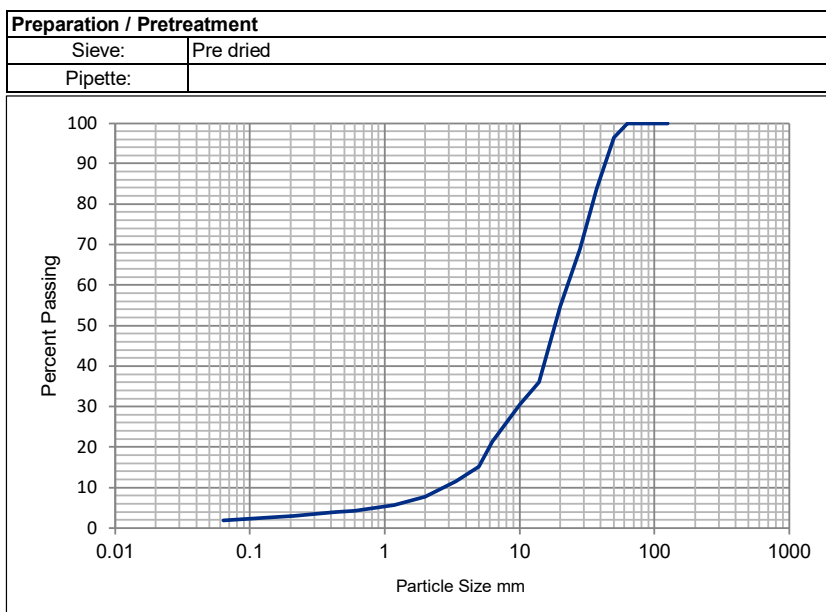
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D20135	Client:	Darlow Lloyd & Sons Ltd
Project Name:	TATA Aggregates	Address:	Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No:	23235		

Site Ref / Hole ID:	N/A	Depth (m):	-
Sample No:	N/A	Sample Type:	Bulk
Sampling Certificate Received:	Yes	Material Description:	Grey slightly silty sandy GRAVEL
Location in Works:	Landfill Bio Cell	Material Source:	Site Generated
Date Sampled:	26 January 2021	Material Supplier:	Site Generated
Sampled By:	J Davis	Specification:	6F2 SHW Series 600
Date Received:	26 January 2021	Date Tested:	29 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	96	
37.5	84	45-100
28	69	
20	55	
14	36	
10	30	15-60
6.3	21	
5.0	15	10-45
3.35	12	
2.00	8	
1.18	6	
0.600	4	0-25
0.425	4	
0.300	3	
0.212	3	
0.150	3	
0.063	2	<10



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	92		
Sand	6	Dry mass of sample, kg	
Silt / Clay	2	13.0	N/A

Remarks:

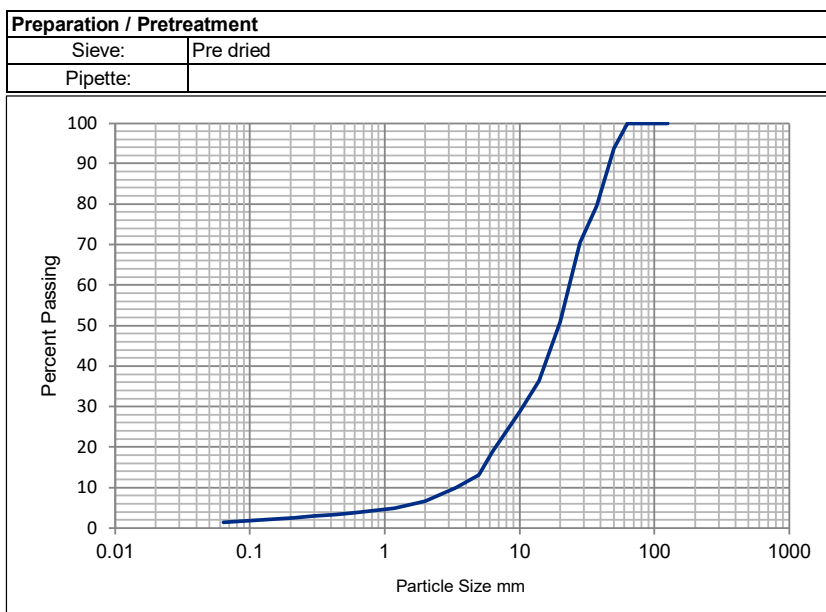
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D20135	Client:	Darlow Lloyd & Sons Ltd
Project Name:	TATA Aggregates	Address:	Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No:	23236		

Site Ref / Hole ID:	N/A	Depth (m):	-
Sample No:	N/A	Sample Type:	Bulk
Sampling Certificate Received:	Yes	Material Description:	Grey slightly silty sandy GRAVEL
Location in Works:	Landfill Bio Cell	Material Source:	Site Generated
Date Sampled:	26 January 2021	Material Supplier:	Site Generated
Sampled By:	J Davis	Specification:	6F2 SHW Series 600
Date Received:	26 January 2021	Date Tested:	29 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	94	
37.5	79	45-100
28	70	
20	51	
14	36	
10	29	15-60
6.3	19	
5.0	13	10-45
3.35	10	
2.00	7	
1.18	5	
0.600	4	0-25
0.425	3	
0.300	3	
0.212	3	
0.150	2	
0.063	2	<10



Sample Portions		Particle Density Mg/m ³	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	93		
Sand	5	Dry mass of sample, kg	
Silt / Clay	2	14.0	N/A

Remarks:

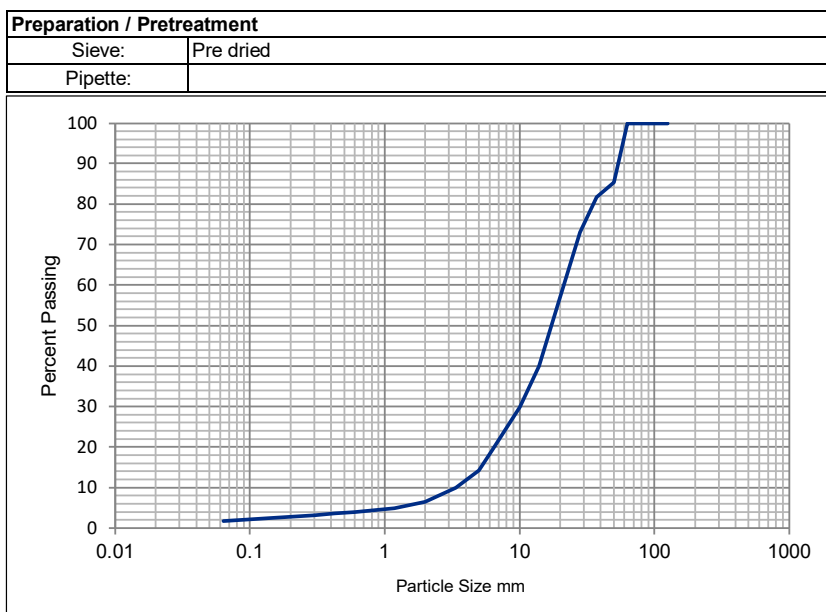
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D20135	Client:	Darlow Lloyd & Sons Ltd
Project Name:	TATA Aggregates	Address:	Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No:	23237		

Site Ref / Hole ID:	N/A	Depth (m):	-
Sample No:	N/A	Sample Type:	Bulk
Sampling Certificate Received:	Yes	Material Description:	Grey slightly silty slightly sandy GRAVEL
Location in Works:	Landfill Bio Cell	Material Source:	Site Generated
Date Sampled:	26 January 2021	Material Supplier:	Site Generated
Sampled By:	J Davis	Specification:	6F2 SHW Series 600
Date Received:	26 January 2021	Date Tested:	29 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	85	
37.5	82	45-100
28	73	
20	57	
14	40	
10	30	15-60
6.3	19	
5.0	14	10-45
3.35	10	
2.00	7	
1.18	5	
0.600	4	0-25
0.425	4	
0.300	3	
0.212	3	
0.150	3	
0.063	2	<10



Sample Portions		Particle Density Mg/m ³	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	93		
Sand	5	Dry mass of sample, kg	
Silt / Clay	2	15.6	N/A

Remarks:

QA Ref.		Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 01/02/2021	Fig PSD
BS1377 - 2 Rev 3.0						

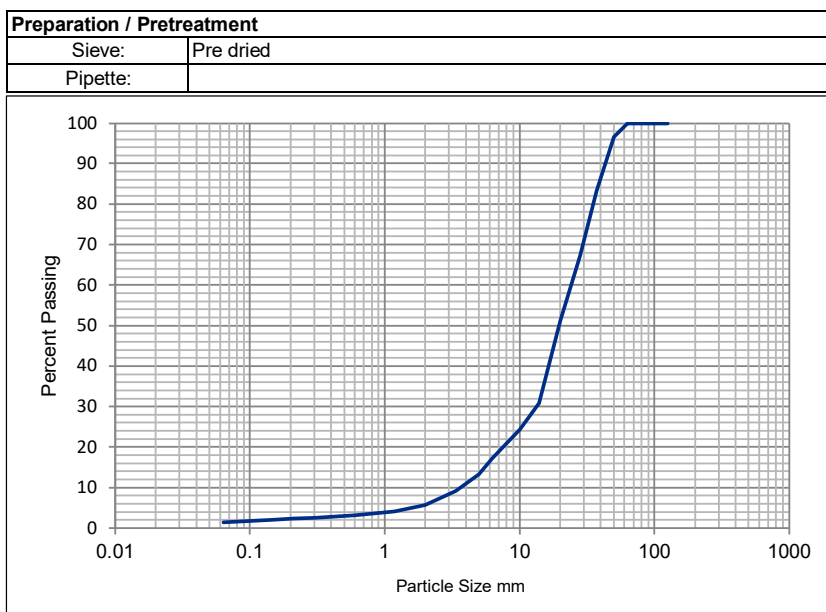
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D20135	Client:	Darlow Lloyd & Sons Ltd
Project Name:	TATA Aggregates	Address:	Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
ATS Sample No:	23238		

Site Ref / Hole ID:	N/A	Depth (m):	-
Sample No:	N/A	Sample Type:	Bulk
Sampling Certificate Received:	Yes	Material Description:	Grey slightly silty slightly sandy GRAVEL
Location in Works:	Landfill Bio Cell	Material Source:	Site Generated
Date Sampled:	26 January 2021	Material Supplier:	Site Generated
Sampled By:	J Davis	Specification:	6F2 SHW Series 600
Date Received:	26 January 2021	Date Tested:	29 January 2021

Test Results

Sieving		
Particle Size mm	% Passing	Specification
125	100	100
90	100	80-100
75	100	65-100
63	100	
50	97	
37.5	83	45-100
28	67	
20	51	
14	31	
10	24	15-60
6.3	17	
5.0	13	10-45
3.35	9	
2.00	6	
1.18	4	
0.600	3	0-25
0.425	3	
0.300	3	
0.212	2	
0.150	2	
0.063	2	<10



Sample Portions		Particle Density Mg/m ³	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	94		
Sand	4	Dry mass of sample, kg	
Silt / Clay	2	14.7	N/A

Remarks:

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 21862	

Site Reference: Dust	Sample Type: Bulk
Location in works: Stockpile	Material Description: Grey fine aggregate

Date Sampled: 01 October 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 01 October 2020	Date Tested: 06 October 2020

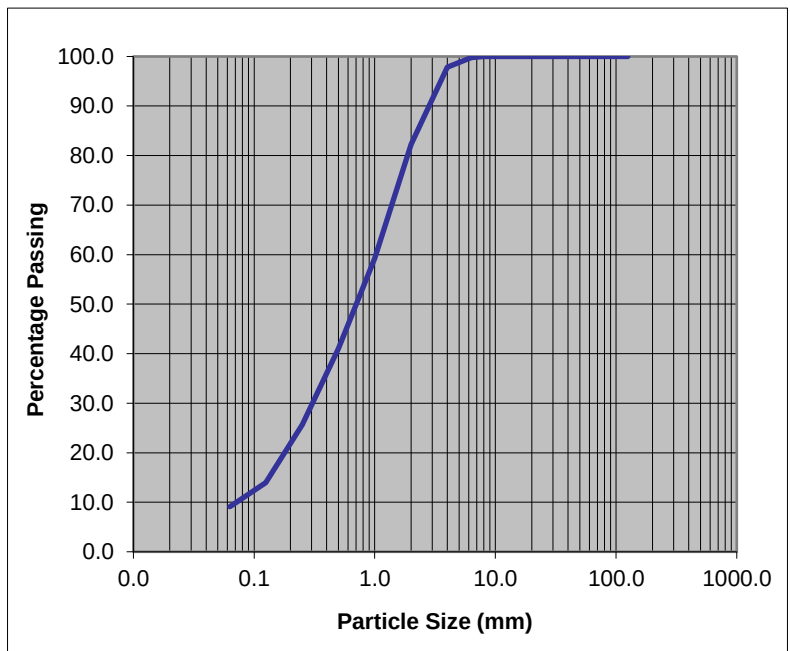
TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	98	
2.0	82	
1.0	59	
0.5	41	
0.250	26	
0.125	14	
0.063	9	

Water Content (%)	11
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Dry mass of sample, kg	0.4
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Method of Analysis	Washing & Sieving
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Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver <i>A Grogan</i>	Date 06/10/2020	Fig.
EN 933-1 Rev. 2.0		A Grogan, Laboratory Manager			

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

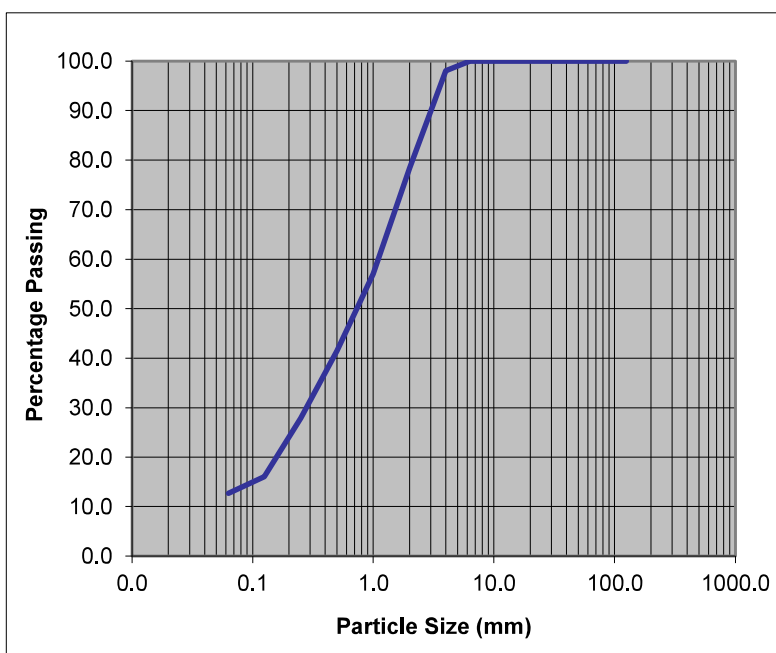
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22823	

Site Reference: Dust Layer DL 1	Sample Type: Bulk
Location in works: Stockpile	Material Description: Dust Layer
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	98	
2.0	78	
1.0	57	
0.5	41	
0.250	28	
0.125	16	
0.063	13	

Water Content (%)	20
Dry mass of sample, kg	0.3
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

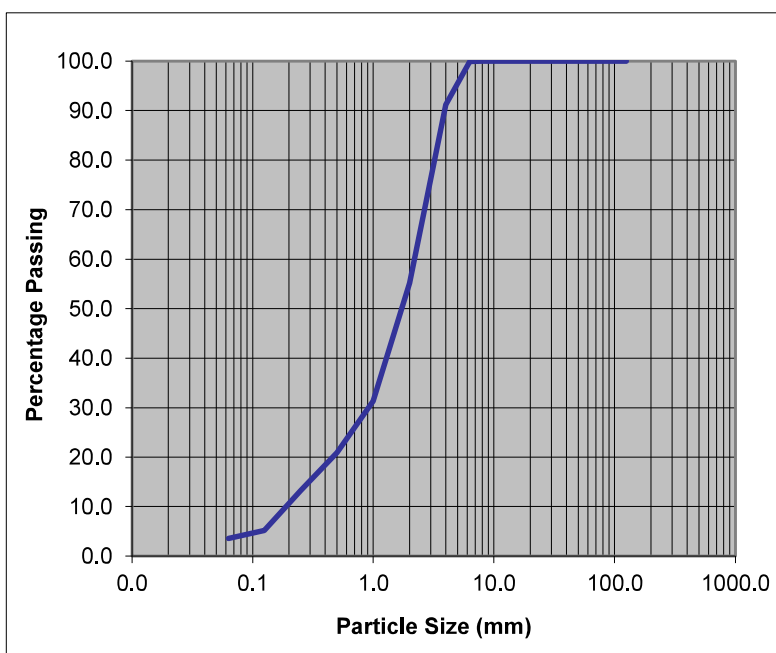
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22824	

Site Reference: Dust Layer DL 2	Sample Type: Bulk
Location in works: Stockpile	Material Description: Dust Layer
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	91	
2.0	55	
1.0	31	
0.5	21	
0.250	13	
0.125	5	
0.063	4	

Water Content (%)	17
Dry mass of sample, kg	0.5
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

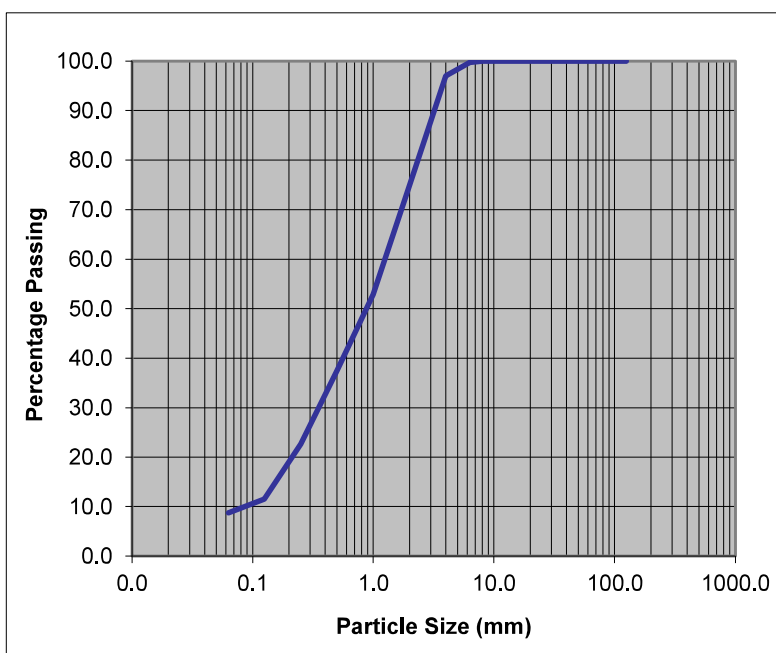
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22825	

Site Reference: Dust Layer DL 3	Sample Type: Bulk
Location in works: Stockpile	Material Description: Dust Layer
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	97	
2.0	75	
1.0	53	
0.5	37	
0.250	23	
0.125	12	
0.063	9	

Water Content (%)	20
Dry mass of sample, kg	0.4
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 16/12/2020	Fig.
EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

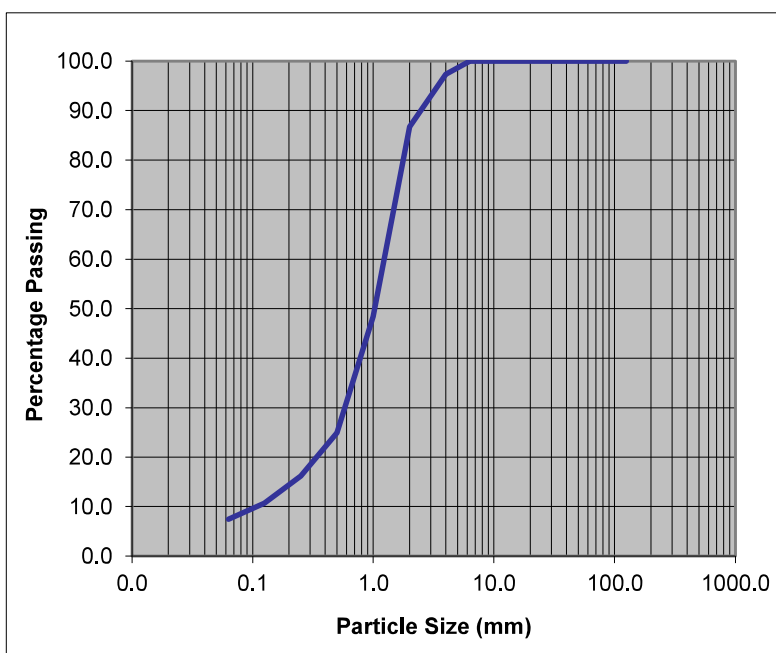
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23174	

Site Reference: Dust	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Grey fine aggregate
Date Sampled: 22 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 25 January 2021	Date Tested: 27 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	97	
2.0	87	
1.0	48	
0.5	25	
0.250	16	
0.125	11	
0.063	7	

Water Content (%)	18
Dry mass of sample, kg	1.3
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 27/01/2021	Fig.
EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

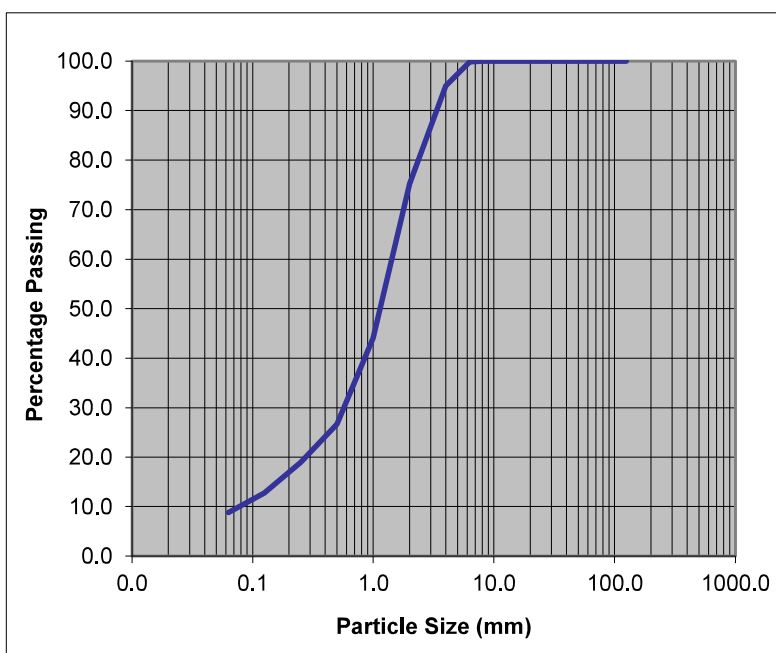
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23175	

Site Reference: Dust	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Grey fine aggregate
Date Sampled: 22 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 25 January 2021	Date Tested: 27 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	95	
2.0	75	
1.0	44	
0.5	27	
0.250	19	
0.125	13	
0.063	9	

Water Content (%)	18
Dry mass of sample, kg	1.7
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 27/01/2021	Fig.
EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

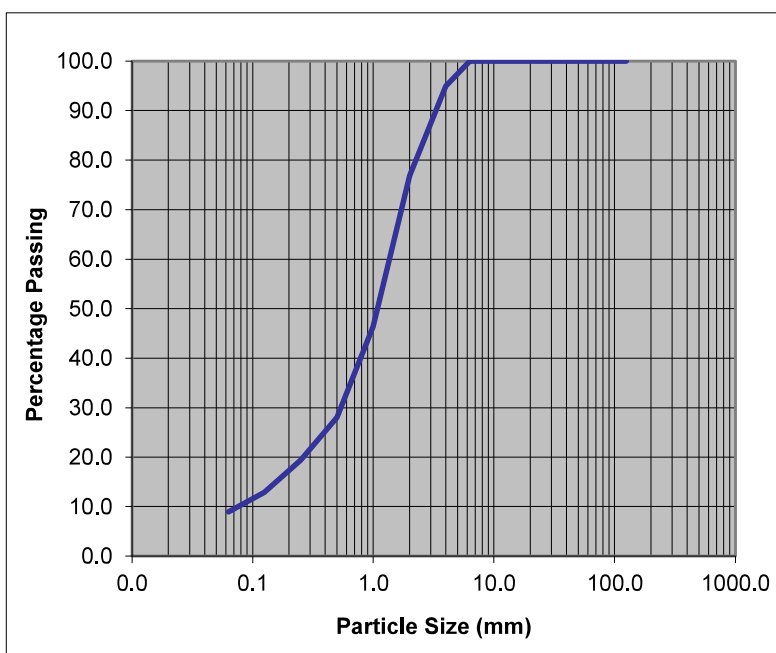
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23176	

Site Reference: Dust	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Grey fine aggregate
Date Sampled: 22 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 25 January 2021	Date Tested: 27 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	95	
2.0	77	
1.0	46	
0.5	28	
0.250	19	
0.125	13	
0.063	9	

Water Content (%)	17
Dry mass of sample, kg	2.0
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref. EN 933-1 Rev. 2.0	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver A Grogan, Laboratory Manager	Date 27/01/2021	Fig.
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TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

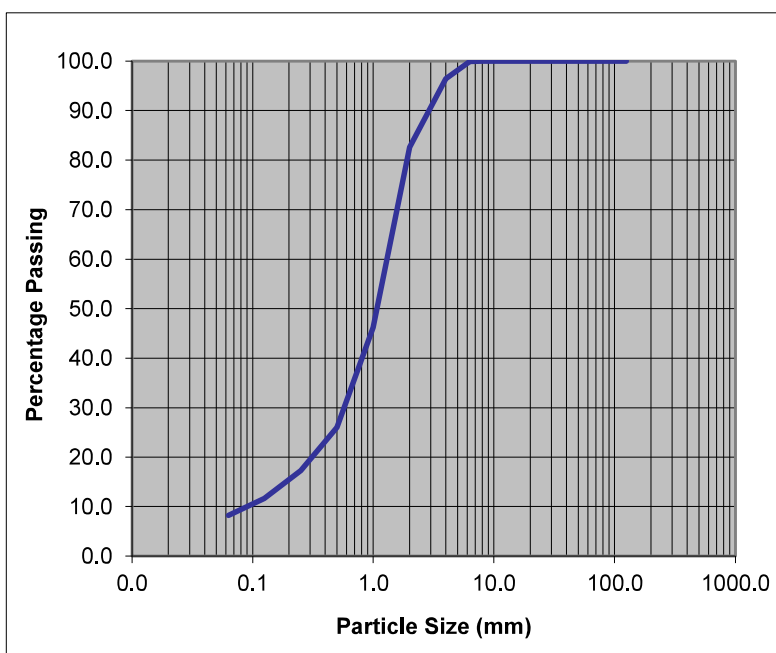
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23177	

Site Reference: Dust	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Grey fine aggregate
Date Sampled: 22 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 25 January 2021	Date Tested: 27 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	100	
10.0	100	
8.0	100	
6.3	100	
4.0	96	
2.0	83	
1.0	46	
0.5	26	
0.250	17	
0.125	12	
0.063	8	

Water Content (%)	18
Dry mass of sample, kg	1.6
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	 Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 27/01/2021	Fig.
EN 933-1 Rev. 2.0			A Grogan, Laboratory Manager		

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 3
HDPE Manufacturers QC Data
Report Number 1915r4v1d0722



Geosynthetic Materials Inventory

CQA11

Site	Morfa Biocell Extension Phase 2	Manufacturer & Material Type	2mm DRS HDPE
-------------	--	---	---------------------

Date	Batch No	Roll No	Length	Width	MQC Received?	MQC Pass?	Sample Number	Handle Store	Visual Check	Approved
25/11/2020	1005	048017	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048032	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048062	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048063	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048075	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048078	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048086	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048087	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	048091	128	6.8	Y	Y		Y	Y	Y
25/11/2020	1005	047991	128	6.8	Y	Y		Y	Y	Y
25/11/2020	4200	420072335	128	7	Y	Y		Y	Y	Y
25/11/2020	4200	420072337	128	7	Y	Y		Y	Y	Y

25/11/2020	4200	420072342	128	7	Y	Y		Y	Y	Y
25/11/2020	4200	420072343	128	7	Y	Y		Y	Y	Y
25/11/2020	4200	420072344	128	7	Y	Y		Y	Y	Y
25/11/2020	4200	420072346	128	7	Y	Y		Y	Y	Y
08/01/2022	22049	0305-010103	110	7	Y	Y		Y	Y	Y
08/01/2022	22049	0305-010109	110	7	Y	Y		Y	Y	Y

ROLL IDENTIFICATION

ROLL NUMBER: 1005-048017
PACKING SLIP NUMBER: VS-000000375
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 14 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,772 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKG611710

RESIN TYPE:

RESIN SUPPLIER:

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.07
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY	TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90
	Minimum			1.70
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls	
Yield strength KN/m	TD		31	34.4
	MD			34.4
Yield elongation (%)	TD		13	16.5
	MD			17.5
Break strength KN/m	TD		31	42.6
	MD			46.6
Break elongation (%)	TD		150	539
	MD			550
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265
	MD			292
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2
DIMENSIONAL STABILITY (%)	TD			
	MD			



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ROLL IDENTIFICATION
ROLL NUMBER: 1005-047987

PACKING SLIP NUMBER: VS-000000383

PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured

PRODUCTION DATE: 12 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,842 kg

RESIN INFORMATION
RESIN LOT NUMBER : PKG611710

RESIN TYPE:
RESIN SUPPLIER:

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.07
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY			TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average		ASTM D5994	Every roll	1.90	1.91
	Minimum				1.70	1.83
ASPERITY(MM)	Average(In/Out)		ASTM D7466	Every roll	0.40/0.40	0.70/0.57
TENSILE PROPERTIES			ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD				31	33.5
	MD					33.0
Yield elongation (%)	TD				13	16.3
	MD					17.3
Break strength KN/m	TD				31	40.3
	MD					43.4
Break elongation (%)	TD				150	508
	MD					528
TEAR RESISTANCE (N)	TD		ASTM D1004	Every 5 rolls	265	287
	MD					280
PUNCTURE RESISTANCE(N)			ASTM D4833	Every 5 rolls	675	756
DENSITY (G/CC)			ASTM D792	Every 10 rolls	≥ 0.940	0.944
CARBON BLACK CONTENT(%)			ASTM D4218	Every 2 rolls	2.0 - 3.0	2.63
CARBON BLACK DISPERSION			ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD					
	MD					



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**ROLL IDENTIFICATION****ROLL NUMBER:** 1005-047991**PACKING SLIP NUMBER:** VS-000000383**PRODUCT CODE:** 1053324 HDPE 2.00 mm Black Textured**PRODUCTION DATE:** 12 Jan 2020**LENGTH(± 1%):** 128.02 m**WIDTH:** 6.80 m**SHEET AREA:** 870.5 sqmt**WEIGHT :** 1,777 kg**RESIN INFORMATION****RESIN LOT NUMBER :** PKG611710**RESIN TYPE:****RESIN SUPPLIER:**

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.07
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.91
	Minimum			1.70	1.85
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.44/0.48
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	34.3
	MD				32.9
Yield elongation (%)	TD			13	16.1
	MD				17.9
Break strength KN/m	TD			31	45.9
	MD				46.2
Break elongation (%)	TD			150	588
	MD				553
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	282
	MD				270
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	750
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.945
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.49
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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**ROLL IDENTIFICATION****ROLL NUMBER:** 1005-048031**PACKING SLIP NUMBER:** VS-000000383**PRODUCT CODE:** 1053324 HDPE 2.00 mm Black Textured**PRODUCTION DATE:** 15 Jan 2020**LENGTH(± 1%):** 128.02 m**WIDTH:** 6.80 m**SHEET AREA:** 870.5 sqmt**WEIGHT :** 1,774 kg**RESIN INFORMATION****RESIN LOT NUMBER :** PKG611710**RESIN TYPE:****RESIN SUPPLIER:**

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.07
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.91
	Minimum			1.70	1.84
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.45/0.47
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	35.2
	MD				35.0
Yield elongation (%)	TD			13	16.4
	MD				17.0
Break strength KN/m	TD			31	44.7
	MD				45.4
Break elongation (%)	TD			150	562
	MD				539
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	289
	MD				278
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	768
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.946
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.53
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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ROLL IDENTIFICATION

ROLL NUMBER: 1005-048062
PACKING SLIP NUMBER: VS-000000383
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 16 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,788 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKK821210
RESIN TYPE: HDPE Chevron K306-USA
RESIN SUPPLIER: CHEVRON PHILLIPS

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.937
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.11
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.93
	Minimum			1.70	1.85
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.45/0.47
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	37.1
	MD				34.6
Yield elongation (%)	TD			13	15.7
	MD				17.4
Break strength KN/m	TD			31	42.7
	MD				46.6
Break elongation (%)	TD			150	550
	MD				566
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	284
	MD				272
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	723
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.946
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.58
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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**ROLL IDENTIFICATION****ROLL NUMBER:** 1005-048063**PACKING SLIP NUMBER:** VS-000000383**PRODUCT CODE:** 1053324 HDPE 2.00 mm Black Textured**PRODUCTION DATE:** 16 Jan 2020**LENGTH(± 1%):** 128.02 m**WIDTH:** 6.80 m**SHEET AREA:** 870.5 sqmt**WEIGHT :** 1,784 kg**RESIN INFORMATION****RESIN LOT NUMBER :** PKK821210**RESIN TYPE:** HDPE Chevron K306-USA**RESIN SUPPLIER:** CHEVRON PHILLIPS

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.937
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.11
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.90
	Minimum			1.70	1.83
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.47/0.46
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	37.1
	MD				34.6
Yield elongation (%)	TD			13	15.7
	MD				17.4
Break strength KN/m	TD			31	42.7
	MD				46.6
Break elongation (%)	TD			150	550
	MD				566
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	289
	MD				278
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	766
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.947
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.58
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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ROLL IDENTIFICATION

ROLL NUMBER: 1005-048075
PACKING SLIP NUMBER: VS-000000383
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 17 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,778 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKK821210
RESIN TYPE: HDPE Chevron K306-USA
RESIN SUPPLIER: CHEVRON PHILLIPS

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.937
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.11
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.91
	Minimum			1.70	1.82
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.48/0.47
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	34.9
	MD				33.7
Yield elongation (%)	TD			13	15.7
	MD				17.8
Break strength KN/m	TD			31	38.9
	MD				47.3
Break elongation (%)	TD			150	494
	MD				580
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	289
	MD				280
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	733
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.946
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.58
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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ROLL IDENTIFICATION

ROLL NUMBER: 1005-048078
PACKING SLIP NUMBER: VS-000000383
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 17 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,774 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKK821210
RESIN TYPE: HDPE Chevron K306-USA
RESIN SUPPLIER: CHEVRON PHILLIPS

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.937
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.11
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.90
	Minimum			1.70	1.84
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.51/0.49
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	35.8
	MD				34.8
Yield elongation (%)	TD			13	15.9
	MD				16.6
Break strength KN/m	TD			31	39.1
	MD				44.0
Break elongation (%)	TD			150	423
	MD				534
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	295
	MD				280
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	763
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.946
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.56
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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ROLL IDENTIFICATION

ROLL NUMBER: 1005-048086
PACKING SLIP NUMBER: VS-000000383
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 18 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,797 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKK821210
RESIN TYPE: HDPE Chevron K306-USA
RESIN SUPPLIER: CHEVRON PHILLIPS

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.937
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.11
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.94
	Minimum			1.70	1.85
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.49/0.47
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	36.8
	MD				35.9
Yield elongation (%)	TD			13	15.5
	MD				16.6
Break strength KN/m	TD			31	42.6
	MD				44.8
Break elongation (%)	TD			150	551
	MD				543
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	296
	MD				287
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	763
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.947
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.60
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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ROLL IDENTIFICATION

ROLL NUMBER: 1005-048032
PACKING SLIP NUMBER: VS-000000375
PRODUCT CODE: 1053324 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 15 Jan 2020

LENGTH(± 1%): 128.02 m

WIDTH: 6.80 m

SHEET AREA: 870.5 sqmt

WEIGHT : 1,772 kg

RESIN INFORMATION

RESIN LOT NUMBER : PKG611710

RESIN TYPE:

RESIN SUPPLIER:

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.07
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	120
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.91
	Minimum			1.70	1.87
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.47/0.48
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	35.3
	MD				33.9
Yield elongation (%)	TD			13	16.6
	MD				18.0
Break strength KN/m	TD			31	41.3
	MD				49.4
Break elongation (%)	TD			150	515
	MD				597
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	289
	MD				278
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	768
DENSITY (G/CC)		ASTM D792	Every 10 rolls	≥ 0.940	0.946
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.72
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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Roll Identification

Roll Number	420072335	Length	70 meters	Sheet Area	486,50 m ²
Product Name	HDT-200AM-BBB-V-W0	Width	6,95 meters	Weight	1.036 kilograms
Production Date	May 14, 2019				

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,04
Core Thickness Minimum [mm]	ASTM D5994 MI	1,92
Core Thickness Maximum [mm]	ASTM D5994 MA	2,18
Carbon Black Content [%]	ASTM D4218.	2,3
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,8
Yield Strength [N/mm] MD	ASTM D6693 SP	38,7
Yield Strength [N/mm] CMD	ASTM D6693 SP	38,7
Yield Elongation [%] MD	ASTM D6693 SD	20,2
Yield Elongation [%] CMD	ASTM D6693 SD	20,6
Break Strength [N/mm] MD	ASTM D6693 ZF	23
Break Strength [N/mm] CMD	ASTM D6693 ZF	23
Break Elongation [%] MD	ASTM D6693 BD	306
Break Elongation [%] CMD	ASTM D6693 BD	208
Tear Resistance [N] MD	ASTM D1004	290
Tear Resistance [N] CMD	ASTM D1004	300
Asperity Height [mm] Top	ASTM D7466 /A	0,61
Asperity Height [mm] Bottom	ASTM D7466 /A	0,63
Puncture Resistance [N]	ASTM D4833	808
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG
 * Modified



Roll Identification

Roll Number	420072337				
Product Name	HDT-200AM-BBB-V-W0	Length	70 meters	Sheet Area	486,50 m ²
Production Date	May 14, 2019	Width	6,95 meters	Weight	1.038 kilograms

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,05
Core Thickness Minimum [mm]	ASTM D5994 MI	1,92
Core Thickness Maximum [mm]	ASTM D5994 MA	2,15
Carbon Black Content [%]	ASTM D4218.	2,3
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,8
Yield Strength [N/mm] MD	ASTM D6693 SP	37,3
Yield Strength [N/mm] CMD	ASTM D6693 SP	37,4
Yield Elongation [%] MD	ASTM D6693 SD	19,8
Yield Elongation [%] CMD	ASTM D6693 SD	19,8
Break Strength [N/mm] MD	ASTM D6693 ZF	26
Break Strength [N/mm] CMD	ASTM D6693 ZF	29
Break Elongation [%] MD	ASTM D6693 BD	366
Break Elongation [%] CMD	ASTM D6693 BD	384
Tear Resistance [N] MD	ASTM D1004	290
Tear Resistance [N] CMD	ASTM D1004	300
Asperity Height [mm] Top	ASTM D7466 /A	0,63
Asperity Height [mm] Bottom	ASTM D7466 /A	0,66
Puncture Resistance [N]	ASTM D4833	808
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG

* Modified



Roll Identification

Roll Number	420072342				
Product Name	HDT-200AM-BBB-V-W0	Length	70 meters	Sheet Area	486,50 m ²
Production Date	May 14, 2019	Width	6,95 meters	Weight	1.038 kilograms

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,02
Core Thickness Minimum [mm]	ASTM D5994 MI	1,93
Core Thickness Maximum [mm]	ASTM D5994 MA	2,11
Carbon Black Content [%]	ASTM D4218.	2,4
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,7
Yield Strength [N/mm] MD	ASTM D6693 SP	36,9
Yield Strength [N/mm] CMD	ASTM D6693 SP	38,0
Yield Elongation [%] MD	ASTM D6693 SD	19,9
Yield Elongation [%] CMD	ASTM D6693 SD	20,8
Break Strength [N/mm] MD	ASTM D6693 ZF	22
Break Strength [N/mm] CMD	ASTM D6693 ZF	25
Break Elongation [%] MD	ASTM D6693 BD	272
Break Elongation [%] CMD	ASTM D6693 BD	306
Tear Resistance [N] MD	ASTM D1004	316
Tear Resistance [N] CMD	ASTM D1004	301
Asperity Height [mm] Top	ASTM D7466 /A	0,60
Asperity Height [mm] Bottom	ASTM D7466 /A	0,62
Puncture Resistance [N]	ASTM D4833	787
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG
 * Modified



Roll Identification

Roll Number	420072343				
Product Name	HDT-200AM-BBB-V-W0	Length	70 meters	Sheet Area	486,50 m ²
Production Date	May 14, 2019	Width	6,95 meters	Weight	1.036 kilograms

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,00
Core Thickness Minimum [mm]	ASTM D5994 MI	1,80
Core Thickness Maximum [mm]	ASTM D5994 MA	2,16
Carbon Black Content [%]	ASTM D4218.	2,4
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,7
Yield Strength [N/mm] MD	ASTM D6693 SP	36,9
Yield Strength [N/mm] CMD	ASTM D6693 SP	38,0
Yield Elongation [%] MD	ASTM D6693 SD	19,9
Yield Elongation [%] CMD	ASTM D6693 SD	20,8
Break Strength [N/mm] MD	ASTM D6693 ZF	22
Break Strength [N/mm] CMD	ASTM D6693 ZF	25
Break Elongation [%] MD	ASTM D6693 BD	272
Break Elongation [%] CMD	ASTM D6693 BD	306
Tear Resistance [N] MD	ASTM D1004	316
Tear Resistance [N] CMD	ASTM D1004	301
Asperity Height [mm] Top	ASTM D7466 /A	0,60
Asperity Height [mm] Bottom	ASTM D7466 /A	0,62
Puncture Resistance [N]	ASTM D4833	787
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG

* Modified



Roll Identification

Roll Number	420072344	Length	70 meters	Sheet Area	486,50 m ²
Product Name	HDT-200AM-BBB-V-W0	Width	6,95 meters	Weight	1.038 kilograms
Production Date	May 14, 2019				

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,00
Core Thickness Minimum [mm]	ASTM D5994 MI	1,80
Core Thickness Maximum [mm]	ASTM D5994 MA	2,15
Carbon Black Content [%]	ASTM D4218.	2,4
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,7
Yield Strength [N/mm] MD	ASTM D6693 SP	36,9
Yield Strength [N/mm] CMD	ASTM D6693 SP	38,0
Yield Elongation [%] MD	ASTM D6693 SD	19,9
Yield Elongation [%] CMD	ASTM D6693 SD	20,8
Break Strength [N/mm] MD	ASTM D6693 ZF	22
Break Strength [N/mm] CMD	ASTM D6693 ZF	25
Break Elongation [%] MD	ASTM D6693 BD	272
Break Elongation [%] CMD	ASTM D6693 BD	306
Tear Resistance [N] MD	ASTM D1004	316
Tear Resistance [N] CMD	ASTM D1004	301
Asperity Height [mm] Top	ASTM D7466 /A	0,49
Asperity Height [mm] Bottom	ASTM D7466 /A	0,51
Puncture Resistance [N]	ASTM D4833	787
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG
 * Modified



Roll Identification

Roll Number	420072346				
Product Name	HDT-200AM-BBB-V-W0	Length	70 meters	Sheet Area	486,50 m ²
Production Date	May 14, 2019	Width	6,95 meters	Weight	1.034 kilograms

Resin Information

Batch number BN19056-33190420

Physical Properties	Test Method	Test Result
Core Thickness Average [mm]	ASTM D5994 MW	2,01
Core Thickness Minimum [mm]	ASTM D5994 MI	1,84
Core Thickness Maximum [mm]	ASTM D5994 MA	2,12
Carbon Black Content [%]	ASTM D4218.	2,4
Carbon Black Dispersion [Cat]	ASTM D5596	1
MFR (190/2,16) [g/10min]	ASTM D1238(190/2,16)	0,2
Density [g/cm ³]	ASTM D792	0,944
Dimensional Stability [%] MD	ASTM D1204	-0,1
Dimensional Stability [%] CMD	ASTM D1204	-0,7
Yield Strength [N/mm] MD	ASTM D6693 SP	38,0
Yield Strength [N/mm] CMD	ASTM D6693 SP	38,0
Yield Elongation [%] MD	ASTM D6693 SD	21,9
Yield Elongation [%] CMD	ASTM D6693 SD	19,7
Break Strength [N/mm] MD	ASTM D6693 ZF	44
Break Strength [N/mm] CMD	ASTM D6693 ZF	23
Break Elongation [%] MD	ASTM D6693 BD	568
Break Elongation [%] CMD	ASTM D6693 BD	227
Tear Resistance [N] MD	ASTM D1004	316
Tear Resistance [N] CMD	ASTM D1004	301
Asperity Height [mm] Top	ASTM D7466 /A	0,60
Asperity Height [mm] Bottom	ASTM D7466 /A	0,65
Puncture Resistance [N]	ASTM D4833	787
OIT [min]	ASTM D3895	178
Stress Crack Resistance [h]	ASTM D 5397 SP-NCTL	500

Sales Order No. VK112375
Customer Name CELTIC LINING Ltd.
Project Name CELTIC LINING Ltd.
Location SOUTH WALES SA13 2NG
 * Modified



ROLL IDENTIFICATION

ROLL NUMBER: 0305-010103
PACKING SLIP NUMBER: EY-0006623
PRODUCT CODE: 1120690 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 8 Aug 2021

LENGTH(± 1%) : 110.00 m
WIDTH: 7.00 m
SHEET AREA: 770.0 sqmt
WEIGHT : 1,585 kg

RESIN INFORMATION

RESIN LOT NUMBER: SJD22049

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.17
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.90
	Minimum			1.70	1.87
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.44/0.45
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	40.0
	MD				39.0
Yield elongation (%)	TD			13	17.0
	MD				17.0
Break strength KN/m	TD			31	49.0
	MD				45.0
Break elongation (%)	TD			150	602
	MD				547
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	319
	MD				324
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	728
DENSITY (G/CC)		ASTM D792	Every 2 rolls	≥ 0.940	0.945
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.50
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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Solmax Geosynthetics S.A.E.

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ROLL IDENTIFICATION

ROLL NUMBER: 0305-010109
PACKING SLIP NUMBER: EY-0006623
PRODUCT CODE: 1120690 HDPE 2.00 mm Black Textured
PRODUCTION DATE: 8 Aug 2021

LENGTH(± 1%) : 110.00 m
WIDTH: 7.00 m
SHEET AREA: 770.0 sqmt
WEIGHT : 1,585 kg

RESIN INFORMATION

RESIN LOT NUMBER: SJE21048

PROPERTY	TEST METHOD	RESULTS
Density (g/cc)	ASTM D 1505	0.938
Melt Index (g/10 min.)	ASTM D 1238 (190/2.16)	0.17
ESCR (hrs)	ASTM D 5397	> 500
OIT (min.)	ASTM D 3895	
HP-OIT (min.)	ASTM D 5885	

PHYSICAL PROPERTY		TEST METHOD	TEST FREQUENCY	TECHNICAL DATA	TEST RESULTS
THICKNESS(MM)	Average	ASTM D5994	Every roll	1.90	1.92
	Minimum			1.70	1.85
ASPERITY(MM)	Average(In/Out)	ASTM D7466	Every roll	0.40/0.40	0.45/0.45
TENSILE PROPERTIES		ASTM D6693	Every 2 rolls		
Yield strength KN/m	TD			31	40.0
	MD				40.0
Yield elongation (%)	TD			13	18.0
	MD				17.0
Break strength KN/m	TD			31	47.0
	MD				42.0
Break elongation (%)	TD			150	548
	MD				478
TEAR RESISTANCE (N)	TD	ASTM D1004	Every 5 rolls	265	329
	MD				339
PUNCTURE RESISTANCE(N)		ASTM D4833	Every 5 rolls	675	756
DENSITY (G/CC)		ASTM D792	Every 2 rolls	≥ 0.940	0.945
CARBON BLACK CONTENT(%)		ASTM D4218	Every 2 rolls	2.0 - 3.0	2.70
CARBON BLACK DISPERSION		ASTM D5596	Every 10 rolls	Cat. 1 / Cat. 2	10
DIMENSIONAL STABILITY (%)	TD				
	MD				



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Solmax Geosynthetics S.A.E.
STREET #28, 4TH INDUSTRIAL ZONE, 6TH OF OCTOBER CITY, , EGYPT,

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GSE Lining Technology GmbH Warboys, HUNTINGDON

Number VKL+122725
Voucher VKL+122725

Received at Warboys, HUNTINGDON from GSE Lining Technology GmbH the property described below, in apparent good order, except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated below, which said Carrier agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to the rates and contract agreed to in writing by GSE Lining Technology GmbH and Carrier. GSE Lining Technology GmbH's obligation to pay freight charges for the shipment is conditioned on (1) the existence of a separate written contract with the Carrier transporting the freight and (2) the Carrier's name appearing on this Bill of Lading, and other carriers must look solely to a party other than GSE Lining Technology GmbH for payment.

Ship to:	CELTIC LINING Ltd. C/O TATA STEEL PORT TALBOT SOUTH WALES SA13 2NG Great Britain	Ship date:	Apr 16, 2020
		Branch plant:	1815
		Sales order:	VK112375

Shipping instructions:

Line no.	Shipped quantity	Product code	Unit	Kind of Package, Description of Articles, Special Marks and Exceptions	Weight kg	Project
1	8.704,00	HDT-200AM-BBB-W-W0	sqm	GSE HD textured 2.0 mm - 10 rolls - Canadian HS Code: 39201089 Country of Origin: Egypt	17.896,10	Freight charges are prepaid unless marked collect.
2				1005-047987 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.812,04	Check box if collect
3				1005-047991 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.746,72	☐
4				1005-048017 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.781,00	Customer PO number
5				1005-048031 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	Tata Steel
6				1005-048032 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.742,00	If this shipment is to be delivered to consignee, consignor shall sign the following statement.
7				1005-048062 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.757,61	Carrier may decline to deliver this shipment without payment of freight and all other lawful charges.
8				1005-048063 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.753,52	
9				1005-048075 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.748,08	
10				1005-048078 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	
11	2.919,00	HDT-200AM-BBB-V-W0	sqm	GSE HD Textured 2.0 mm - 6 rolls - German HS Code: 39201089	6.124,00	Signature of Consignor
12				420072335 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	Local Verification Signed
13				420072337 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	
14				420072342 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	X
15				420072343 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	
16				420072344 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	PRO Number
				420072346 GSE HD Textured 2.0 mm - 6 rolls - German	1.034,00	UK103899
						Seal numbers
						Truckers P.O. #
Total quantity:		11.623,00	Total weight:		23.816,10	PO850

Carrier name: Manchett's Transport LTD

Carrier signature: _____

Date: _____

GSE Lining Technology GmbH Warboys, HUNTINGDON

Number VKL+122725
Voucher VKL+122725

Received at **Warboys, HUNTINGDON** from GSE Lining Technology GmbH the property described below, in apparent good order, except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated below, which said Carrier agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to the rates and contract agreed to in writing by GSE Lining Technology GmbH and Carrier. GSE Lining Technology GmbH's obligation to pay freight charges for the shipment is conditioned on (1) the existence of a separate written contract with the Carrier transporting the freight and (2) the Carrier's name appearing on this Bill of Lading, and other carriers must look solely to a party other than GSE Lining Technology GmbH for payment.

Ship to:	CELTIC LINING Ltd. C/O TATA STEEL PORT TALBOT SOUTH WALES SA13 2NG Great Britain	Ship date:	Apr 16, 2020
		Branch plant:	1815
		Sales order:	VK112375

Shipping instructions:

Line no.	Shipped quantity	Product code	Unit	Kind of Package, Description of Articles, Special Marks and Exceptions	Weight kg	Project
1	8.704,00	HDT-200AM-BBB-W-W0	sqm	GSE HD textured 2.0 mm - 10 rolls - Canadian HS Code: 39201089 Country of Origin: Egypt	17.896,10	Freight charges are prepaid unless marked collect.
2				1005-047987 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.812,04	Check box if collect
3				1005-047991 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.746,72	☐
4				1005-048017 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.781,00	Customer PO number
5				1005-048031 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	Tata Steel
6				1005-048032 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.742,00	If this shipment is to be delivered to consignee, consignor shall sign the following statement.
7				1005-048062 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.757,61	Carrier may decline to deliver this shipment without payment of freight and all other lawful charges.
8				1005-048063 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.753,52	
9				1005-048075 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.748,08	
10				1005-048078 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	
11	2.919,00	HDT-200AM-BBB-V-W0	sqm	GSE HD Textured 2.0 mm - 6 rolls - German HS Code: 39201089	6.124,00	Signature of Consignor
12				420072335 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	Local Verification Signed
13				420072337 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	
14				420072342 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	X
15				420072343 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	
16				420072344 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	PRO Number
				420072346 GSE HD Textured 2.0 mm - 6 rolls - German	1.034,00	UK103899
						Seal numbers
						Truckers P.O. #
Total quantity:		11.623,00	Total weight:		23.816,10	PO850

Carrier name: Manchett's Transport LTD

Carrier signature: _____

Date: _____

GSE Lining Technology GmbH Warboys, HUNTINGDON

Number VKL+122725
Voucher VKL+122725

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Ship to:	CELTIC LINING Ltd. C/O TATA STEEL PORT TALBOT SOUTH WALES SA13 2NG Great Britain	Ship date:	Apr 16, 2020
		Branch plant:	1815
		Sales order:	VK112375

Shipping instructions:

Line no.	Shipped quantity	Product code	Unit	Kind of Package, Description of Articles, Special Marks and Exceptions	Weight kg	Project
1	8.704,00	HDT-200AM-BBB-W-W0	sqm	GSE HD textured 2.0 mm - 10 rolls - Canadian HS Code: 39201089 Country of Origin: Egypt	17.896,10	Freight charges are prepaid unless marked collect.
2				1005-047987 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.812,04	Check box if collect
3				1005-047991 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.746,72	☐
4				1005-048017 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.781,00	Customer PO number
5				1005-048031 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	Tata Steel
6				1005-048032 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.742,00	If this shipment is to be delivered to consignee, consignor shall sign the following statement.
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8				1005-048063 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.753,52	
9				1005-048075 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.748,08	
10				1005-048078 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	
11	2.919,00	HDT-200AM-BBB-V-W0	sqm	GSE HD Textured 2.0 mm - 6 rolls - German HS Code: 39201089	6.124,00	Signature of Consignor
12				420072335 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	Local Verification Signed
13				420072337 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	
14				420072342 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	X
15				420072343 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	
16				420072344 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	PRO Number
				420072346 GSE HD Textured 2.0 mm - 6 rolls - German	1.034,00	UK103899
						Seal numbers
						Truckers P.O. #
Total quantity:		11.623,00	Total weight:		23.816,10	PO850

Carrier name: Manchett's Transport LTD

Carrier signature: _____

Date: _____

GSE Lining Technology GmbH Warboys, HUNTINGDON

Number VKL+122725
Voucher VKL+122725

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Ship to:	CELTIC LINING Ltd. C/O TATA STEEL PORT TALBOT SOUTH WALES SA13 2NG Great Britain	Ship date:	Apr 16, 2020
		Branch plant:	1815
		Sales order:	VK112375

Shipping instructions:

Line no.	Shipped quantity	Product code	Unit	Kind of Package, Description of Articles, Special Marks and Exceptions	Weight kg	Project
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2				1005-047987 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.812,04	Check box if collect
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4				1005-048017 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.781,00	Customer PO number
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9				1005-048075 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.748,08	
10				1005-048078 GSE HD textured 2.0 mm - 10 rolls - Canadian	1.744,00	
11	2.919,00	HDT-200AM-BBB-V-W0	sqm	GSE HD Textured 2.0 mm - 6 rolls - German HS Code: 39201089	6.124,00	Signature of Consignor
12				420072335 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	Local Verification Signed
13				420072337 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	
14				420072342 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	X
15				420072343 GSE HD Textured 2.0 mm - 6 rolls - German	1.036,00	
16				420072344 GSE HD Textured 2.0 mm - 6 rolls - German	1.038,00	PRO Number
				420072346 GSE HD Textured 2.0 mm - 6 rolls - German	1.034,00	UK103899
						Seal numbers
						Truckers P.O. #
Total quantity:		11.623,00	Total weight:		23.816,10	PO850

Carrier name: Manchett's Transport LTD

Carrier signature: _____

Date: _____

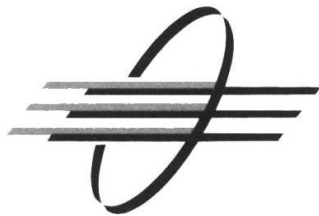
**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 4
HDPE Conformance Test
Results

Report Number 1915r4v1d0722



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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-S772/a

Report Date 03/12/2020

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Morfa Landfill Site

Client PO/Ref No TBA

Material Tested 2mm Textured HDPE Geomembrane

Date Received 27/11/2020

Sample IDs See Test Report

Tests Requested Asperity Height - ASTM D7466/D7466M-10(2015)e1
Carbon Black Content - ASTM D1603-14
Carbon Black Dispersion - ASTM D5596-03(2016)
Density - ASTM D1505-18
Oxidative Induction Time - ASTM D3895-19
Puncture Resistance - ASTM D4833/D4833M-07(2020)
Tear Resistance - ASTM D1004-13
Tensile Properties - ASTM D6693/D6693M-04(2015)e1
Thickness - ASTM D5994/D5994M-10(2015)e1

Data Pending → Stress Crack Resistance - ASTM D5397-20

Prepared by:

Alex Hornby
Technician

Approved by:

PP:Cliff Butt
Managing Director



4438

Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-S772/a
Dates Tested: 30/11-03/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		
Sample ID: Roll No: 346						BICS Sample Ref: 1						
Asperity Height (ASTM D7466/D7466M-10(2015)e1)												
Side A mm	0.89	0.82	0.80	0.88	0.85	0.84	0.76	0.67	0.59	0.80	0.79	0.1
Side B mm	0.73	0.87	0.83	0.70	0.81	0.85	0.83	0.89	0.88	0.80	0.82	0.1
Carbon Black Content (ASTM D1603-14)												
%	2.50	2.47									2.49	0.02
Carbon Black Dispersion (ASTM D5596-03(2016))												
Category Rating - 1st Rf	1	1	1	1	1						1	0
Category Rating - 2nd Rf	1	1	1	1	1						1	0
Density (ASTM D1505-18)												
g/ml	0.944	0.944	0.945								0.944	0.000
Oxidative Induction Time (ASTM D3895-19)												
min	167	170									169	2.0
Puncture Resistance (ASTM D4833/D4833M-07(2020))												
N	853	843	835	830	780						828	29
Tear Resistance (ASTM D1004-13)												
N (MD)	351	339	352	356	328	343	312	323	326	354	338	15
N (CD)	348	303	317	374	330	315	288	332	323	326	326	24
Tensile Properties (ASTM D6693/D6693M-04(2015)e1)												
Yield Strength N/mm (MD)	41.7	40.1	46.8	43.0	40.5						42.4	2.7
Yield Strength N/mm (CD)	41.2	43.4	45.8	45.9	41.7						43.6	2.2
Yield Elongation % (MD)	18	17	18	16	16						17	1
Yield Elongation % (CD)	15	15	17	16	17						16	1
Break Strength N/mm (MD)	50.8	40.7	34.0	47.9	35.0						41.7	7.5
Break Strength N/mm (CD)	31.1	31.5	33.4	35.1	42.4						34.7	4.6
Break Elongation % (MD)	630	510	310	600	450						500	128
Break Elongation % (CD)	250	180	290	450	520						338	142
Thickness (ASTM D5994/D5994M-10(2015)e1)												
mm	2.10	2.16	1.86	1.94	1.97	2.01	2.06	2.13	2.09	2.00	2.03	0.09

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-S772/a
Dates Tested: 30/11-03/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev		
	1	2	3	4	5	6	7	8	9	10				
Sample ID: Roll No: 048017						BICS Sample Ref: 2								
Asperity Height (ASTM D7466/D7466M-10(2015)e1)														
Side A mm	0.63	0.63	0.55	0.58	0.59	0.47	0.45	0.45	0.48	0.51	0.53	0.1		
Side B mm	0.56	0.55	0.58	0.54	0.56	0.54	0.56	0.72	0.61	0.75	0.60	0.1		
Carbon Black Content (ASTM D1603-14)														
%	2.75	2.75									2.75	0.00		
Carbon Black Dispersion (ASTM D5596-03(2016))														
Category Rating - 1st Rf	1	1	1	1	1						1	0		
Category Rating - 2nd Rf	1	1	1	1	1						1	0		
Density (ASTM D1505-18)														
g/ml	0.944	0.944	0.944								0.944	0.000		
Oxidative Induction Time (ASTM D3895-19)														
min	177	180									179	2.5		
Puncture Resistance (ASTM D4833/D4833M-07(2020))														
N	819	815	830	840	819						825	10		
Tear Resistance (ASTM D1004-13)														
N (MD)	332	292	327	301	330	309	303	321	305	335	315	15		
N (CD)	320	308	352	314	328	340	308	326	307	351	325	17		
Tensile Properties (ASTM D6693/D6693M-04(2015)e1)														
Yield Strength N/mm (MD)	40.4	38.6	38.7	40.4	36.7						39.0	1.5		
Yield Strength N/mm (CD)	41.6	39.6	39.7	41.8	41.1						40.8	1.0		
Yield Elongation % (MD)	16	18	17	18	15						17	1		
Yield Elongation % (CD)	18	15	15	16	17						16	1		
Break Strength N/mm (MD)	48.5	53.6	53.2	50.9	43.7						50.0	4.1		
Break Strength N/mm (CD)	45.3	40.3	48.1	46.8	47.3						45.6	3.1		
Break Elongation % (MD)	520	620	620	570	500						566	55		
Break Elongation % (CD)	540	470	590	540	570						542	45		
Thickness (ASTM D5994/D5994M-10(2015)e1)														
mm	2.07	2.06	2.02	2.06	1.99	1.96	2.03	2.04	1.95	2.01	2.02	0.04		

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-S772/a
Dates Tested: 30/11-03/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		
Sample ID: Roll No: 048078						BICS Sample Ref: 3						
Asperity Height (ASTM D7466/D7466M-10(2015)e1)												
Side A mm	0.49	0.52	0.61	0.52	0.43	0.54	0.52	0.56	0.62	0.56	0.54	0.1
Side B mm	0.77	0.66	0.70	0.76	0.73	0.68	0.72	0.84	0.68	0.86	0.74	0.1
Carbon Black Content (ASTM D1603-14)												
%	2.74	2.72									2.73	0.01
Carbon Black Dispersion (ASTM D5596-03(2016))												
Category Rating - 1st Rf	1	1	1	1	1						1	0
Category Rating - 2nd Rf	1	1	1	1	1						1	0
Density (ASTM D1505-18)												
g/ml	0.945	0.944	0.944								0.944	0.000
Oxidative Induction Time (ASTM D3895-19)												
min	169	178									173	6.4
Puncture Resistance (ASTM D4833/D4833M-07(2020))												
N	810	798	794	800	805						801	6
Tear Resistance (ASTM D1004-13)												
N (MD)	291	293	304	289	310	290	272	306	304	292	295	11
N (CD)	337	309	349	340	355	349	305	340	332	347	336	17
Tensile Properties (ASTM D6693/D6693M-04(2015)e1)												
Yield Strength N/mm (MD)	42.1	42.1	40.3	42.5	41.8						41.7	0.8
Yield Strength N/mm (CD)	46.9	41.9	44.2	44.3	44.0						44.2	1.8
Yield Elongation % (MD)	17	17	17	17	18						17	0
Yield Elongation % (CD)	17	16	17	17	15						16	1
Break Strength N/mm (MD)	49.8	49.7	43.9	48.8	48.1						48.1	2.4
Break Strength N/mm (CD)	50.0	42.8	49.1	47.1	47.8						47.3	2.8
Break Elongation % (MD)	530	540	460	520	500						510	32
Break Elongation % (CD)	480	480	570	520	540						518	39
Thickness (ASTM D5994/D5994M-10(2015)e1)												
mm	1.94	1.94	1.98	1.95	1.95	1.98	2.04	2.03	1.92	2.03	1.98	0.05

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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CONFIDENTIAL TEST REPORT



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site
Material: 2mm Textured HDPE Geomembrane

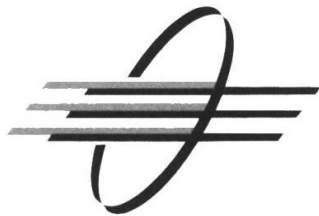
Report Ref No: BS-S772/a
Dates Tested: 30/11-03/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev	
	1	2	3	4	5	6	7	8	9	10			
Sample ID: Roll No: 420072344						BICS Sample Ref: 4							
Asperity Height (ASTM D7466/D7466M-10(2015)e1)													
Side A mm	0.68	0.80	0.67	0.68	0.75	0.85	0.76	0.79	0.68	0.66	0.73	0.1	
Side B mm	0.75	0.87	0.83	0.83	0.87	0.80	0.78	0.84	0.76	0.82	0.82	0.1	
Carbon Black Content (ASTM D1603-14)													
%	2.33	2.41									2.37	0.06	
Carbon Black Dispersion (ASTM D5596-03(2016))													
Category Rating - 1st Rf	1	1	1	1	1						1	0	
Category Rating - 2nd Rf	1	1	1	1	1						1	0	
Density (ASTM D1505-18)													
g/ml	0.942	0.942	0.942								0.942	0.000	
Oxidative Induction Time (ASTM D3895-19)													
min	178	176									177	1.1	
Puncture Resistance (ASTM D4833/D4833M-07(2020))													
N	800	807	781	802	800						798	10	
Tear Resistance (ASTM D1004-13)													
N (MD)	346	274	316	337	338	319	314	326	329	361	326	23	
N (CD)	339	299	338	344	340	348	300	341	328	331	331	18	
Tensile Properties (ASTM D6693/D6693M-04(2015)e1)													
Yield Strength N/mm (MD)	42.9	43.7	45.1	41.2	42.3						43.1	1.5	
Yield Strength N/mm (CD)	41.1	43.3	43.0	37.4	43.8						41.7	2.6	
Yield Elongation % (MD)	18	17	15	17	15						16	1	
Yield Elongation % (CD)	16	16	15	13	16						15	1	
Break Strength N/mm (MD)	44.9	46.6	47.1	41.4	45.8						45.2	2.2	
Break Strength N/mm (CD)	36.7	39.3	31.7	35.7	44.2						37.5	4.6	
Break Elongation % (MD)	540	550	540	500	550						536	21	
Break Elongation % (CD)	450	530	160	490	530						432	156	
Thickness (ASTM D5994/D5994M-10(2015)e1)													
mm	1.96	1.93	1.93	2.02	1.99	2.01	2.06	1.94	1.95	1.89	1.97	0.05	

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-S772/a{Supplementary¹}

Report Date 24/12/2020

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Morfa Landfill Site

Client PO/Ref No TBA

Material Tested 2mm Textured HDPE Geomembrane

Date Received 27/11/2020

Sample IDs See Test Report

Tests Requested Stress Crack Resistance - ASTM D5397-20

Prepared by:

Alex Hornby
Technician

Approved by:

PP:Cliff Butt
Managing Director



4438

Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
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Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-S772/a{Supplementary¹}
Dates Tested: 03-24/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: Roll No: 346

BICS Sample Ref: 1

Stress Crack (ASTM D5397-20)

hrs	>500	>500	>500	>500	>500	Note: Test terminated without break, no failure					>500	-
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Sample ID: Roll No: 048017

BICS Sample Ref: 2

Stress Crack (ASTM D5397-20)

hrs	>500	>500	>500	>500	>500	Note: Test terminated without break, no failure					>500	-
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Sample ID: Roll No: 048078

BICS Sample Ref: 3

Stress Crack (ASTM D5397-20)

hrs	>500	>500	>500	>500	>500	Note: Test terminated without break, no failure					>500	-
-----	------	------	------	------	------	---	--	--	--	--	------	---

Sample ID: Roll No: 420072344

BICS Sample Ref: 4

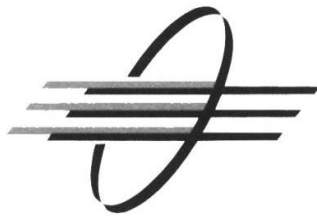
Stress Crack (ASTM D5397-20)

hrs	>500	>500	>500	>500	>500	Note: Test terminated without break, no failure					>500	-
-----	------	------	------	------	------	---	--	--	--	--	------	---

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-U129/a

Report Date 22/02/2022

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested 2mm Textured HDPE Geomembrane

Date Received 18/02/2022

Sample IDs Roll No: 10103

Tests Requested Asperity Height - ASTM D7466/D7466M-10(2015)e1
Carbon Black Content - ASTM D1603-20
Carbon Black Dispersion - ASTM D5596-03(2021)
Density - ASTM D1505-18
Puncture Resistance - ASTM D4833/D4833M-07(2020)
Tear Resistance - ASTM D1004-21
Tensile Properties - ASTM D6693/D6693M-20
Thickness - ASTM D5994/D5994M-10(2021)

Data Pending → Stress Crack Resistance - ASTM D5397-20

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



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Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-U129/a
Dates Tested: 21/02/2022

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: Roll No: 10103

BICS Sample Ref: 1

Asperity Height (ASTM D7466/D7466M-10(2015)e1)

Side A mm	0.52	0.52	0.56	0.54	0.53	0.53	0.59	0.53	0.49	0.50	0.53	0.0
Side B mm	0.57	0.49	0.53	0.53	0.54	0.56	0.53	0.54	0.51	0.55	0.53	0.0

Carbon Black Content (ASTM D1603-20)

%	2.50	2.47									2.49	0.02
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Carbon Black Dispersion (ASTM D5596-03(2021))

Category Rating - 1st Rf	1	1	1	1	1						1	0
Category Rating - 2nd Rf	1	1	1	1	1						1	0

Density (ASTM D1505-18)

g/ml	0.949	0.949	0.948								0.949	0.000
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Puncture Resistance (ASTM D4833/D4833M-07(2020))

N	791	814	780	820	798						800	16
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Tear Resistance (ASTM D1004-21)

N (MD)	357	291	341	308	341	353	319	345	293	333	328	24
N (CD)	350	314	322	310	355	357	298	338	299	347	329	23

Tensile Properties (ASTM D6693/D6693M-20)

Yield Strength N/mm (MD)	45.1	39.8	41.6	37.3	35.8						39.9	3.6
Yield Strength N/mm (CD)	42.9	42.7	39.8	40.1	38.0						40.7	2.1
Yield Elongation % (MD)	16	16	16	17	16						16	0
Yield Elongation % (CD)	17	17	16	16	16						16	1
Break Strength N/mm (MD)	47.2	45.6	47.0	41.7	39.5						44.2	3.4
Break Strength N/mm (CD)	50.0	42.3	41.3	41.7	36.7						42.4	4.8
Break Elongation % (MD)	520	580	590	550	510						550	35
Break Elongation % (CD)	630	503	530	550	468						536	61

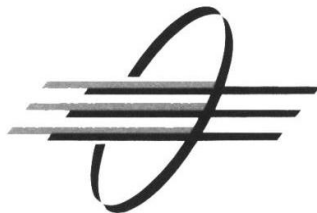
Thickness (ASTM D5994/D5994M-10(2021))

mm	2.03	2.02	2.04	2.04	2.05	2.05	2.06	2.00	2.09	2.03	2.04	0.02
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Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-U129/a {Supplementary¹}

Report Date 14/03/2022

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested 2mm Textured HDPE Geomembrane

Date Received 18/02/2022

Sample IDs Roll No: 10103

Tests Requested Stress Crack Resistance - ASTM D5397-20

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-U129/a {Supplementary¹}
Dates Tested: 21/02-14/03/2022

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
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	1	2	3	4	5	6	7	8	9	10		
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Sample ID: Roll No: 10103

BICS Sample Ref: 1

Stress Crack (ASTM D5397-20)

hrs	>500	>500	>500	>500	>500	Note: Test terminated without break, no failure					>500	-
-----	------	------	------	------	------	---	--	--	--	--	------	---

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 5
HDPE Deployment Records
Report Number 1915r4v1d0722



HDPE Repair 1



HDPE Repair 2



HDPE Repair 3



HDPE Repair 4



HDPE Repair 5



HDPE Repair 6



HDPE Repair 7



HDPE Repair 8



HDPE Repair 9



HDPE Repair 10



HDPE Repair 11



HDPE Repair 12



HDPE Repair 13



HDPE Repair 14



HDPE Repair 15



HDPE Repair 16



Geosynthetic Panel Deployment

CQA12

Site	Morfa Biocell Extension Phase 2	Material	2mm DRS HDPE	Installer	Celtic Lining Ltd.
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Date	Roll No	Panel No	Thickness L	Thickness R	Thickness F	Thickness B	Length	Width	Visual Check	Non-Con No
02/12/2020	420072346	P1B	2.0	2.1	2.1	2.0	68	6.8	Y	
02/12/2020	420072343	P2B	2.1	2.1	2.0	2.0	68	6.8	Y	
02/12/2020	048063	P3B	2.0	2.1	2.0	2.1	13.5	6.8	Y	
02/12/2020	048063	P4B	2.0	2.1	2.0	2.1	75	6.8	Y	
02/12/2020	048063	P5B	2.0	2.1	2.0	2.0	17.5	6.8	Y	
02/12/2020	047991	P6B	2.2	2.0	2.0	2.0	55	6.8	Y	
03/12/2020	047991	P7B	2.0	2.1	2.1	2.0	68	6.8	Y	
03/12/2020	047987	P8B	2.1	2.1	2.1	2.0	4.5	6.8	Y	
03/12/2020	047987	P9B	2.1	2.1	2.1	2.0	72.5	6.8	Y	
03/12/2020	047987	P10B	2.1	2.0	2.1	2.0	45.8	6.8	Y	
03/12/2020	048031	P11B	2.1	2.0	2.1	2.0	27.5	6.8	Y	
03/12/2020	048031	P12B	2.1	2.0	2.1	2.0	73.5	6.8	Y	
09/12/2020	048075	P13B	2.2	2.0	2.0	2.0	52.4	6.8	Y	



Geosynthetic Panel Deployment

CQA12

Site	Morfa Biocell Extension Phase 2	Material	2mm DRS HDPE	Installer	Celtic Lining Ltd.
-------------	--	-----------------	---------------------	------------------	---------------------------

Date	Roll No	Panel No	Thickness L	Thickness R	Thickness F	Thickness B	Length	Width	Visual Check	Non-Con No
09/12/2020	048031	P14B	2.2	2.0	2.0	2.0	23.7	6.8	Y	
09/12/2020	048075	P15B	2.0	2.0	2.1	2.1	74	6.8	Y	
10/12/2020	420072335	P16B	2.0	2.0	2.0	2.0	68	6.8	Y	
10/12/2020	420072334	P17B	2.1	2.1	2.1	2.1	5.5	6.8	Y	
10/12/2020	420072342	P18B	2.1	2.0	2.1	2.1	68	6.8	Y	
10/12/2020	420072334	P19B	2.1	2.1	2.1	2.1	6	6.8	Y	
10/12/2020	420072334	P20B	2.0	2.0	2.2	2.1	7	6.8	Y	
10/12/2020	420072337	P21B	2.1	2.1	2.2	2.1	67.5	6.8	Y	
07/02/2022	420072337	P22B	2.0	2.1	2.1	2.2	45.2	6.8	Y	
07/02/2022	420072337	P23B	2.1	2.1	2.1	2.2	31	6.8	Y	
07/02/2022	010109	P24B	2.0	2.0	2.2	2.1	69	6.8	Y	
08/02/2022	010103	P25B	2.1	2.0	2.1	2.1	55.7	6.8	Y	

[illegible]



Geosynthetic Repair Record

CQA14

Site	Morfa Biocell Extension Phase 2	Material	2mm DRS HDPE	Installer	Celtic Lining Ltd.
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Date	Repair No	Location	Defect Type	Repair Type	Machine	Operator	NDT	Test Time	Pass/Fail	Approved
02/12/2021	1	P3B / P4B	Burn	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	2	P4B,P5B&P6B	3 way Join	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	3	P4B/P6B	Weld Burn	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	4	P4B/P6B	DS2	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	5	P8B	Damaged Liner	Large Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	6	P8B/P9B	Weld Join	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	7	P11B/P12B	Weld Burn	Patch	CL1A	EJ	Vacc		Pass	Y
02/12/2021	8	P11B/P12B	Weld Burn	Patch	CL1A	EJ	Vacc		Pass	Y
10/12/2021	9	P12B/P14B	DS4	Patch	CL1A	GE	Vacc		Pass	Y
10/12/2021	10	P12B/P14B	Weld Burn	Patch	CL1A	GE	Vacc		Pass	Y
10/12/2021	11	P12B/P13B	Weld Burn	Patch	CL1A	GE	Vacc		Pass	Y
10/12/2021	12	P12B/P14B	Weld Burn	Patch	CL1A	GE	Vacc		Pass	Y

10/12/2021	13	P5B/P7B/PB8	Weld Join	Patch	CL1A	GE	Vacc		Pass	Y
08/02/2022	14	P21B/P23B	Weld Join	Patch	CL1A	DJ	Vacc		Pass	Y
08/02/2022	15	P24B/P23B	Weld Join	Patch	CL1A	DJ	Vacc		Pass	Y



Geomembrane Seam Construction

CQA13

Site	Morfa Biocell Extension Phase 2	Membrane	2mm DRS HDPE	Installer	Celtic Lining Ltd.
-------------	--	-----------------	---------------------	------------------	---------------------------

Date	Seam No	Panel Nos	Length	Machine	Operator	DS Number	NDT Type	APT Start	APT Finish	Approved
02/12/2021	1	P1B - P2B	68	CL90043	EJ		APT	12:30 - 2.0	12:40 - 2.0	Y
02/12/2021	2	P1B/P2B - P3B	13.5	CL90043	EJ		APT	12:52 - 2.0	13:02 - 2.0	Y
02/12/2021	3	P2B/P3B - P4B	75	CL90043	EJ	DS1	APT	14:10 - 2.1	14:20 - 2.0	Y
02/12/2021	4	P1B/P3B - Existing	75	CL90043	EJ		APT	15:35 - 2.0	15:45 - 1.9	Y
02/12/2021	5	P5B-P6B	7	CL90043	EJ		APT	14:40-2.0	14:50 - 2.0	Y
02/12/2021	6	P4B- P5B/P6B	18	CL90043	EJ	DS2	APT	15:53-2.0	16:03-1.9	Y
03/12/2021	6a	P4B- P5B/P6B	17	CL90043	EJ		APT	12:30 - 2	12:40 - 1.9	Y
03/12/2021	6b	P4B- P5B/P6B	20	CL90043	EJ		APT	10:19 - 2.0	10:28 - 1.8	Y
03/12/2021	6c	P4B- P5B/P6B	20	CL90043	EJ		APT	10:03-2	10.13-1.8	Y
03/12/2021	7	P7B-P8B	7	CL90043	EJ		APT	09:10 - 2	09:20 - 2	Y
03/12/2021	8	P5B/P6B- P7B/P8B	75	CL90043	EJ		APT	09:24-2	09:34 - 1.9	Y
03/12/2021	9	P7B/P8B-P9B	76	CL90043	EJ		APT	09:51-2	10:01:00 - 1.9	Y

03/12/2021	10	P10B-P11B	7	CL90043	EJ	DS3	APT	11:05 - 2	11:15 - 1.9	Y
03/12/2021	11	P9B/P10B-P11B	76	CL90043	EJ		APT	11:40 - 2	11:50 - 1.8	Y
03/12/2021	12	P10B/P11B-P12B	76	CL90044	EJ		APT	13:15-2	13:25 - 2	Y
03/12/2021	13	Tie in to existing	56	CL1A	ML		Vacuum			Y
09/12/2021	14	P13B-P14B	7	CL90044	EJ		APT	09:20-2	0930-1.9	Y
09/12/2021	15	P12B-P13B/P14B	12	CL90044	EJ		APT	10:30-2	10:40-1.9	Y
09/12/2021	16	P15B-P13B/P14B	76	CL90043	EJ	DS4	APT	11:14-2	11:24-1.9	Y
09/12/2021	17	P12B-P14B	17	CL90043	EJ		APT	10:30-2	10:40-1.9	Y
09/12/2021	18	P12B-P13B/P14B	20	CL90043	EJ		APT	10:16-2	1026-1.9	Y
09/12/2021	19	P12B-P13B	20	CL90043	EJ		APT	10:05-2	10:15-1.9	Y
10/12/2021	20	P16B-P17B	7	CL90043	EJ		APT	09:00-2	09:10-1.9	Y
10/12/2021	21	P15B-P16B/P17B	76	CL90043	EJ	DS6	APT	10:05-2	10:15-1.9	Y
10/12/2021	22	P18B-P19B	7	CL90043	EJ		APT	09:40-2	09:50-1.8	Y
10/12/2021	23	P16B/P17B-P18B/P19B	76	CL90043	EJ		APT	11:02-2	11:12-1.9	Y
10/12/2021	24	P20B/P21B	7	CL90043	EJ		APT	11:50-2	12:00-2	Y
10/12/2021	25	P18B/P19B-P20B/P21B	76	CL90043	EJ	DS7	APT	13:00-2	13:10-1.9	Y
07/02/2022	26	P22B-P23B	7	CL90043	EJ		APT	10:45-2	10:55-1.9	Y

07/02/2022	27	P22B/P23B-P24B	74	CL90043	EJ	DS9	APT	13:32-2	13:42-1.9	Y
08/02/2021	28	P25B-P26B	7	CL90043	EJ		APT	09:46-2	09:56-1.9	Y
08/02/2021	29	P24B-P25B/P26B	66	CL90043	EJ		APT	13:20-2.1	13:30-2	Y
08/02/2021	30	P27B-P28B	1	CL90043	EJ		APT	11:00-2	11:10-2	Y
08/02/2021	31	P28B-P29B	2	CL90043	EJ		APT	11:12-2	11:22-1.9	Y
08/02/2021	32	P27B-P29B/P26B	20	CL90043	EJ	DS10	APT	11:45-2.0	11:55-2	Y

Project: HAZARD CELL B
Location: TATA STEEL
Date: 2/12/21

1. QA Eng 2. Head Office 3. Client

Celtic Lining Ltd.

Project: Hazardous Cell B Location: TATA Steel Date: 3/12/21
Rep: [Signature] O/A Client: [Signature]

SUPERVISOR		NAMES	TODAY HRS	B/F HRS	TOTAL HRS
TECHNICIANS		D Jones			
LABOUR		+2			
PLANT					
HOURS		INSTALLATION HRS	STANDING HRS	CUMULATING HRS	

DAILY PRODUCTION					
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC		
20m HOURS	2,036	2,036	2,036		
TIE-IN	56m	56m	56m		

CUMULATIVE PRODUCTION					
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC		
20m HOURS	3,994	3,994	3,994		
TIE-IN	56m	56m	56m		

DESTRUCTIVE SAMPLES					
TABS	SEAM NO.	WELD DATE	WELDED BY	RESULT	LOCATION
All Tabs Pass Street Level					
OF SEAMS					

PRE WELD					
MACH NO.	OPERATOR	TEMP	SPEED	TIME	RESULT
90043	D Jones	410	18mm	08:15	Pass
C-12	MANU	250	-	14:10	Pass

DEPLOYMENT				WELDING			NON DESTRUCTIVE APT TESTING					
TYPE	PANEL NO.	ROLL NO.	AREA	MACH NO.	TECH	SEAM NO.	LENGTH	SEAM NO.	LENGTH	START TIME	END TIME	TECH
20m	78	7941	475	90043	DS	7/8	7m			09:10	09:20	ML
1	90	7987	37	-	-	5/8	75m			09:24	09:34	20
1	90	-	509	-	-	3/8	76m			09:31	10:01	20
-	100	-	316	-	-	10/11	7m			11:05	11:15	20
1	110	8031	190	-	-	9/10-11	76m			11:40	11:50	20
1	128	-	509	-	-	10-11	76m			13:15	13:25	20
				C-12	ML	3-4/8	76m			11:54	12:04	20
				-	-	4/5-6	R2					
				-	-	4/6	R3					
				-	-	4/6	R4					
				-	-	8/8	R5					
				-	-	8-9/8	R6					
				-	-	11/12	R7					
				-	-	11/12	R8					
				-	-	TIE-IN	56m					

LAB TESTING					
SAMPLE NO.	SEAM NO.	DATE WELDED	LOCATION	DATE SENT	
DS ③	9/11	3/12/21	END OF SEAM	13/12/21	

NON DESTRUCTIVE TESTING					
TYPE	SEAM NO.	LENGTH	LOCATION	RESULT	TECH
All Vac Box TESTING					
Pass Field TEST OK					
DS					

WEATHER	
TYPE	TEMP
-	-

DELAYS TO WEATHER	
TYPE	TEMP
-	-

1. QA Eng 2. Head Office 3. Client

Celtic Lining Ltd.

Project: HAZARD Cais Location: TATA STEEL Date: 9/12/21
 Rep: [Signature] Q/A Client:

SUPERVISOR		NAMES		TODAY HRS	B/F HRS	TOTAL HRS
TECHNICIANS		D JONES				
LABOUR		+2				
PLANT						
HOURS		INSTALLATION HRS		STANDING HRS	CUMULATING HRS	

DAILY PRODUCTION			
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC
20m Hous	1,028	1,028	1,028

CUMULATIVE PRODUCTION			
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC
20m Hous	5,022	5,022	5,022
Tie-in	56m	56m	56m

PRE WELD					
MACH NO.	OPERATOR	TEMP	SPEED	TIME	RESULT
90043	E JONES	410	18mp	08:10	Pass

DESTRUCTIVE SAMPLES					
TABS	SEAM NO.	WELD DATE	WELDED BY	RESULT	LOCATION
All Tabs Pass STRENGTH					
OK Seams					

LAB TESTING				
SAMPLE NO.	SEAM NO.	DATE WELDED	LOCATION	DATE SENT
DS4	14/15	9/12/21	R12	12/12/21

DEPLOYMENT				WELDING			NON DESTRUCTIVE APT TESTING						
TYPE	PANEL NO.	ROLL NO.	AREA	MACH NO.	TECH	SEAM NO.	LENGTH	SEAM NO.	LENGTH	START TIME	END TIME	TECH	
20m	13B	8095	352	90043	EJ	13/14	7m			09:20	10:40	20	DS
14B	8031	160				13/14	7m			10:30	10:40	20	
15B	8075	516				13/14	7m			11:14	11:24	15	
						13/14	20m			10:05	10:15	20	

NON DESTRUCTIVE TESTING					
TYPE	SEAM NO.	LENGTH	LOCATION	RESULT	TECH

Celtic Lining Ltd.

Project: Hazard Cell 13 Location: TATA STEEL Date: 10/12/21
Rep: [Signature] Q/A Client: _____

SUPERVISOR		NAMES		TODAY HRS	B/F HRS	TOTAL HRS
TECHNICIANS		D Jones + 2				
LABOUR						
PLANT						
HOURS				INSTALLATION HRS	STANDING HRS	CUMULATING HRS

DAILY PRODUCTION						
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC			
20-H00s	1,557	1,557	1,557			
Tie-in	33m	33m	33m			
HPS 17	6,503	6,503	6,503			

CUMULATIVE PRODUCTION						
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC			
20-H00s	6,579	6,579	6,579			
Tie-in	89m	89m	89m			
HPS 17	6,503	6,503	6,503			

PRE WELD						
MACH NO.	OPERATOR	TEMP	SPEED	TIME	RESULT	
90043	D Jones	410	187	07:50	Pass	
CL1A	Gedwards	250	-	12:50	Pass	

DESTRUCTIVE SAMPLES						
TABS	SEAM NO.	WELD DATE	WELDED BY	RESULT	LOCATION	
All Tabs				Pass	Start/End of Seams	

DEPLOYMENT						
TYPE	PANEL NO.	ROLL NO.	AREA	MACH NO.	TECH	SEAM NO.
20~	166	2335	476	90043	DJ	16/17
~	173	2334	44	~	~	15/17
~	186	2342	476	~	~	15/19
~	196	2334	44	~	~	16-18
~	206	2334	47	~	~	18-19
~	216	2337	470	~	~	20-21

WELDING						
SEAM NO.	LENGTH	START	END	TECH		
16/17	7m	09:20	09:40	GE		
15/17	76m	10:05	10:15	~		
15/19	7m	09:20	09:50	~		
16-18	76m	11:02	11:12	~		
18-19	7m	11:50	12:00	~		
20-21	76m	13:00	13:10	~		

NON DESTRUCTIVE APT TESTING						
SEAM NO.	LENGTH	START	END	TECH		
CL1A	GE	12/14	R9			
~	~	12/14	R10			
~	~	14/13	R11			
~	~	14/15	R12			
~	~	14/18	R13			

NON DESTRUCTIVE TESTING						
TYPE	SEAM NO.	LENGTH	LOCATION	RESULT	TECH	
All Vac Box				TESTING		
Pass Field				TEST	OK	
					ES	

LAB TESTING						
SAMPLE NO.	SEAM NO.	DATE WELDED	LOCATION	DATE SENT		
DS6	TEST	3/12/21	EXTENSION	13/12/21		
DS6	weld	9/12/21	END OF SEAM	13/12/21		
DS6	19/20	10/12/21	END OF SEAM	13/12/21		
DS6	TEST	10/12/21	EXTENSION WELD	13/12/21		

DELAYS/COMMENTS						
Deploying 20-H00s on cell base,						
Wedge welding + APT's						
Extension welding tie-in to existing						
liner and repairs.						
Vac Box testing						
Deploying HPS 17 Geo textile for cover purposes.						

WEATHER	
TYPE	TEMP
-	-

DELAYS TO WEATHER	
-	-

Celtic Lining Ltd.

Project: Biohazard Cell B Location: TATA Steel Date: 7/2/22
 Rep: [Signature] Q/A Client: _____

SUPERVISOR			NAMES			TODAY HRS		B/F HRS		TOTAL HRS	
TECHNICIANS			D Jones								
LABOUR			ES + ML								
PLANT											
HOURS			INSTALLATION HRS			STANDING HRS		CUMULATING HRS			

DAILY PRODUCTION									
TYPE	DEPLOYED	M ²	WELDED	M ²	QC	M ²	QC		
20m Dcs	990		990		990				
CUMULATIVE PRODUCTION									
TYPE	DEPLOYED	M ²	WELDED	M ²	QC	M ²	QC		
20m Dcs	7,569		7,569		7,569				
HPS 17	6,503		6,503		6,503				
Tie-in	89m		89m		89m				

PRE WELD									
MACH NO.	OPERATOR	TEMP	SPEED	TIME	RESULT	TYPE	PANEL NO.	ROLL NO.	AREA
90043	ES	405	18m	0930	Pass	20m	228	344	310
						238			204
						248			476

WELDING									
SEAM NO.	LENGTH	START TIME	END TIME	TECH	SEAM NO.	LENGTH	START TIME	END TIME	TECH
228	7m	1045	1055	ML	228	7m	1045	1055	ML
238	7m	1332	1342	ML	238	7m	1332	1342	ML
248	7m				248	7m			

NON DESTRUCTIVE APT TESTING									
SEAM NO.	LENGTH	START TIME	END TIME	TECH	SEAM NO.	LENGTH	START TIME	END TIME	TECH
228	7m	1045	1055	ML	228	7m	1045	1055	ML
238	7m	1332	1342	ML	238	7m	1332	1342	ML
248	7m				248	7m			

DESTRUCTIVE SAMPLES									
TABS	SEAM NO.	WELD DATE	WELDED BY	RESULT	LOCATION				
All Tabs Pass START/END OF SEAMS									

LAB TESTING									
SAMPLE NO.	SEAM NO.	DATE WELDED	LOCATION	DATE SENT					
DS 9	228/7248	7/2/22	PURCH TRENCH	15/2					

DELAYS/COMMENTS									
Deploying 20m Hore Dcs on cell base.									
Wedge welding + APT's									

WEATHER	
TYPE	TEMP
-	-

NON DESTRUCTIVE TESTING									
TYPE	SEAM NO.	LENGTH	LOCATION	RESULT	TECH				

Celtic Lining Ltd.

Project: HAROLD CELL B Location: TATA STEEL Date: 8/2/22
Rep: [Signature] O/A Client:

SUPERVISOR		NAMES	TODAY HRS	B/F HRS	TOTAL HRS
TECHNICIANS		① JONES			
LABOUR		ES + MC			
PLANT					
HOURS		INSTALLATION HRS	STANDING HRS	CUMULATING HRS	

DAILY PRODUCTION					
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC		
20m DAs	490	490	490		
HRS 17	20 1,556	1,556	1,556		
TIE-IN	14m	14m	14m		

CUMULATIVE PRODUCTION					
TYPE	M ² DEPLOYED	M ² WELDED	M ² QC		
20m DAs	8,059	8,059	8,059		
HRS 17	8,059	8,059	8,059		
TIE-IN	103m	103m	103m		

DESTRUCTIVE SAMPLES					
TABS	SEAM NO.	WELD DATE	WELDED BY	RESULT	LOCATION
All TABS PASS START/END OF SEAMS					

PRE WELD				DEPLOYMENT				WELDING				NON DESTRUCTIVE APT TESTING							
MACH NO.	OPERATOR	TEMP	SPEED	TIME	RESULT	TYPE	PANEL NO.	ROLL NO.	AREA	MACH NO.	TECH	SEAM NO.	LENGTH	SEAM NO.	LENGTH	START	END	TECH	
90043	ES	405	18m	0745	PASS	20m	253		55	90043	ES	253/268	7m			09:44	2:00	36/21	MC
							263	10103	400			268/273	6m			10:20	2:10	35/21	
							273		7			273/283	1m			11:00	2:00	11/10	
							283		14			283/293	2m			11:12	2:00	11/22	
							293		14			293/303	20m			11:45	2:00	11/55	
												303/313	R14						
												313/323	R15						
												323/333	TIE IN						

LAB TESTING					
SAMPLE NO.	SEAM NO.	DATE WELDED	LOCATION	DATE SENT	
DS10	268	8/2	END OF SEAM	15/2	
DS11	EXT TEST WELD	8/2	TEST WELD	15/2	

NON DESTRUCTIVE TESTING					
TYPE	SEAM NO.	LENGTH	LOCATION	RESULT	TECH
All VAC BOX TESTING					
PASS FIELD TEST					
OK DS					

WEATHER		TYPE	TEMP
DELAYS TO WEATHER		-	-

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 6
HDPE Destructive Test Results
Report Number 1915r4v1d0722



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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-T928/a

Report Date 16/12/2021

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested 2mm Smooth & Textured HDPE Geomembrane

Date Received 16/12/2021

Sample IDs DS-1 through to DS-8 {Fusion & Extrusion Welds}

Tests Requested Seam Integrity (Peel & Shear) - ASTM D6392-12(2018)

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



4438

Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Smooth & Textured HDPE Geomembrane

Report Ref No: BS-T928/a
Dates Tested: 16/12/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: DS-1, P3/P4

BICS Sample Ref: 1

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	28.4	28.0	30.4	28.8	29.6	30.1	29.0	29.3	28.7	28.8	29.1	0.7
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	34.6	33.6	33.6	33.5	33.1						33.7	0.6
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	NOBRK	NOBRK	NOBRK	NOBRK							

Sample ID: DS-2, P4/P6

BICS Sample Ref: 2

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	29.3	29.1	28.4	28.0	28.4	29.7	28.8	30.0	30.4	30.0	29.2	0.8
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	34.7	33.8	34.1	34.2	33.3						34.0	0.5
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	NOBRK	NOBRK	SE1	NOBRK							

Sample ID: DS-3, P9/P11

BICS Sample Ref: 3

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	28.9	28.0	27.2	29.0	27.5	25.9	26.6	26.1	27.0	27.8	27.4	1.1
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	36.5	25.5	35.7	35.9	35.5						33.8	4.6
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE1	SE1	SE1	SE1	SE1							

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Smooth & Textured HDPE Geomembrane

Report Ref No: BS-T928/a
Dates Tested: 16/12/2021

TEST METHOD TEST SPECIMEN NUMBER MEAN Std Dev

1 2 3 4 5 6 7 8 9 10

Sample ID: DS-4, P14/P15

BICS Sample Ref: 4

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	26.6	25.9	29.3	18.7	22.2	28.3	27.0	26.4	25.5	27.2	25.7	3.1
Peel Separation %	0	0	0	75	100	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	ADBRK	AD	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	36.3	35.8	35.4	35.4	35.5						35.7	0.4
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	SE1	SE1	SE1	SE1							

Sample ID: DS-5, Test Weld

BICS Sample Ref: 5

Seam Integrity (ASTM D6392-12(2018)) {Extrusion Weld}

Peel Strength N/mm	23.3	22.8	19.3	24.0	25.3						23.0	2.2
Peel Separation %	0	0	0	0	0							
Peel Break Classification	SE3	SE3	SE3	SE3	SE3							
Shear Strength N/mm	36.5	34.5	30.0	30.1	33.1						32.8	2.8
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE2	SE2	SE2	SE2	SE2							

Sample ID: DS-6, P19/P20

BICS Sample Ref: 6

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	27.1	28.1	28.1	28.5	29.4	28.8	26.1	26.2	26.6	25.6	27.4	1.3
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	35.9	35.2	36.4	35.6	35.6						35.7	0.4
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	NOBRK	NOBRK	NOBRK	SE1							

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Smooth & Textured HDPE Geomembrane

Report Ref No: BS-T928/a
Dates Tested: 16/12/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: DS-7, P15/P17

BICS Sample Ref: 7

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	22.2	25.2	27.5	27.1	27.5	25.8	24.0	19.6	23.9	27.6	25.0	2.6
Peel Separation %	100	0	0	0	0	0	0	35	0	0		
Peel Break Classification	AD	SE1	SE1	SE1	SE1	SE1	SE1	ADBRK	SE1	SE1		
Shear Strength N/mm	36.0	34.8	35.2	34.8	35.8						35.3	0.6
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE1	SE1	SE1	SE1	SE1							

Sample ID: DS-8, Test Weld

BICS Sample Ref: 8

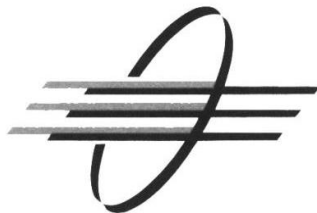
Seam Integrity (ASTM D6392-12(2018)) {Extrusion Weld}

Peel Strength N/mm	20.6	27.2	22.4	25.2	25.2						24.1	2.6
Peel Separation %	0	0	0	0	0							
Peel Break Classification	SE3	SE3	SE3	SE3	SE3							
Shear Strength N/mm	36.0	33.0	35.4	34.9	32.5						34.4	1.6
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE2	SE2	NOBRK	SE2	SE2							

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-T943/a

Report Date 22/12/2021

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested 2mm HDPE Geomembrane

Date Received 22/12/2021

Sample IDs DS-4 & DS-7 {Fusion Welds}

Tests Requested Seam Integrity (Peel & Shear) - ASTM D6392-12(2018)

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



4438

Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, tests marked ** are not accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
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Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm HDPE Geomembrane

Report Ref No: BS-T943/a
Dates Tested: 22/12/2021

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: DS-4, Retest

BICS Sample Ref: 1

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	30.1	28.1	29.1	31.3	31.0	28.8	29.6	30.2	29.3	30.6	29.8	1.0
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	33.8	33.1	33.8	33.7	34.6						33.8	0.5
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE1	SE1	NOBRK	SE1	SE1							

Sample ID: DS-7, Retest

BICS Sample Ref: 2

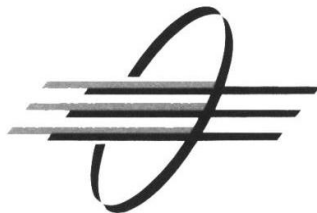
Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	31.0	28.2	29.7	30.4	30.0	30.8	30.6	31.1	31.4	31.6	30.5	1.0
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	34.0	33.7	34.1	34.1	33.8						33.9	0.2
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE1	SE1	SE1	SE1	SE1							

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-U131/a

Report Date 18/02/2022

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested 2mm Textured HDPE Geomembrane

Date Received 18/02/2022

Sample IDs DS-09 through to DS-11 {Fusion & Extrusion Welds}

Tests Requested Seam Integrity (Peel & Shear) - ASTM D6392-12(2018)

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



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Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
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GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: 2mm Textured HDPE Geomembrane

Report Ref No: BS-U131/a
Dates Tested: 18/02/2022

TEST METHOD TEST SPECIMEN NUMBER MEAN Std Dev

1 2 3 4 5 6 7 8 9 10

Sample ID: DS-09, P22B/P24B

BICS Sample Ref: 1

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	27.6	25.4	25.6	27.0	25.2	25.0	24.6	25.9	24.1	24.6	25.5	1.1
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	34.6	35.0	35.3	35.1	35.6						35.1	0.4
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	NOBRK	NOBRK	NOBRK	NOBRK							

Sample ID: DS-10, P26B/P27B

BICS Sample Ref: 2

Seam Integrity (ASTM D6392-12(2018)) {Fusion Weld}

Peel Strength N/mm	24.9	24.8	25.0	24.9	26.1	25.2	27.5	27.4	25.7	25.8	25.7	1.0
Peel Separation %	0	0	0	0	0	0	0	0	0	0		
Peel Break Classification	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1	SE1		
Shear Strength N/mm	36.1	34.7	35.4	34.7	35.0						35.2	0.6
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	NOBRK	NOBRK	NOBRK	NOBRK	NOBRK							

Sample ID: DS-11, Test Weld

BICS Sample Ref: 3

Seam Integrity (ASTM D6392-12(2018)) {Extrusion Weld}

Peel Strength N/mm	20.0	26.4	23.3	24.5	22.2						23.3	2.4
Peel Separation %	0	0	0	0	0							
Peel Break Classification	SE3	SE3	SE3	SE3	SE3							
Shear Strength N/mm	34.5	35.3	36.4	34.1	33.2						34.7	1.2
Shear Elongation %	>50	>50	>50	>50	>50							
Shear Break Classification	SE2	SE2	SE2	SE2	SE2							

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

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CONFIDENTIAL TEST REPORT

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 7
Cylinder Test Result
Report Number 1915r4v1d0722



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REPORT

CYLINDER TEST REPORT

REPORT REFERENCE: S740/a

Report Date 16/11/2020
Client Geofabrics Ltd
Address Skelton Grange Road, Stourton, Leeds, LS10 1RZ

Contact Gavin O'Brien
Contract Reference Morfa Landfill Site
Client PO/Ref No N/A

Test Requested Cylinder Test - EA Method LFE2 2014

Materials Tested Liner: GSE 2mm HDPE Smooth Geomembrane
Protector: HPS 17
Cover: Recycled Slag 10/30mm

Date Received 11/11/2020

If you have any questions or require additional information, please do not hesitate to contact us.

Prepared By:

Michael Barker
Senior Technician

Approved By:

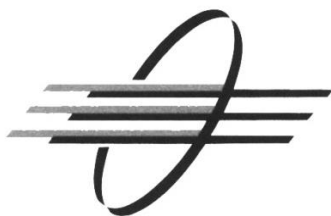
Cliff Butt
Managing Director



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CYLINDER TEST RESULTS GEOFABRICS LTD P.O NO: N/A

Contract Reference: Morfa Landfill Site
Date Tested: 12-16/11/2020
Test Method: Cylinder Test - EA Method LFE2 2014

Report Ref. No: S740/a
BICS Labs Ref: 1

Test Conditions **Material Conditioning:** 24 hrs @ 20 +/- 2°C, 65 +/- 5% RH
Test Duration: 100 hrs @ 20 +/- 2°C, 65 +/- 5% RH

Test Loadings: **Waste:** 10m depth @ 1100 kg/m³ **Cover:** 0.4m depth @ 1600 kg/m³
FOS: 2.5, **Applied Test Pressure:** 297kPa

Lead Sheet: 1.3mm, Grade 3, Conforming to the requirements of Annex A

Friction Liner: None

Test Set-up: Lead Sheet / 2mm HDPE Smooth Geomembrane / Geotextile / 300mm Stone Layer

Test Results:	1	2	3	MEAN
Calculated Average Local Strains %	0.16	0.10	0.08	0.11
Protector Mass Per Unit Area (BS EN ISO 9864) g/m ²				1749
Protector Thickness @ 2kPa (BS EN ISO 9863-1) mm				11.28
Protector CBR Puncture Resistance (BS EN ISO 12236) Puncture Force, kN Puncture Displacement, mm				22.47 78.8

Visual Inspection of samples after test:

1. Liner: Minor indentations, no damage or puncturing observed
2. Protector: Moderate indentations, no damage or puncturing observed
3. Stone: No crushing of the stone was observed

The proposed composite system has met the Environment Agency's maximum 0.25% local strain criteria.

Changes in the protection layer, overburden depth, density of waste or applied factor of safety may vary the results obtained.
BICS Laboratories Ltd., neither accepts responsibility for and nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample size(s) and related test item(s) comply with the listed test method.
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CYLINDER TEST RESULTS GEOFABRICS LTD P.O NO: N/A

Contract Reference: Morfa Landfill Site
Date Tested: 12-16/11/2020
Test Method: Cylinder Test - EA Method LFE2 2014

Report Ref. No: S740/a
BICS Labs Ref: 1

Stone:



Changes in the protection layer, overburden depth, density of waste or applied factor of safety may vary the results obtained.
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Unless otherwise detailed sample size(s) and related test item(s) comply with the listed test method.
Test results relate only to the sample(s) supplied. The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT

CYLINDER TEST RESULTS

GEOFABRICS LTD

P.O NO: N/A

Contract Reference: Morfa Landfill Site

Date Tested: 12-16/11/2020

Test Method: Cylinder Test - EA Method LFE2 2014

Report Ref. No: S740/a

BICS Labs Ref: 1

Strain Calculations

[illegible][illegible]

Indentation 1 Mean Local Strain (%)

0.07

CONFIDENTIAL TEST REPORT

CYLINDER TEST RESULTS

GEOFABRICS LTD

P.O NO: N/A

Contract Reference: Morfa Landfill Site

Date Tested: 12-16/11/2020

Test Method: Cylinder Test - EA Method LFE2 2014

Report Ref. No: S740/a

BICS Labs Ref: 1

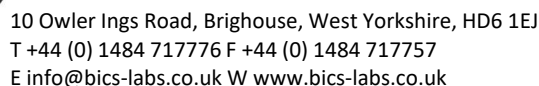
Strain Calculations

[illegible][illegible]

Indentation 2 Mean Local Strain (%)

0.08

CONFIDENTIAL TEST REPORT



P.O NO: N/A

Report Ref. No: S740/a
BICS Labs Ref: 1

Indentation 3 - X Axis

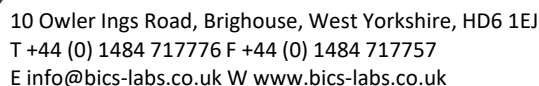
Calculated Local Strain	
l_u (mm)	48.000
l_d (mm)	48.064
Local Strain (%)	0.132

Indentation 3 - Y Axis

Calculated Local Strain	
l_u (mm)	39.000
l_d (mm)	39.071
Local Strain (%)	0.182

0.16

Page 6 of 8



P.O NO: N/A

Report Ref. No: S740/a
BICS Labs Ref: 1

[illegible]

YZ mm	ΔYZ mm	Y mm	A mm	Incremental %
0.000	0.000	0.000	0.000	
0.000	0.000	3.000	3.000	0.000
-0.050	-0.050	6.000	3.000	0.014
-0.223	-0.173	9.000	3.005	0.166
-0.462	-0.239	12.000	3.010	0.317
-0.683	-0.221	15.000	3.008	0.271
-0.756	-0.073	18.000	3.001	0.030
-0.772	-0.016	21.000	3.000	0.001
-0.761	0.011	24.000	3.000	0.001
-0.731	0.030	27.000	3.000	0.005
-0.702	0.029	30.000	3.000	0.005
-0.677	0.025	33.000	3.000	0.003
-0.643	0.034	36.000	3.000	0.006

Calculated Local Strain

I_u (mm) 36.000

I_d (mm) 36.025

Local Strain (%) 0.068

0.08

Page 7 of 8

CYLINDER TEST RESULTS

GEOFABRICS LTD

P.O NO: N/A

Contract Reference: Morfa Landfill Site

Date Tested: 12-16/11/2020

Test Method: Cylinder Test - EA Method LFE2 2014

Report Ref. No: S740/a

BICS Labs Ref: 1

Strain Calculations

Indentation 5 - X Axis				
XZ mm	ΔXZ mm	X mm	A mm	Incremental %
0.000	0.000	0.000	0.000	
0.043	0.043	3.000	3.000	0.010
0.031	-0.012	6.000	3.000	0.001
-0.033	-0.064	9.000	3.001	0.023
-0.151	-0.118	12.000	3.002	0.077
-0.381	-0.230	15.000	3.009	0.293
-0.631	-0.250	18.000	3.010	0.347
-0.780	-0.149	21.000	3.004	0.123
-0.704	0.076	24.000	3.001	0.032
-0.410	0.294	27.000	3.014	0.479
-0.125	0.285	30.000	3.014	0.450
0.098	0.223	33.000	3.008	0.276
0.268	0.170	36.000	3.005	0.160
0.387	0.119	39.000	3.002	0.079
0.442	0.055	42.000	3.001	0.017
0.476	0.034	45.000	3.000	0.006
				Calculated Local Strain
				I _u (mm) 45.000
				I _d (mm) 45.071
				Local Strain (%) 0.158

[illegible]

Indentation 5 Mean Local Strain (%)

0.10

CONFIDENTIAL TEST REPORT

HPS 17 Needleponched Nonwoven

- 1. DESCRIPTION** Thick needleponched nonwoven geotextile manufactured from 100% virgin polypropylene high tenacity fibres containing 1% active carbon black.
- 2. APPLICATIONS** Typical applications for GEOfabrics' HPS Geotextiles include, but are not limited to:
- Membrane protection in landfill cells and cover systems
 - Soil filtration and separation beneath rock armour in coastal defence
 - Soil filtration within landfill cells
 - Heavy duty soil filters in civil applications
- 3. FEATURES**
- Optimised for maximum strength and performance – not mass
 - Available in wide widths to allow for minimal construction costs – up to 6m
 - Manufactured from a unique blend of high tenacity fibres providing class leading durability
 - 100% virgin polypropylene fibres for guaranteed durability
 - Carbon black for UV stability



	Test	Unit	MEAN VALUES
4. MECHANICAL PROPERTIES			
Static puncture (CBR)	EN ISO 12236	kN	17
Push through displacement		mm	65
Tensile strength (MD/CMD)	EN ISO 10319	kN/m	90
Tensile elongation (MD/CMD)		%	80
Cone drop	EN ISO 13433	mm	0
Protection efficiency (10 ³)	EN ISO 13719	kN/m ²	56
5. FILTER PROPERTIES			
Apparent opening size	EN ISO 12956	µm	<69
Water permeability v _{H50}	EN ISO 11058	l/(m ² ·s)	15
Coefficient of permeability (10 ⁻³)		m/s	2.6
6. PHYSICAL PROPERTIES			
Thickness @ 2kPa (Nominal)	EN ISO 9863-1	mm	8.8
Carbon black content			1% active carbon black
Standard colour			Black
Polymer			100% virgin polypropylene

Notes:

- a) Mean values indicate the arithmetic mean derived from the samples taken for any one test as defined in the standard – usually an overall mean of five samples.
Mean values are subject to tolerances based on 95% confidence limits as published on the product CE declaration of performance.
- b) Nominal Value (indicates an average manufacturing norm and not a controlled performance parameter).
- c) MD: Machine Direction (longitudinal to the roll).
- d) CMD: Cross Machine Direction (across the roll).
- e) Tensile testing is performed using extensometers.

	Test	VALUES
7. DURABILITY		
Weathering 50 MJ/m ² (1 month)	EN ISO 12224	>90% Retained Strength
Microbiological resistance	EN ISO 12225	No loss in strength
Resistance to acids & alkalis	EN ISO 14030	No loss in strength
Oxidation at 112 days (100 years)	EN ISO 13438	>90% Retained Strength



HPS 17 Needlepunched Nonwoven

- 8. NEEDLE DETECTION** During manufacture, the protection geotextile passes close to three sets of magnets which remove metal particles up to 12g and >2mm. Just before the roll up, the geotextile passes through an electronic metal detection field. Audio and visual alarms indicate if metal particles are detected. Rolls are sent to stock if they pass through the field without an alarm event or, in the case of an alarm event, the operator inspects the suspect area, locates any metal particles and removes them. If unsuccessful, or if any doubt remains as to the presence of metal particles, then the roll goes to the re-inspection facility.
- 9. TESTING** All materials are tested every 6000m² in an UKAS accredited ISO 17025 laboratory to all mechanical properties prior to release.
- 10. STORAGE** The geotextiles are supplied in packaging designed to protect the product from damage during handling, storage and degradation as a result of UV exposure. The product should be kept in appropriate packaging until such time that it is required for installation. The product is clearly and indelibly marked with the product name along the edge of the roll at regular intervals no greater than 5m. The packaging is labelled clearly to identify the product supplied in accordance with EN ISO 10320: Geotextile and Geotextile related products – Identification on site. Use slings where provided. Product weights are given on roll tickets. Use equipment appropriate to weight and dimension. Store and handle in accordance with good occupational hygiene and safety practice.

	Unit	VALUES
11. DIMENSIONS		
Standard roll length	m	50
Standard roll width	m	6
Approximate roll weight	kg	530



**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 8
Protector Geotextile
Manufacturers QC Data
Report Number 1915r4v1d0722



Geosynthetic Materials Inventory

CQA11

Site	Morfa Biocell Extension Phase 2	Manufacturer & Material Type	Geofabrics - HPS17 Geotextile
-------------	--	---	-------------------------------

Date	Batch No	Roll No	Length	Width	MQC Received?	MQC Pass?	Sample Number	Handle Store	Visual Check	Approved
27/11/2020	23525	001	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	002	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	003	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	005	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	006	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	007	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	008	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	009	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	010	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	011	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	012	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	013	50	5.9	Y	Y		Y	Y	Y

01/12/2020	23525	014	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	015	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	016	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	017	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	018	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	019	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	020	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	021	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	022	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	023	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	024	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	025	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	026	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	027	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	028	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	029	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	030	50	5.9	Y	Y		Y	Y	Y

27/11/2020	23525	031	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	032	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	033	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	034	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	035	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	036	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	037	50	5.9	Y	Y		Y	Y	Y
01/12/2020	23525	038	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	039	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	040	50	5.9	Y	Y		Y	Y	Y
27/11/2020	23525	041	50	5.9	Y	Y		Y	Y	Y
27/01/2022	25184	014	50	5.9	Y	Y		Y	Y	Y
27/01/2022	25184	015	50	5.9	Y	Y		Y	Y	Y
27/01/2022	25184	016	50	5.9	Y	Y		Y	Y	Y
27/01/2022	25184	018	50	5.9	Y	Y		Y	Y	Y

Despatch Note: 64270

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E-mail: info@geofabrics.com
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Despatch Date: 27/11/20

Customer: CELT001

Page 1 of 2

Sales Order: 81367

Customer Order Ref: EMAIL PO

Site contact: DYFED

Site telephone: 07795422916

Incoterms (R) 2010:

Customer copy ☐ Transport copy ☐ GEOfabrics' copy ☐

Invoice address

CELTIC LINING LIMITED

HOLLYBUSH, BLACKWOOD
GWENT
NP12 0SF

Delivery address

CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS

TATA STEEL PORT TALBOT
PORT TALBOT
SA13 2NG

				Quantity ordered	UoM	Qty supplied to date	Qty this delivery	Qty to follow
HPS17BLA600 GEOfabrics HPS17 6.00m wide black Rolls: 22				12000	SQM	0	6600	5400
Serial roll number	Sq m	Roll Length (m)	Weight (kg)					
23525/002	300.00	50.00	446					
23525/003	300.00	50.00	461					
23525/005	300.00	50.00	515					
23525/006	300.00	50.00	511					
23525/009	300.00	50.00	486					
23525/011	300.00	50.00	481					
23525/017	300.00	50.00	476					
23525/021	300.00	50.00	456					
23525/025	300.00	50.00	465					
23525/026	300.00	50.00	456					
23525/027	300.00	50.00	450					
23525/030	300.00	50.00	465					
23525/031	300.00	50.00	450					
23525/032	300.00	50.00	451					
23525/033	300.00	50.00	460					
23525/034	300.00	50.00	460					
23525/035	300.00	50.00	440					
23525/036	300.00	50.00	467					
23525/037	300.00	50.00	458					
23525/039	300.00	50.00	460					

Despatch Note: 64270 cont

Despatch Date: 27/11/20CustomerCELT001

Invoice address
CELTIC LINING LIMITED
HOLLYBUSH, BLACKWOOD
GWENT
NP12 0SF

GEOfabrics Limited
Skelton Grange Road
Stourton, Leeds LS10 1RZ
United Kingdom

Tel: +44 (0)113 202 5678
Fax: +44 (0)113 202 5655
E-mail: info@geofabrics.com
www.geofabrics.com

Page 2 of 2

Sales Order: 81367

Customer Order Ref: EMAIL PO

Site contact: DYFED

Site telephone: 07795422916

Incoterms (R) 2010:

Customer copy ☐ Transport copy ☐ GEOfabrics' copy ☐

Delivery address
CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS
TATA STEEL PORT TALBOT
PORT TALBOT
SA13 2NG

				Quantity ordered	UoM	Qty supplied to date	Qty this delivery	Qty to follow
23525/040	300.00	50.00	468					
23525/041	300.00	50.00	468					
			10250					

Quality Control Test Certificate

Our reference: 81367

Your reference: EMAIL PO

Delivery Date 27/11/2020

Product: GEOfabrics HPS17 6.00m wide black

Despatched to your site:

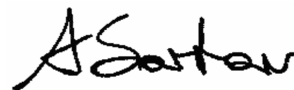
CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS

TATA STEEL PORT TALBOT
PORT TALBOT

Serial roll number	m ²	Roll Length (m)
23525/002	300.00	50
23525/003	300.00	50
23525/005	300.00	50
23525/006	300.00	50
23525/009	300.00	50
23525/011	300.00	50
23525/017	300.00	50

This product was sampled to BS EN ISO 9862 & tested in accordance with BS EN ISO 10319, BS EN ISO 12236, BS EN ISO 9863-1, BS EN ISO 9864 & BS EN ISO 13433.

The Product named above complies with quality control requirements.



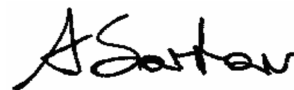
Alessandro Sartori
Technical Manager
Date: 03/02/2021

Quality Control Test Certificate

23525/021	300.00	50
23525/025	300.00	50
23525/026	300.00	50
23525/027	300.00	50
23525/030	300.00	50
23525/031	300.00	50
23525/032	300.00	50
23525/033	300.00	50
23525/034	300.00	50
23525/035	300.00	50
23525/036	300.00	50
23525/037	300.00	50
23525/039	300.00	50
23525/040	300.00	50
23525/041	300.00	50

This product was sampled to BS EN ISO 9862 & tested in accordance with BS EN ISO 10319, BS EN ISO 12236, BS EN ISO 9863-1, BS EN ISO 9864 & BS EN ISO 13433.

The Product named above complies with quality control requirements.



Alessandro Sartori
Technical Manager
Date: 03/02/2021

Despatch Note: 64278

GEOfabrics Limited
Skelton Grange Road
Stourton, Leeds LS10 1RZ
United Kingdom
Tel: +44 (0)113 202 5678
Fax: +44 (0)113 202 5655
E-mail: info@geofabrics.com
www.geofabrics.com

Despatch Date: 1/12/20

Customer: CELT001

Page 1 of 2

Sales Order: 81367

Customer Order Ref: EMAIL PO

Site contact: DYFED

Site telephone: 07795422916

Incoterms (R) 2010:

Customer copy ☐ Transport copy ☐ GEOfabrics' copy ☐

Invoice address

CELTIC LINING LIMITED

HOLLYBUSH, BLACKWOOD
GWENT
NP12 0SF

Delivery address

CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS

TATA STEEL PORT TALBOT
PORT TALBOT
SA13 2NG

				Quantity ordered	UoM	Qty supplied to date	Qty this delivery	Qty to follow
HPS17BLA600				12000	SQM	6600	5400	0
GEOfabrics HPS17 6.00m wide black								
Rolls: 18								
Serial roll number	Sq m	Roll Length (m)	Weight (kg)					
23525/001	300.00	50.00	454					
23525/007	300.00	50.00	501					
23525/008	300.00	50.00	483					
23525/010	300.00	50.00	479					
23525/012	300.00	50.00	491					
23525/013	300.00	50.00	493					
23525/014	300.00	50.00	477					
23525/015	300.00	50.00	475					
23525/016	300.00	50.00	483					
23525/018	300.00	50.00	481					
23525/019	300.00	50.00	483					
23525/020	300.00	50.00	487					
23525/022	300.00	50.00	451					
23525/023	300.00	50.00	456					
23525/024	300.00	50.00	450					
23525/028	300.00	50.00	454					
23525/029	300.00	50.00	475					
23525/038	300.00	50.00	462					
8535								

Received in good condition by:
Sold subject to the Terms & Conditions overleaf

Quality Control Test Certificate

Our reference: 81367

Your reference: EMAIL PO

Delivery Date 01/12/2020

Product: GEOfabrics HPS17 6.00m wide black

Despatched to your site:

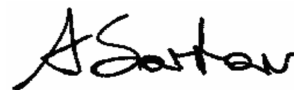
CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS

TATA STEEL PORT TALBOT
PORT TALBOT

Serial roll number	m ²	Roll Length (m)
23525/001	300.00	50
23525/007	300.00	50
23525/008	300.00	50
23525/010	300.00	50
23525/012	300.00	50
23525/013	300.00	50
23525/014	300.00	50

This product was sampled to BS EN ISO 9862 & tested in accordance with BS EN ISO 10319, BS EN ISO 12236, BS EN ISO 9863-1, BS EN ISO 9864 & BS EN ISO 13433.

The Product named above complies with quality control requirements.



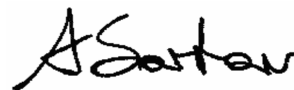
Alessandro Sartori
Technical Manager
Date: 03/02/2021

Quality Control Test Certificate

23525/015	300.00	50
23525/016	300.00	50
23525/018	300.00	50
23525/019	300.00	50
23525/020	300.00	50
23525/022	300.00	50
23525/023	300.00	50
23525/024	300.00	50
23525/028	300.00	50
23525/029	300.00	50
23525/038	300.00	50

This product was sampled to BS EN ISO 9862 & tested in accordance with BS EN ISO 10319, BS EN ISO 12236, BS EN ISO 9863-1, BS EN ISO 9864 & BS EN ISO 13433.

The Product named above complies with quality control requirements.



Alessandro Sartori
Technical Manager
Date: 03/02/2021

Despatch Note: 65719

GEOfabrics Limited
Skelton Grange Road
Stourton, Leeds LS10 1RZ
United Kingdom

Tel: +44 (0)113 202 5678
Fax: +44 (0)113 202 5655
E-mail: info@geofabrics.com
www.geofabrics.com

Despatch Date: 26/1/22 Customer: CELT001

Invoice address
CELTIC LINING LIMITED
HOLLYBUSH, BLACKWOOD GWENT NP12 0SF

Page 1 of 1

Sales Order: 82592
Customer Order Ref: EMAIL PO
Site contact: MEL
Site telephone: 07795422916

Incoterms (R) 2010:

Customer copy ☐ Transport copy ☐ GEOfabrics' copy ☐

Delivery address
CELTIC LINING LIMITED C/O DARLOW LLOYD & SONS
TATA STEEL PORT TALBOT SA13 2NG

				Quantity ordered	UoM	Qty supplied to date	Qty this delivery	Qty to follow
HPS17BLA600 GEOfabrics HPS17 6.00m wide black Rolls: 4				1200	SQM	0	1200	0
Serial roll number	Sq m	Roll Length (m)	Weight (kg)					
25184/014	300.00	50.00	471					
25184/015	300.00	50.00	468					
25184/016	300.00	50.00	471					
25184/018	300.00	50.00	463					
				1873				

Received in good condition by:

Quality Control Test Certificate

Our reference: 82592

Your reference: EMAIL PO

Delivery Date 26/01/2022

Product: GEOfabrics HPS17 6.00m wide black

Despatched to your site:

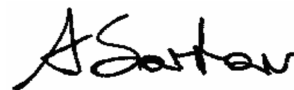
CELTIC LINING LIMITED
C/O DARLOW LLOYD & SONS

TATA STEEL
PORT TALBOT

Serial roll number	m ²	Roll Length (m)
25184/014	300.00	50
25184/015	300.00	50
25184/016	300.00	50
25184/018	300.00	50

This product was sampled to BS EN ISO 9862 & tested in accordance with BS EN ISO 10319, BS EN ISO 12236, BS EN ISO 9863-1, BS EN ISO 9864 & BS EN ISO 13433.

The Product named above complies with quality control requirements.



Alessandro Sartori
Technical Manager
Date: 28/01/2022

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 9
Protector Geotextile
Conformance Test Results
Report Number 1915r4v1d0722



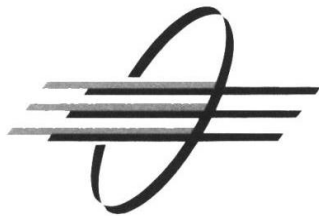
Geosynthetic Panel Deployment

CQA12

Site	Morfa Biocell Extension Phase 2	Material	HPS17	Installer	Celtic Lining Ltd.
-------------	--	-----------------	--------------	------------------	---------------------------

Date	Roll No	Panel No	Thickness L	Thickness R	Thickness F	Thickness B	Length	Width	Visual Check	Non-Con No
10/12/2021	23525/039	P1B					50	5.9	OK	
10/12/2021	23525/033	P2B					50	5.9	OK	
10/12/2021	23525/041	P3B					50	5.9	OK	
10/12/2021	23525/03	P4B					50	5.9	OK	
10/12/2021	23525/040	P5B					50	5.9	OK	
10/12/2021	23525/006	P6B					50	5.9	OK	
10/12/2021	23525/032	P7B					50	5.9	OK	
10/12/2021	23525/036	P8B					50	5.9	OK	
10/12/2021	23525/034	P9B					50	5.9	OK	
10/12/2021	23525/020	P10B					50	5.9	OK	
10/12/2021	23525/017	P11B					50	5.9	OK	
10/12/2021	23525/025	P12B					50	5.9	OK	

10/12/2021	23525/005	P13B					50	5.9	OK	
10/12/2021	23525/030	P14B					50	5.9	OK	
10/12/2021	23525/011	P15B					6	5.9	OK	
10/12/2021	23525/002	P16B					50	5.9	OK	
10/12/2021	23525/021	P17B					35	5.9	OK	
10/12/2021	23525/008	P18B					35	5.9	OK	
10/12/2021	23525/012	P19B					35	5.9	OK	
10/12/2021	23525/008	P20B					4	5.9	OK	
10/12/2021	23525/008	P21B					8.5	5.9	OK	
10/12/2021	23525/008	P22B					3	5.9	OK	
10/12/2021	23525/012	P23B					8	5.9	OK	
10/12/2021	23525/012	P24B					7.5	5.9	OK	
10/12/2021	23525/021	P25B					7.5	5.9	OK	
10/12/2021	23525/021	P26B					7.5	5.9	OK	
10/12/2021	23525/027	P27B					7	5.9	OK	



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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-S809/a

Report Date 22/12/2020

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Morfa Landfill Site {Biocell Extension}

Client PO/Ref No TBA

Material Tested Geotextile

Date Received 15/12/2020

Sample IDs Roll No: 23525-013 & Roll No: 23525-022

Tests Requested Cone Drop - BS EN ISO 13433:2006(2016)
Static Puncture CBR - BS EN ISO 12236:2006(2016)
Thickness - BS EN ISO 9863-1:2016
Wide Width Tensile - BS EN ISO 10319:2015

Prepared by:

Alex Hornby
Technician

Approved by:

PP:Cliff Butt
Managing Director



4438

Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, and are UKAS accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



BICS Laboratories Ltd

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T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk



GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Morfa Landfill Site {Biocell Extension}
Material: Geotextile

Report Ref No: BS-S809/a
Dates Tested: 18-21/12/2020

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: Roll No: 23525-013

BICS Sample Ref: 1

Cone Drop (BS EN ISO 13433:2006(2016))

mm	0	0	0	0	0						0	0
----	---	---	---	---	---	--	--	--	--	--	---	---

Static Puncture CBR (BS EN ISO 12236:2006(2016))

Puncture Force kN	21.89	20.50	19.81	19.71	21.05						20.59	0.91
Puncture Displacement mm	82	81	81	79	82						81	1

Thickness under 2kPa (BS EN ISO 9863-1:2016)

mm	9.18	9.47	9.27	9.41	9.44	8.83	9.24	9.77	9.22	9.33	9.32	0.24
----	------	------	------	------	------	------	------	------	------	------	------	------

Wide Width Tensile Properties (BS EN ISO 10319:2015)

Tensile Strength kN/m (MD)	103.6	106.6	99.4	99.0	98.3						101.4	3.6
Tensile Strength kN/m (CD)	142.8	144.6	146.6	134.4	145.6						142.8	4.9
Tensile Strain % (MD)	117.6	143.6	113.5	114.9	127.8						123.5	12.6
Tensile Strain % (CD)	121.5	118.8	114.9	111.9	130.8						119.6	7.3

Sample ID: Roll No: 23525-022

BICS Sample Ref: 2

Cone Drop (BS EN ISO 13433:2006(2016))

mm	0	0	0	0	0						0	0
----	---	---	---	---	---	--	--	--	--	--	---	---

Static Puncture CBR (BS EN ISO 12236:2006(2016))

Puncture Force kN	21.17	21.45	23.03	19.73	19.38						20.95	1.46
Puncture Displacement mm	81	80	83	82	82						82	1

Thickness under 2kPa (BS EN ISO 9863-1:2016)

mm	10.27	9.90	9.69	9.20	10.16	9.40	9.38	9.53	9.50	10.00	9.70	0.36
----	-------	------	------	------	-------	------	------	------	------	-------	------	------

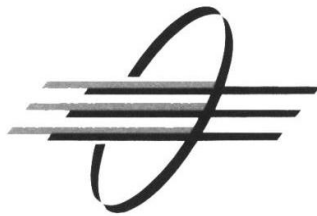
Wide Width Tensile Properties (BS EN ISO 10319:2015)

Tensile Strength kN/m (MD)	92.2	99.2	94.0	90.9	98.7						95.0	3.8
Tensile Strength kN/m (CD)	152.6	156.0	128.2	136.4	133.8						141.4	12.2
Tensile Strain % (MD)	129.6	124.8	123.9	128.6	127.8						126.9	2.5
Tensile Strain % (CD)	117.6	110.9	111.9	106.0	102.4						109.8	5.8

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT



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REPORT

GEOSYNTHETICS TEST REPORT

REPORT REFERENCE: BS-U130/a

Report Date 21/02/2022

Client Celtic Lining Ltd

Address Unit 16 Crown Avenue Industrial Estate, Tredegar, Gwent, NP22 4EE

Contact Dyfed Jones

Contract Reference Port Talbot {Tata Steel}

Client PO/Ref No Dyfed Jones

Material Tested Geotextile

Date Received 18/02/2022

Sample IDs Roll No: 016

Tests Requested Cone Drop - BS EN ISO 13433:2006(2016)
Static Puncture CBR - BS EN ISO 12236:2006(2016)
Thickness - BS EN ISO 9863-1:2016+A1:2019
Wide Width Tensile - BS EN ISO 10319:2015

Prepared by:

David Smith
Technical Co-ordinator

Approved by:

Shazeena Iqbal
Technical Director



4438

Samples tested as received. Tests Marked with an asterisk (*) in this report are not included in the UKAS Accreditation Schedule for our laboratory.
Tests marked # have been subcontracted, tests marked ** are not accredited. Tests marked ^F are accredited under the company's UKAS Flexible Scope.
This test report is in a condensed format, complete test details available upon request.
This test report may not be reproduced other than in full, except with prior written approval.

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
Directors: Clifford Butt, Shazeena N. Iqbal Company Registration Number: 4213030



BICS Laboratories Ltd

10 Owler Ings Road, Brighouse, West Yorkshire, HD6 1EJ
T +44 (0) 1484 717776 E info@bics-labs.co.uk W www.bics-labs.co.uk



GEOSYNTHETICS TEST RESULTS CELTIC LINING LTD

Contract Ref: Port Talbot {Tata Steel}
Material: Geotextile

Report Ref No: BS-U130/a
Dates Tested: 21/02/2022

TEST METHOD	TEST SPECIMEN NUMBER										MEAN	Std Dev
	1	2	3	4	5	6	7	8	9	10		

Sample ID: Roll No: 016

BICS Sample Ref: 1

Cone Drop (BS EN ISO 13433:2006)

mm	0	0	0	0	0							0	0
----	---	---	---	---	---	--	--	--	--	--	--	---	---

Static Puncture CBR (BS EN ISO 12236:2006)

Puncture Force kN	20.36	21.70	20.21	20.75	19.94							20.59	0.69
Puncture Displacement mm	81	81	79	80	78							80	1

Thickness under 2kPa (BS EN ISO 9863-1:2016+A1:2019)

mm	10.34	11.14	10.09	10.44	10.24	10.98	11.92	11.21	10.71	10.29		10.74	0.57
----	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--	-------	------

Wide Width Tensile Properties (BS EN ISO 10319:2015)

Tensile Strength kN/m (MD)	94.8	96.3	91.8	95.7	94.5							94.6	1.7
Tensile Strength kN/m (CD)	139.8	127.6	131.7	139.6	138.5							135.4	5.5
Tensile Strain % (MD)	98.7	101.2	97.3	99.7	94.0							98.2	2.7
Tensile Strain % (CD)	89.8	87.2	89.3	80.6	79.6							85.3	4.9

Atmospheric Conditions at Test: 21 ± 2 °C, Relative Humidity : 65 ± 5 % RH

BICS Laboratories Ltd. neither accepts responsibility for nor makes claim as to the final use and purpose of the material.
Unless otherwise detailed sample sizes and related test items comply with the listed test method. Test results relate only to the sample(s) supplied.
The company also observes and maintains client confidentiality.

CONFIDENTIAL TEST REPORT

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 10
Leachate Drainage Details
Report Number 1915r4v1d0722

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 21863	

Site Reference: Landfill Drainage	Sample Type: Bulk
Location in works: Stockpile	Material Description: Grey aggregate
Date Sampled: 01 October 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 01 October 2020	Date Tested: 06 October 2020

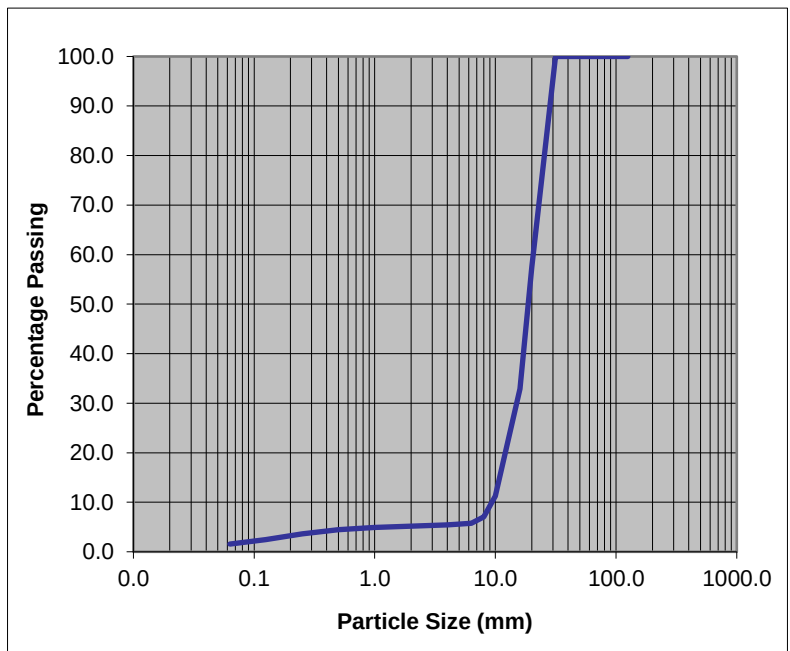
TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	58	
16.0	33	
10.0	11	
8.0	7	
6.3	6	
4.0	5	
2.0	5	
1.0	5	
0.5	4	
0.250	4	
0.125	2	
0.063	2	

Water Content (%)	2
-------------------	---

Dry mass of sample, kg	12.9
------------------------	------

Method of Analysis	Washing & Sieving
--------------------	-------------------



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 06/10/2020	Fig.
EN 933-1 Rev. 2.0	A Grogan, Laboratory Manager				

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

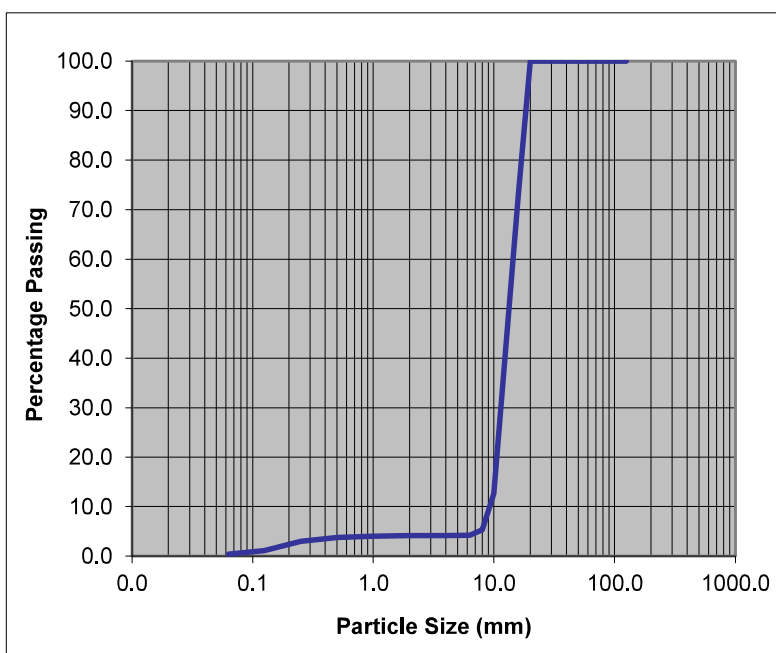
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22826	

Site Reference: Landfill Drainage DA1	Sample Type: Bulk
Location in works: Stockpile	Material Description: Landfill Drainage
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	100	
16.0	73	
10.0	13	
8.0	5	
6.3	4	
4.0	4	
2.0	4	
1.0	4	
0.5	4	
0.250	3	
0.125	1	
0.063	0	

Water Content (%)	5
Dry mass of sample, kg	6.3
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref. EN 933-1 Rev. 2.0	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096		Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 16/12/2020	Fig.
--	--	--	--	---------------------------	-------------

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

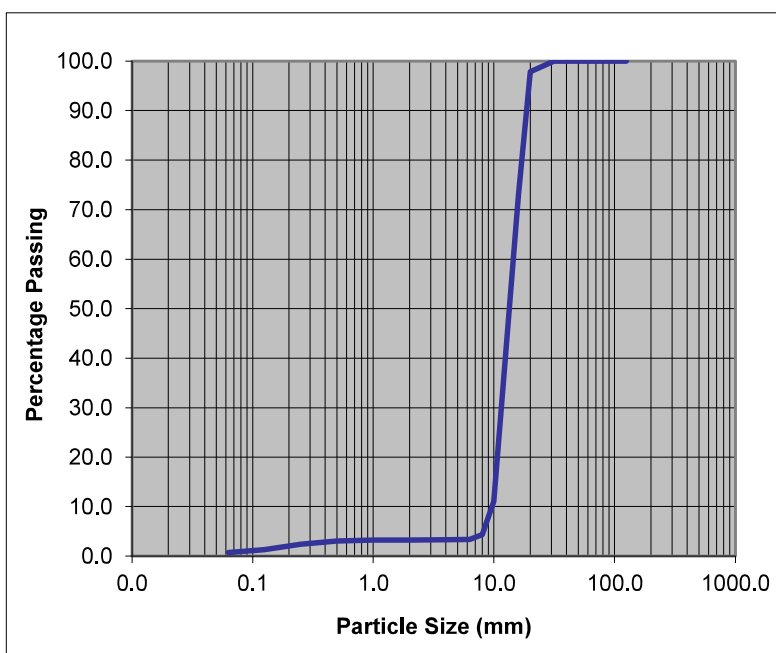
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22827	

Site Reference: Landfill Drainage DA2	Sample Type: Bulk
Location in works: Stockpile	Material Description: Landfill Drainage
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	98	
16.0	73	
10.0	11	
8.0	4	
6.3	3	
4.0	3	
2.0	3	
1.0	3	
0.5	3	
0.250	2	
0.125	1	
0.063	1	

Water Content (%)	6
Dry mass of sample, kg	5.8
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref. EN 933-1 Rev. 2.0	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 16/12/2020	Fig.
			A Grogan, Laboratory Manager		

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

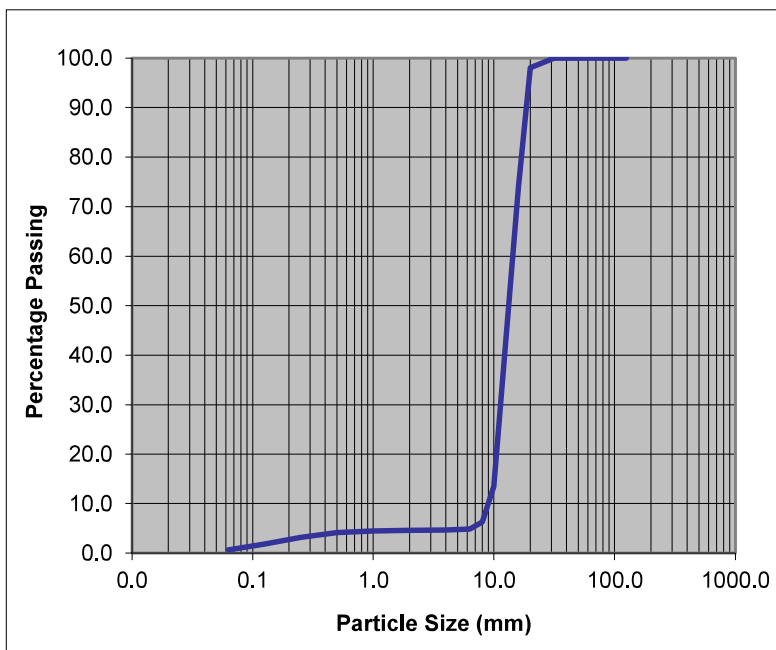
Project No.: D20477	Client: Darlow Lloyd & Sons Ltd
Project Name: Morfa Landfill	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 22828	

Site Reference: Landfill Drainage DA3	Sample Type: Bulk
Location in works: Stockpile	Material Description: Landfill Drainage
Date Sampled: 11 December 2020	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 11 December 2020	Date Tested: 15 December 2020

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	
31.5	100	
20.0	98	
16.0	74	
10.0	13	
8.0	6	
6.3	5	
4.0	5	
2.0	5	
1.0	4	
0.5	4	
0.250	3	
0.125	2	
0.063	1	

Water Content (%)	5
Dry mass of sample, kg	6.6
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref. EN 933-1 Rev. 2.0	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i> A Grogan, Laboratory Manager	Date 15/12/2020	Fig.
--	--	----------	---	---------------------------	-------------

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

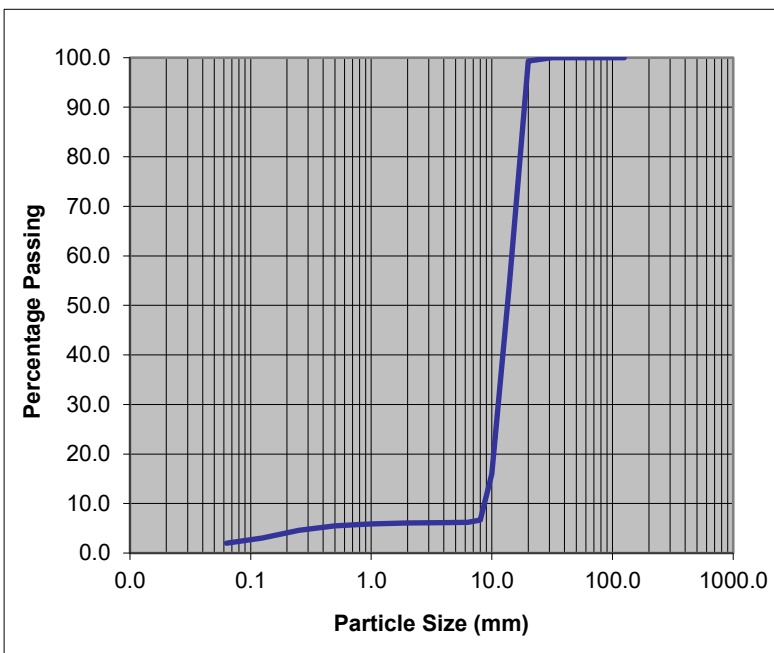
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23231	

Site Reference: Drainage 1	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Drainage Stone
Date Sampled: 26 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 26 January 2021	Date Tested: 28 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	100
31.5	100	98-100
20.0	99	80-99
14.0	54	20-70 (±15)
10.0	16	0-20
8.0	7	
6.3	6	
4.0	6	0-5
2.0	6	
1.0	6	
0.5	5	
0.250	5	
0.125	3	
0.063	2	

Water Content (%)	7
Dry mass of sample, kg	1.9
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	 Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 01/02/2021	Fig.
EN 933-1 Rev. 2.0			A Grogan, Laboratory Manager		

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23232	

Site Reference: Drainage 2	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Drainage Stone
Date Sampled: 26 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 26 January 2021	Date Tested: 29 January 2021

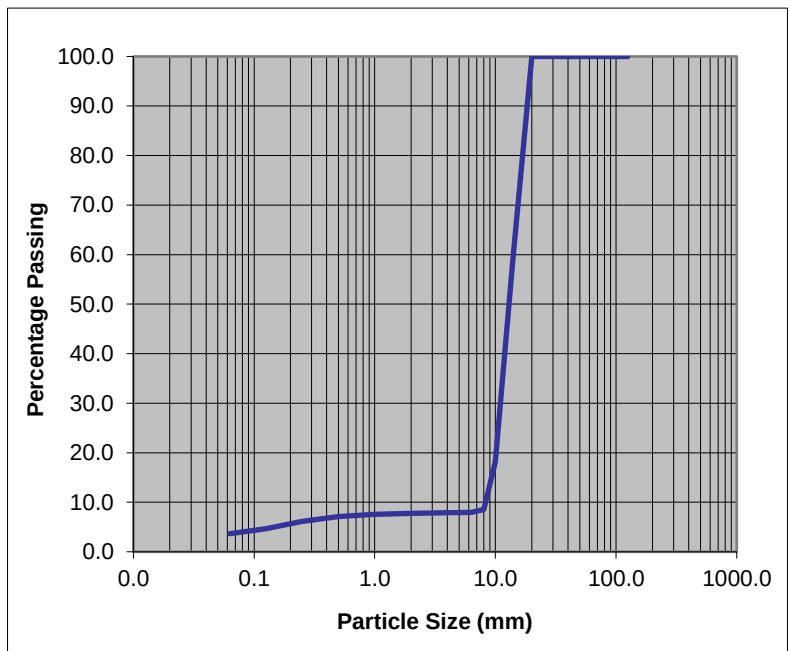
TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	100
31.5	100	98-100
20.0	100	80-99
14.0	59	20-70 (±15)
10.0	18	0-20
8.0	9	
6.3	8	
4.0	8	0-5
2.0	8	
1.0	8	
0.5	7	
0.250	6	
0.125	5	
0.063	4	

Water Content (%)	6
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Dry mass of sample, kg	1.9
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Method of Analysis	Washing & Sieving
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Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	 Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 01/02/2021	Fig.
EN 933-1 Rev. 2.0			A Grogan, Laboratory Manager		

TEST REPORT
WATER CONTENT AND PARTICLE SIZE DISTRIBUTION
BS EN 1097-5:2008 & BS EN 933-1:2012

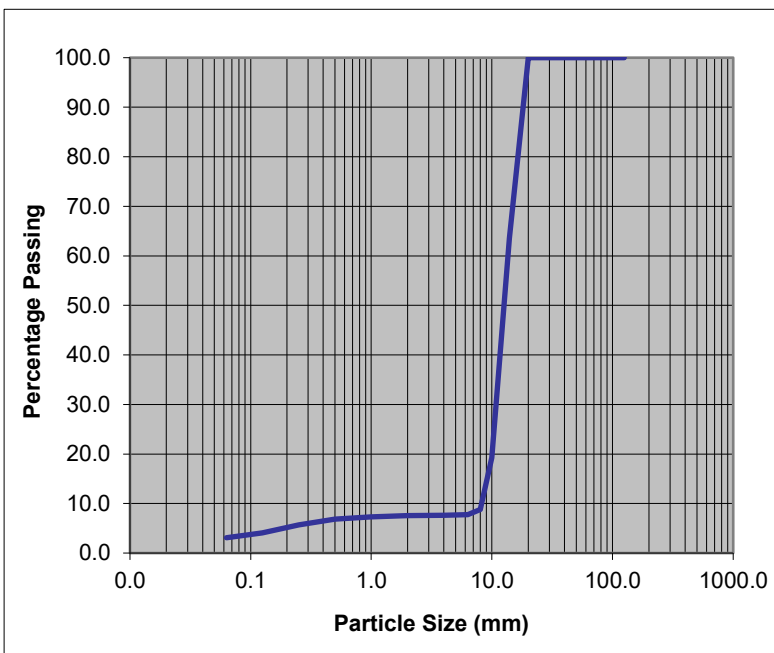
Project No.: D20135	Client: Darlow Lloyd & Sons Ltd
Project Name: TATA Aggregates	Address: Corneldu Mawr Farm, Heol Y Cym, Bridgend CF36 6HL
Sample No.: 23233	

Site Reference: Drainage 3	Sample Type: Bulk
Location in works: Landfill Bio Cell	Material Description: Drainage Stone
Date Sampled: 26 January 2021	Depth: N/A
Sampled By: J Davis	Borehole: N/A
Sampling Certificate Received: Yes	Specification: BS EN 13242
Date Received: 26 January 2021	Date Tested: 29 January 2021

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	
40.0	100	100
31.5	100	98-100
20.0	100	80-99
14.0	64	20-70 (±15)
10.0	19	0-20
8.0	9	
6.3	8	
4.0	8	0-5
2.0	8	
1.0	7	
0.5	7	
0.250	6	
0.125	4	
0.063	3	

Water Content (%)	7
Dry mass of sample, kg	1.9
Method of Analysis	Washing & Sieving



Remarks:

Please note: Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

QA Ref.	 Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	 7771	Approver <i>A Grogan</i>	Date 01/02/2021	Fig.
EN 933-1 Rev. 2.0			A Grogan, Laboratory Manager		



Laboratory Report



Contract Number: 60133

Client Ref: **D22297**

Client PO:

Date Received: **27-06-2022**

Date Completed: **13-07-2022**

Report Date: **13-07-2022**

Client: **Apex Drilling Services Ltd**
Sturmi Way
Village Farm Industrial Estate, Pyle
Bridgend
CF33 6BZ

This report has been checked and approved by:

Wayne Honey

Health and Safety Coordinator/ Quality Assistant

Contract Title: **TATA Aggregates**
For the attention of: **Andrew Grogan**

Test Description	Qty
Samples Received - @ Non Accredited Test	3
Ten percent fines value (TFV) BS 812-111:1990 - @ Non Accredited Test	3
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Brendan Evans (Office Administrator) - Emma Sharp (Business Support Manager) - Paul Evans (Director)

Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)

Wayne Honey (Health and Safety Coordinator/ Quality Assistant)

GEO Site & Testing Services Ltd

Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Contract Number	60133	
Site Name	TATA Aggregates	
Test Condition	Dry	
Date Tested	28/06/2022	

[illegible]

<u>Key</u>	<u>Reported As</u>
TFV	kN
ACV	%
Mass Of Test Portions	g
Sample Size Fraction	mm

TFV - Tested in accordance with BS812 : Part
111 : 1990

ACV - Tested in accordance with BS812 : Part
110 : 1990

Operators				
Julian Jones				

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 11
Gas Well Details
Report Number 1915r4v1d0722



Proprietary Gas Well Basal Plate



Gas Well Installation in Bio-cell Extension B

**Marton Geotechnical Services Ltd**

Geotechnical Centre, Rougham Industrial Estate, Rougham, Bury St Edmunds, Suffolk, IP30 9ND, England
t +44 (0)1359 271167 info@mgs.co.uk www.mgs.co.uk

Invoice To:

DARLOW LLOYD & SONS LTD
Corneldu MawrFarm
Heol-y-cyw
Nr. Bridgend
Mid Glamorgan
CF35 6HL

DELIVERY NOTE

Number **DEL71711**
Date 03/03/2021
Page 1
Division LANDFILL
Telephone +44 (0)2476 602323

Deliver To:

DARLOW LLOYD & SONS LTD.
MORFA LANDFILL OFFICES
TATA STEEL STRIP PRODUCTS
UK PORT TALBOT INSTALLATION
PORT TALBOT, NEATH PORT TALBOT
SA13 2NG

Account No: DA21**Your Order No:** ON47356**Our Order No:** ORD83246

Part No.	W/H	Description	Unit	Qty Ordered	Qty Sent
TEL400BASE	07	400/500MM PERF BASE PLATE		6	6
TEL500SLPF	07	500 X 3M 1ST OUTER TELESCOPIC.PERF		6	6
TEL400INP	07	400 X 3M PERF TELE INNER		2	2
DEL-L		Delivery - JAGGARDS		1	1

No. of Pallets _____**No. of Packages** _____**GOODS RECEIVED IN GOOD CONDITION****SIGNED** _____

DOC192726

PRINT NAME _____ **DATE** _____

Claims for damage or shortage must be made within 7 days of despatch date.

QF 026 Issue 3



PO 53758

QUOTATION

Marton Geotechnical Services Ltd

Geotechnical Centre, Rougham Industrial Estate, Rougham, Bury St Edmunds, Suffolk, IP30 9ND, England
t +44(0)1359 271167 e info@mgs.co.uk www.mgs.co.uk

Number **QUO42078**
Date 10/11/2021
Page 1
Division LANDFILL
Telephone +44 (0)2476 602323
Valid To: / /
Raised By: JAMES

Invoice To:

DARLOW LLOYD & SONS LTD
Corneldu Mawr Farm
Heol-y-cyw
Nr. Bridgend
Mid Glamorgan
CF35 6HL

Deliver To:

DARLOW LLOYD & SONS LTD.
MORFA LANDFILL OFFICES
TATA STEEL STRIP PRODUCTS
UK PORT TALBOT INSTALLATION
PORT TALBOT, NEATH PORT TALBOT
SA13 2NG

Account: DA21**Reference:****Opportunity Ref:**

This Invoice is priced in Pounds Sterling

Part No.	Description	Quantity	Unit Price	Disc %	Nett Goods
TEL400BASE	400/500MM PERF BASE PLATE	9	1243.41		11190.69
TEL500SLPF	500 X 3M 1ST OUTER TELESCOPIC.PERF	9	939.31		8453.79
TEL400INP	400 X 3M PERF TELE INNER	5	596.55		2982.75
TEL500SL	500 X 3M TELESCOPIC SLEEVE SOLID	15	939.31		14089.65
TEL400IN	400 X 3M TELESCOPIC INNER SOILD	12	596.55		7158.60
DEL-L	Delivery - PAID	1			

Unit Prices are shown exclusive of VAT.
Payment terms subject to account status.
This quotation is valid for 30 days unless otherwise stated.
Product availability subject to prior sales.

Total Goods	£	43875.48
Discount	% £	
Nett Goods	£	43875.48
VAT	£	8775.10
Total Value	£	52650.58

Customer VAT Reg No: GB 136945641

JAMES DAVIS - 07792 250 965

DOC202325

QF 021 Issue 6

For full terms & conditions visit or click:

<https://www.mgs.co.uk/terms-conditions/>

**Marton Geotechnical Services Ltd**

Geotechnical Centre, Rougham Industrial Estate, Rougham, Bury St Edmunds, Suffolk, IP30 9ND, England
t +44 (0)1359 271167 info@mgs.co.uk www.mgs.co.uk

Invoice To:

DARLOW LLOYD & SONS LTD
Corneldu Mawr Farm
Heol-y-cyw
Nr. Bridgend
Mid Glamorgan
CF35 6HL

DELIVERY NOTE

Number **DEL81365**
Date 20/12/2021
Page 1
Division LANDFILL
Telephone +44 (0)2476 602323

Deliver To:

DARLOW LLOYD & SONS LTD.
MORFA LANDFILL OFFICES
TATA STEEL STRIP PRODUCTS
UK PORT TALBOT INSTALLATION
PORT TALBOT, NEATH PORT TALBOT
SA13 2NG

Account No: DA21**Your Order No:** PO 53758**Our Order No:** ORD91752

Part No.	W/H	Description	Unit	Qty Ordered	Qty Sent
TEL400BASE	07	400/500MM PERF BASE PLATE		9	9
TEL500SLPF	07	500 X 3M 1ST OUTER TELESCOPIC.PERF		9	9
TEL400INP	07	400 X 3M PERF TELE INNER		5	5
TEL500SL	07	500 X 3M TELESCOPIC SLEEVE		15	4
DEL-L		Delivery - JAGGARDS		2	1

JAMES DAVIS - 07792 250 965

No. of Pallets _____**No. of Packages** _____**GOODS RECEIVED IN GOOD CONDITION****SIGNED** _____

DOC202325

PRINT NAME James Davis **DATE** _____

Claims for damage or shortage must be made within 7 days of despatch date.

QF 026 Issue 3

**Marton Geotechnical Services Ltd**

Geotechnical Centre, Rougham Industrial Estate, Rougham, Bury St Edmunds, Suffolk, IP30 9ND, England
t +44 (0)1359 271167 info@mgs.co.uk www.mgs.co.uk

Invoice To:

DARLOW LLOYD & SONS LTD
Corneldu MawrFarm
Heol-y-cyw
Nr. Bridgend
Mid Glamorgan
CF35 6HL

Deliver To:

DARLOW LLOYD & SONS LTD.
MORFA LANDFILL OFFICES
TATA STEEL STRIP PRODUCTS
UK PORT TALBOT INSTALLATION
PORT TALBOT, NEATH PORT TALBOT
SA13 2NG

DELIVERY NOTE

Number **DEL81649**
Date 11/01/2022
Page 1
Division LANDFILL
Telephone +44 (0)2476 602323

Account No: DA21**Your Order No:** PO 53758**Our Order No:** ORD91752

Part No.	W/H	Description	Unit	Qty Ordered	Qty Sent
TEL500SL	07	500 X 3M TELESCOPIC SLEEVE		15	11
TEL400IN	07	400 X 3M TELESCOPIC INNER		12	12
DEL-L		Delivery - JAGGARDS		2	1

JAMES DAVIS - 07792 250 965

No. of Pallets _____**No. of Packages** _____**GOODS RECEIVED IN GOOD CONDITION****SIGNED** _____

DOC202325

PRINT NAME _____ **DATE** _____

Claims for damage or shortage must be made within 7 days of despatch date.

QF 026 Issue 3

**MORFA NON-HAZARDOUS
LANDFILL PERMIT
BV7311Ie**

**BIOCELL EXTENSION
CELL C (B)**

Construction Quality
Assurance Validation Report

Appendix 12
Daily Site Records
Report Number 1915r4v1d0722



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	02/12/2021
-------------	--	-------------	-------------------

CQA Staff	Arwel Jones			
Contractors	DLS & Celtic Lining			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Clear, cold, dry	cold, dry	8	1	
Plant / Equipment	Hours of Operation	Comments		
20 Tracked Backhoe	0800 - 1610			
Visitors	James Davis (DLS)			
Health and Safety				
Deliveries				
Work Undertaken				
HDPE panels 1B-6B placed				
DS Samples 1&2 recovered				
Outside edge secured with sand bags.				
All field testing completed.				
Prepared by	Arwel Jones		Signed	



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	03/12/2021
-------------	--	-------------	-------------------

CQA Staff	Arwel Jones			
Contractors	DLS & Celtic Lining			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Overcast, cold	Dry	8	4	0mm
Plant / Equipment	Hours of Operation	Comments		
20 Tracked Backhoe	0800 - 1600			
Visitors				
Health and Safety				
Deliveries				
Work Undertaken				
HDPE panels 7B-12B placed				
Extrusion tie in to existing biocell started - 56m completed				
DS Sample 3 recovered				
All field testing completed.				
Outside edge secured with sand bags.				
Prepared by	Arwel Jones	Signed		



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	09/12/2021
-------------	--	-------------	-------------------

CQA Staff	Ben Rees			
Contractors	DLS & Celtic Lining			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Overcast, cool	Dry cold and cloudy	8	5	
Plant / Equipment	Hours of Operation	Comments		
20tonne backhoe	0800 - 1500	With Celtic Lining Ltd.		
Visitors	None			
Health and Safety				
Deliveries	Drainage Stone			
Work Undertaken				
HDPE panels 13 to 15 placed & welded				
One DS sample DS4 collected				
Prepared by	Ben Rees		Signed	



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	10/12/2021
-------------	--	-------------	-------------------

CQA Staff	Ben Rees			
Contractors	DLS & Celtic Lining			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Dry and sunny	Dry sunny	10	8	
Plant / Equipment	Hours of Operation	Comments		
20tonne backhoe	0800 - 1600	With Celtic Lining Ltd.		
Visitors	None			
Health and Safety				
Deliveries	Drainage Stone			
Work Undertaken				
HDPE panels 14B to 21B placed & welded				
Tie in weld to existng biocell continued				
Geotextile placed and fused.				
Prepared by	Ben Rees		Signed	



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	07/02/2022
-------------	--	-------------	-------------------

CQA Staff	Arwel Jones			
Contractors	Celtic Lining and DLS			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Overcast, cool	Overcast, Dry	8	5	None
Plant / Equipment	Hours of Operation	Comments		
20tonne backhoe	0800 - 1600	With Celtic Lining Ltd.		
Visitors	None			
Health and Safety				
Deliveries	Drainage Stone			
Work Undertaken				
HDPE panels 22B to 24B placed & welded				
All panels surveyed and all welds tested				
Tie in weld to exisitng biocell continued				
Prepared by	Arwel Jones	Signed		



Daily Site Record Sheet

CQA1

Site	Morfa Biocell Extension Phase 2	Date	08/02/2022
-------------	--	-------------	-------------------

CQA Staff	Arwel Jones			
Contractors	Celtic Lining and DLS			
Weather AM	Weather PM	Temp Max	Temp Min	Rainfall
Overcast, cool	Overcast, Dry	8	5	None
Plant / Equipment	Hours of Operation	Comments		
20tonne backhoe	0800 - 1600	With Celtic Lining Ltd.		
Visitors	None			
Health and Safety				
Deliveries				
Work Undertaken				
HDPE panels 25B to 29B placed & welded				
All panels surveyed and all welds tested				
Tie in weld to exisitng biocell completed				
All repairs completed.				
Prepared by	Arwel Jones	Signed		



GEO
TECHNOLOGY

Geotechnical &
Environmental Services

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