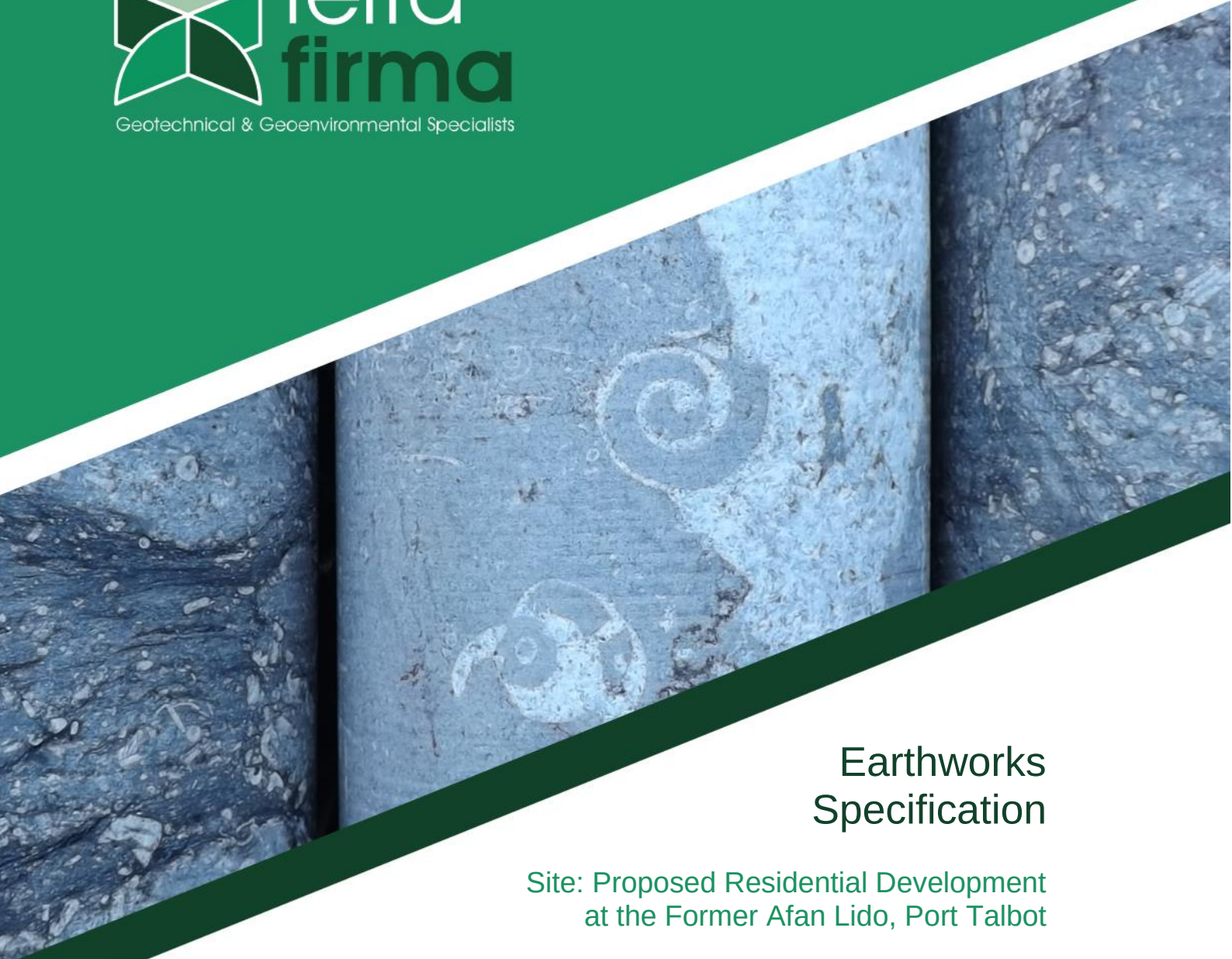




Earthworks Specification

Site: Proposed Residential Development
at the Former Afan Lido, Port Talbot

Prepared For: Persimmon Homes West Wales

Issue Date: August 2021

Job No: 14647/ES

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SECTION 1 Introduction

Persimmon Homes West Wales (the Client) is developing the former Afan Lido and land to the south of Channel View for residential end use.

The former Afan Lido area of the site was previously occupied by an indoor swimming pool and sports hall. Consequently, the foundations and other buried concrete structures from the previous buildings need to be excavated and removed to allow for reinforced shallow spread foundations to be constructed within the re-engineered ground. It is proposed that the buried concrete will be crushed and reused.

The soil and crushed concrete are to be excavated from beneath the former buildings and recompacted in layers to form a development plateau.

Terra Firma (Wales) Limited have not been retained to provide foundation recommendations. However, it is understood that the Client propose to use reinforced concrete strip foundations founded within the blown sand, or within re-engineered ground at a minimum depth of 900mm below finished development ground level using an allowable bearing pressure of 80KPa. The following specification allows for these requirements.

This report should be read in conjunction with Terra Firma Wales Ltd's Remediation Strategy (ref 14647/RS Issue 02, dated June 2021).

The remedial earthworks shall be carried out under CLAIRE:Dow:CoP.

1.1 Background

The site has previously been subject to numerous phases of investigation. A list of previous investigations is presented in **Table 1.1**.

Table 1.1. Previous Investigations		
Report	Date	Reference
Clarke Bond – Phase 1 Geo-environmental Assessment	14 th October 2013	WB03278/R1
Hyder Consulting (UK) Limited – Site Investigation Report	July 2015	UA007442-001-R001
Terra Firma (Wales) Limited – Remediation Strategy	June 2021	14647/RS (Issue 02)
Terra Firma (Wales) Limited - Supplementary Geotechnical and Geo Environmental Site Investigation Report	February 2020	14647/1
Terra Firma (Wales) Limited – Soakaway Test Letter Report	29 th April 2021	MW/14647/Soakaway

Terra Firma Wales Ltd have been commissioned by the Client to provide an earthworks specification for the site.

1.2 Limitations and Exceptions

The Client has requested that an Earthworks Specification be prepared for the proposed excavation and re-use of buried concrete and soil for the scheme.

This report has been prepared for the sole internal reliance of the Client and its design team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

As stated above, the findings and opinions in this report are based on information obtained from the sources detailed in Table 1.1. While Terra Firma (Wales) Limited believe these sources to be reliable, Terra Firma (Wales) Limited cannot and does not guarantee the authenticity or reliability of the information it has relied on from these sources.

All site investigations are limited to the specific borehole and trial pit locations investigated and as such, ground conditions may be encountered during earthworks which were not detailed in the proceeding ground investigation reports.

We would therefore expect a degree of independent site supervision during the earthworks and for the earthworks specification to be amended should anomalous ground conditions be encountered during site construction works.

SECTION 2 Site Description

The site is located off The Princess Margaret Way, Port Talbot, and is centred on a National Grid Reference of 274730 189450. The location of the site is shown below in **Figure 2.1**.

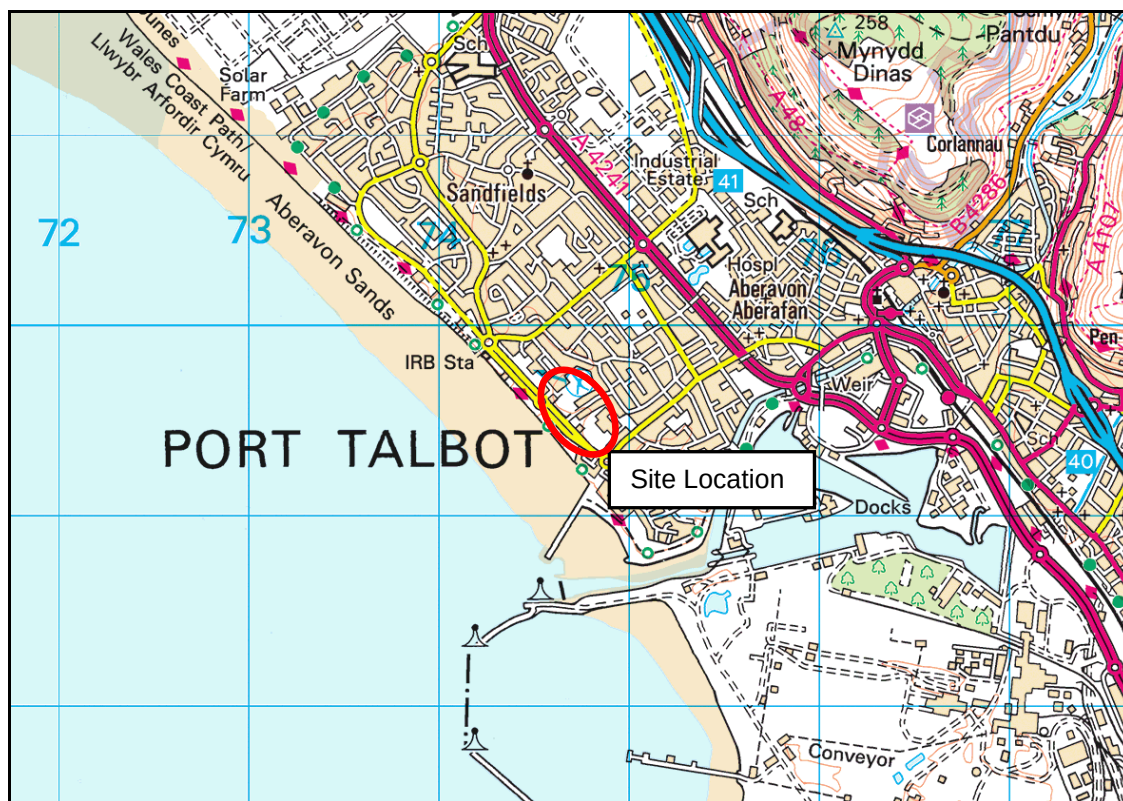


Figure 2.1: Site Location Ordnance Survey Map (Not to Scale)

The site is split into two areas by Channel View, which cuts through the centre of the site from northeast to southwest. The northwest of the site is derelict following the demolition of the former Afan Lido. To the immediate southeast of Channel View is a small car park, beyond which is a large patch of empty land, which is often used for overflow car parking.

The site and surrounding area is generally flat.

The proposed development is shown in **Figure 2.2**.

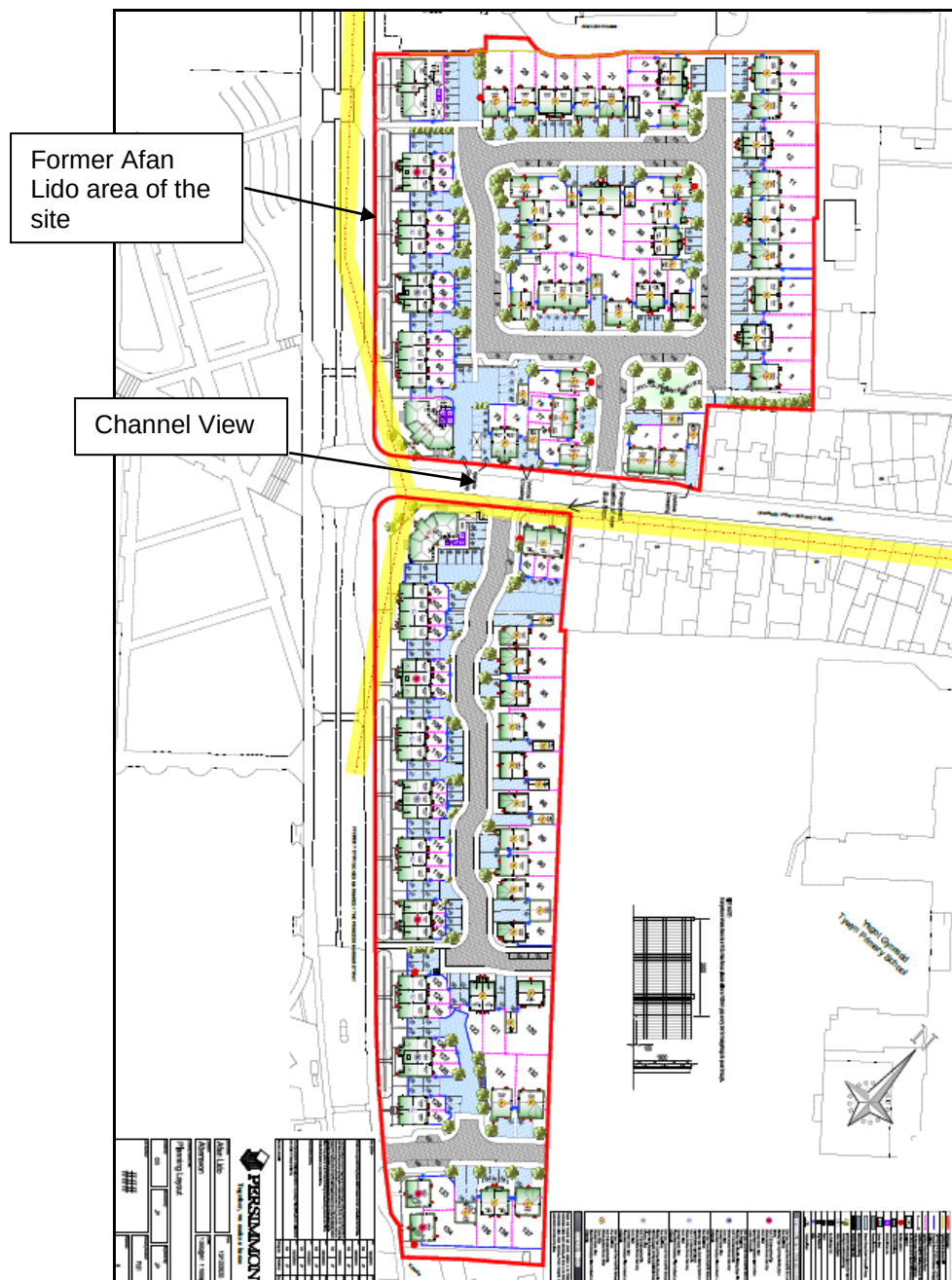


Figure 2.2: Proposed Development (not to scale).

SECTION 3 Ground Conditions and Material Properties

3.1 Summary of Ground Conditions

The ground conditions revealed during the previously mentioned site investigations are summarised in Table 3.1.

Table 3.1 Summary of Ground Conditions			
Stratum	Description	Depth Range (mbgl)	Locations Present
Concrete	Grey reinforced concrete (occasionally buried)	GL/0.9 - 0.05/1.2	TP07-2020, TP08-2020, TP09-2020, TP10-2020, SA20, SA25, SA26, SA30, TP128, TP129, TP130, TP135, TP136,
Asphalt	Dark grey to black Asphalt.	GL - 0.15	TP06-2020, SA15, SA17, SA29, TP131, TP133, WS147,
Made Ground (highly variable)	Variable composition including soils dominated by building rubble, re-worked natural soils, granular soils dominated by slag, ash and clinker.	GL/1.2 to 0.12/2.9	TP06-2020, TP07-2020, TP08-2020, TP09-2020, TP10-2020, TP11-2020, SA15, SA16, SA17, SA18, SA19, SA20, SA21, SA22, SA23, SA24, SA25, SA29, SA30, SA31, BH102, BH103, TP127, TP128, TP129, TP130, TP131, TP132, TP133, TP134, TP135, TP136, TP137, WS147, WS148
Blown Sand	Loose to medium dense pale brown, orangish brown to yellowish brown slightly silty fine to medium SAND with occasional cemented laminae and rare coarse gravel size grey mudstone and shell fragments.	0.12/2.9 to 6.6/13.8	TP06-2020, TP07-2020, TP08-2020, TP09-2020, TP10-2020, SA26, BH102, BH103, TP127, TP128, TP129, TP130, TP131, TP132, TP133, TP134, TP135, TP136, TP137, WS147, WS148, BH102, BH103
Tidal Flat Deposits	Interlayered SAND , SILT and CLAY units, which locally form distinct lenses or beds several metres thick but are interlaminated with sand, silt and clay.	6.6/13.8 to 20.4/22.8	BH102, BH103
Marine Beach Deposits	Dense grey clayey silty sandy GRAVEL with medium cobble content.	20.4/22.8 to 28.7	BH102, BH103
Glacial Deposits	Very stiff to hard dark grey to greyish brown slightly sandy gravelly CLAY .	28.7 to >30.4	BH103

3.2 Miscellaneous Ground Conditions

Soft to firm brown variably sandy variably gravelly clay was encountered in SA16, SA27, SA28.

3.3 Groundwater Level Monitoring

Groundwater level monitoring was undertaken during a programme of gas monitoring between 13th January and 9th March 2020. The results are presented in **Table 2.2**.

Table 3.2 Summary of Groundwater Level Monitoring							
Location	Groundwater Depth (m)						Borehole Depth (m)
	13/01/20	27/01/20	12/02/20	20/02/20	03/03/20	09/03/20	
BH101	5.83	6.00	5.80	5.79	5.75	5.74	6.05
BH102	6.13	6.19	6.22	6.13	6.02	6.15	7.10
BH103	3.17	3.77	3.47	3.58	3.43	3.60	6.40
WS143A	Dry	Dry	Dry	Dry	Dry	Dry	2.10
WS144	Dry	4.80	Dry	Dry	Dry	4.79	4.85
WS146	Dry	Dry	Dry	Dry	Dry	Dry	5.04
WS147	Dry	Dry	Dry	Dry	Dry	Dry	5.04

Groundwater monitoring was also undertaken between 9:00am on Monday 10th February 2020 and 9:00am on Monday 17th February 2020 using an In-situ Inc. Rugged Troll 100 groundwater data logger, and a Rugged BaroTroll barometric pressure data logger. The data loggers were installed within the monitoring well of BH103 where the shallowest groundwater level had previously been recorded. The period of monitoring coincided with spring tide.

The groundwater monitoring was undertaken to determine whether groundwater beneath the site is influenced by the tide, and if so, to what extent.

During the period of groundwater monitoring, the deepest groundwater level was recorded at 3.853m below ground level at 03:45 on Friday 14th February. The shallowest was 3.725m below ground level at 09:00 on 17th February. It should be noted that groundwater level was continuing to rise whilst the data logger was retrieved from the monitoring well.

The groundwater monitoring data indicates that there is no apparent correlation between changes in the groundwater level and the tide, and as such it appears that the tide has little to no influence on the groundwater level. Indeed, when groundwater level measurements are compared to rainfall data over a similar period, peaks in groundwater levels were recorded shortly after peaks in rainfall during the evening of 12th/morning 13th February, and a prolonged period of heavy rainfall on the 15th and 16th February.

3.4 Sampling Locations

Bulk samples were collected from the following locations and depths:

Table 3.3 Sample Locations and Depths		
Location	Depth (m)	Field Soil Description
TPA	0.5	Greyish light brown clayey very sandy GRAVEL with low cobble content
TPB	0.5	Light brown slightly silty very sandy GRAVEL
TPC	1.00	Greyish brown silty very gravelly SAND with

		low cobble content
TPD	0.8	Yellow slightly gravelly slightly silty SAND
TPE	0.8	Yellow slightly gravelly slightly silty SAND
TPF	0.8	Brown gravelly very silty SAND

3.4 Soil Property Testing

Six bulk samples of the soil were sent to the laboratories of Apex Testing Solutions for geotechnical testing.

The soils were subject to the following testing:

- Particle Size Distribution (PSD)
- Sedimentation by Pipette (where required)
- Proctor Compaction Testing (4.5 Kg Rammer)
- Moisture Content

The tests were undertaken to the appropriate British standards.

SECTION 4 Material Properties

A summary of the geotechnical laboratory testing undertaken is presented in **Table 4.1 to 4.3.**

Table 4.1 Summary of Soil Property Testing - Made Ground (from beneath Lido building)				
Test		Range	Mean	No Tests
Particle Size Distribution	Cobbles (%)	0 – 2	1	2
	Gravel (%)	68 – 75	71.5	
	Sand (%)	22 – 24	23	
	Silt (%)	4-7	5.5	
	Clay (%)			
Moisture Content (%)		3.2-8.3	6.2	2
Uniformity Coefficient (D ₆₀ /D ₁₀)		47-55	51	2

Table 4.2 Summary of Soil Property Testing - Made Ground (from beneath sport centre building)				
Test		Range	Mean	No Tests
Particle Size Distribution	Cobbles (%)	7	-	1
	Gravel (%)	26	-	
	Sand (%)	62	-	
	Silt (%)	5	-	
	Clay (%)			
Moisture Content (%)		7.1	-	1
Uniformity Coefficient (D ₆₀ /D ₁₀)		2.5	-	1

Table 4.3 Summary of Soil Property Testing Blown Sand (type 1)				
Test		Range	Mean	No Tests
Particle Size Distribution	Cobbles (%)	0-0	0	2
	Gravel (%)	1-1	1	
	Sand (%)	97-97	97	
	Silt (%)	2-2	2	
	Clay (%)			
Moisture Content (%)		2.9 – 3.6	3.3	2
Uniformity Coefficient (D ₆₀ /D ₁₀)		1.4 – 1.5	1.45	2

Table 4.4 Summary of Soil Property Testing - Blown Sand (type 2)				
Test		Range	Mean	No Tests
Particle Size Distribution	Cobbles (%)	0	-	1
	Gravel (%)	23	-	
	Sand (%)	48	-	
	Silt (%)	21	-	
	Clay (%)	8	-	
Moisture Content (%)		13.5	-	1
Uniformity Coefficient (D_{60}/D_{10})		67	-	1

Compaction testing was undertaken on selected samples of made ground and representative shallow superficial deposits. The results are summarised in **Table 4.4.**

Table 4.4 Summary of Compaction Testing					
Location	Depth (m)	Stratum	Max dry density (Mg/m³)	Optimum Moisture Content (%)	Typical Natural Moisture content (%)
Sample A		Made ground	1.81	15.4	3.2
Sample B		Made ground	1.88	13.5	8.3
Sample C		Made ground	1.74	11.5	7.1
Sample D		Blown Sand (type 1)	1.66	10.9	3.6
Sample E		Blown Sand (type 1)	1.65	13.0	2.9
Sample F		Blown Sand (type 2)	1.91	11.3	13.5

The results are discussed in **Section 6**.

SECTION 5 Site Preparation

5.1 Proposed Mitigation During Site Construction Works

As previously mentioned, this report should be read in conjunction with Terra Firma's Remediation Strategy reference 14647/RS Issue 02.

All health and safety measures and risk assessments should detail the proposed measures to be put in place to protect construction workers and neighbouring site users. For protection of human health this should include dust suppression when necessary.

It is recommended that the contractor(s) work in accordance with to CIRIA Report 132: A Guide for Safe Working on Contaminated Sites.

Within the documentation prepared by the contractor(s), the following information should be provided, but not limited to:

- Project Description
- Key participants/contractor(s)
- Technical procedures
- Phasing of works and approximate timescales
- Site plans to scale
- Details of consents or license needed
- Health and Safety, COSHH Assessment, Method Statements and Risk Assessments
- Emergency contingencies

In addition, the following precautions should also be taken.

- All potential chemicals and associated risks and emergency procedures for spills/leaks should be considered in the site risk assessment and the details provided to all site employees
- Any potential pollutant materials or chemicals/detergents used on site should be adequately stored in suitable containers, with clear labelling.
- Any oil or hazardous substance containers and associated pipe works should be enclosed within a bund.
- Care taken during delivery of materials, with correct supervision and labelling detailing the substance and its quantities.
- All delivery drivers should be informed of procedures and restrictions
- Any materials on delivery should be covered to ensure no spillage from the vehicle.
- Any detergents, paints, chemicals etc should not be allowed to be discharged into surface drains.
- Washing out and cleaning of concrete/cement plant should be carried out in a contained area with adequate measures to collect all run-off water.
- Security and prevention of vandalism, especially of oil drums/containers.

5.1.1 Asbestos

The chemical testing of the soils on site has identified asbestos to be present in the made ground materials.

Exposure to airborne asbestos fibres is known to cause lung cancer and mesothelioma. Paragraph 4.5 of the Welsh Government guidance document 'Contaminated Land Statutory Guidance - 2012' states that death, life threatening diseases (e.g. cancers), other diseases likely to have serious impacts on health, serious injury, birth defects and the impairment of reproductive functions constitute 'significant harm' to human health.

A potentially significant contaminant linkage has therefore been identified at the site, as summarised in Error! Reference source not found..

Table 5.1 Contaminant Linkage for Assessment		
Source	Pathway	Receptor
Asbestos Fibres	Inhalation of asbestos fibres	Construction and maintenance workers
		Future site users (residents)
		Passers-by or neighbouring site users

It is recommended that the advice of an asbestos specialist is sought prior to undertaking the following earthworks.

5.2 Site Strip

Prior to the commencement of the main cut/fill works, the Contractor shall excavate topsoil (if applicable) and geotechnical unsuitable subsoil from beneath the development area.

All concrete at the surface should be broken up and crushed on site to Type 1/2 grading or similar.

5.3 Formation Preparation

The contractor is expected to install an appropriate surface water run-off/groundwater control system throughout the works to minimise softening and deterioration of the formation and to prevent uncontrolled run-off from leaving the site. It is expected that the contractor will pay close attention to weather conditions and that trafficking of plant across the exposed formation to be filled will be minimised to prevent deterioration.

If during excavation and removal of soils, standing water is present, the water should be pumped to an appropriate stilling pond formed and excavated for such a purpose. Following treatment via a 'siltbuster', the collected water should be pumped to an appropriate sewer outlet following all necessary approvals obtained by the Contractor from the appropriate statutory body. Pumping into the designated sewer shall be at a rate no greater than that laid down in the permission.

As an alternative or should there be a need for extra capacity pumping into water tankers for offsite disposal could also be considered. Any such removal of groundwater would require chemical analysis and classification.

SECTION 6 Earthworks

6.1 Buried Obstructions

The site has previously been occupied by an indoor swimming pool and sports hall. The site will therefore contain many significant buried obstructions such as foundations and basements. Cross sections of the former swimming pool with the assumed demolition extent indicated in red was provided by Persimmon Homes West Wales.

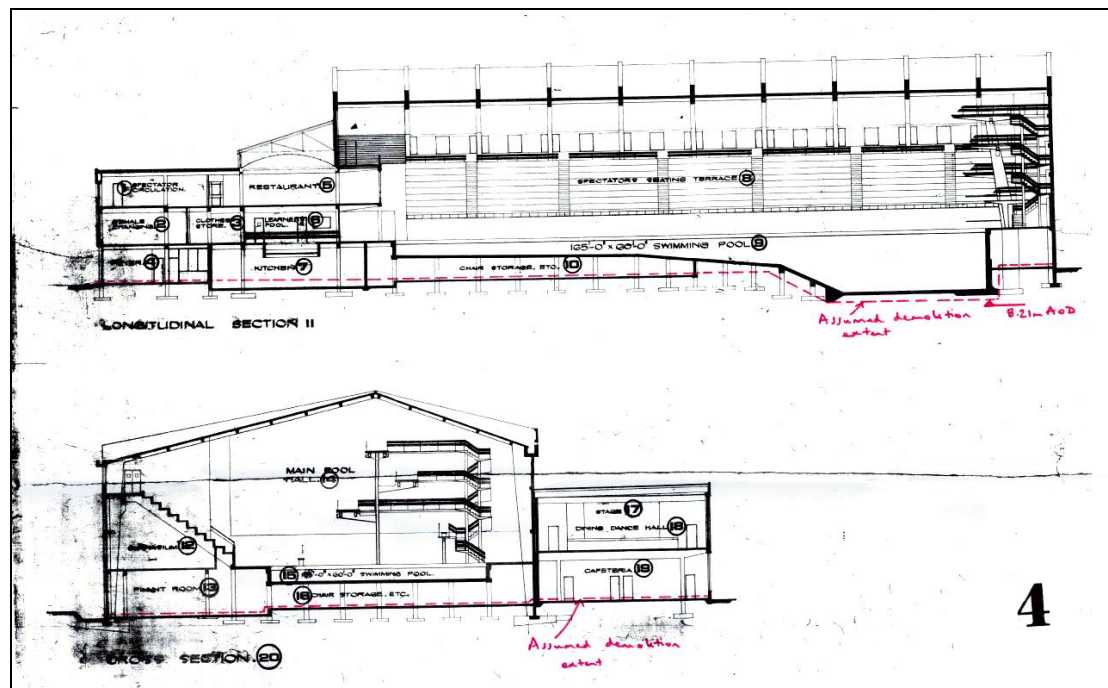


Figure 6.1: Former Afan Lido Building Detail (Not to Scale)

Existing materials to 1.5m below the underside of foundation level in the vicinity of the former buildings at the northern area of the site should be excavated. Natural soils within this zone that are found to suitable, meet the chemical guideline values, bearing pressure and are free of obstructions may be validated to remain.

All structures, foundations, basements, walls and hard standings etc. found within the excavation zone are to be grubbed up and crushed to an acceptable grading such as Type 6F2 or similar.

Any buried concrete left in the ground within 1.5m below the underside of foundation level could create 'hard-spots' and lead to differential settlement or damage to proposed foundations.

6.2 Re-engineered Development Plateau

The earthworks are required to remove the remnant buried structures and to provide a suitable founding stratum for shallow spread foundations where the ground was previously occupied by buildings. Along with the removal of buried concrete, which is to be crushed to appropriate size, site-won soil will be re-used.

Terra Firma have carried out compaction testing on selected samples of made ground and shallow superficial deposits. The results are summarised in **Table 4.1** and are discussed below.

6.2.1 Compaction

The results indicate the majority of soils (Made Ground and Blown Sand type 1) tested to be less than optimum moisture content by between 20% and 62%. Therefore, to re-compact the made ground and Blown Sand type 1 to at least 95% of Optimum Moisture Content and hence Maximum Dry Density, water will need to be added.

Sample F (Blown Sand type 2) was tested to be slightly greater than optimum moisture content by 119%. Therefore, to recompact the Blown Sand type 2 to at least 95% of Optimum Moisture Content and maximum Dry Density, air drying and protection from increased moisture content will be necessary to achieve the required performance.

Failure to achieve 95% compaction will result in settlement of the newly placed made ground and failure to achieve the required performance specification.

Depending upon the condition of the reduced formation level a layer of stabilised ground may be required to form a suitable base for upfilling and re-compaction.

Such treatment is also likely to be required where softer or looser materials are encountered during the excavation.

6.2.2 Particle Size Distribution/Classification

The soil samples which will be available from excavations undertaken on the site has been classified in accordance with Table 6/1 of HA Series 600.

The PSD results have split the soil into 3 types and are discussed in the following sections. It should be noted however that there is likely to be variation of the soil property test results and their exact locations. Examination of the soil as it's being removed from the ground by a qualified geotechnical engineer/engineering geologist should take place on a regular basis during the earthworks. Further soil property testing may also be required.

6.2.2.1 Made Ground (Lido Building)

Based upon the available test results the Made Ground taken from beneath the lido building falls in the 1A Class of the General Granular Fill category as a **well graded granular material**.

The method compaction specification as per Table 6/4 of HA Series 600 is recommended. The recommendation is that **Method 2** is used for compaction.

At present the type of compaction plant is not known and the following has been provided as an example based on the most likely type of plant to be used. For a vibratory roller of between 700kg to 1300kg (mass per meter width of roll) layers of 125mm are required to be compacted with 10 passes. For plant between 2900kg and 3600kg (mass per meter width of roll) layers of 200mm are required with 4 passes. The layer thickness and number of passes should be confirmed when the choice of compaction plant has been decided upon.

6.2.2.2 Made Ground (Sport Centre) and Blown Sand (type 1)

Based upon the available test results the Made Ground taken from beneath the sports centre building and Blown Sand (type 1) falls in the 1B Class of the General Granular Fill category as a **uniformly graded granular material**.

The method compaction specification as per Table 6/4 of HA Series 600 is recommended. The recommendation is that **Method 3** is used for compaction.

At present the type of compaction plant is not known and the following has been provided as an example based on the most likely type of plant to be used. For a vibratory roller of between 700kg to 1300kg (mass per meter width of roll) layers of 150mm are required to be compacted with 6 passes. For plant between 2900kg and 3600kg (mass per meter width of roll) layers of 275mm are required with 8 passes.

The layer thickness and number of passes should be confirmed when the choice of compaction plant has been decided upon.

6.2.2.3 Blown Sand (type 2)

Based upon the available test results the Blown Sand (type 2) falls in the 1B Class of the General Cohesive Fill category as a **stony cohesive material**.

The method compaction specification as per Table 6/4 of HA Series 600 is recommended. The recommendation is that **Method 2** is used for compaction.

At present the type of compaction plant is not known and the following has been provided as an example based on the most likely type of plant to be used. For a smooth wheeled roller (or vibratory roller operating without vibration) of between 2100kg to 2700kg (mass per meter width of roll) layers of 125mm are required to be compacted with 10 passes. For plant between 2700kg and 5400kg (mass per meter width of roll) layers of 125mm are required with 6 passes.

With vibration and the resulting draw-up of water silt can behave as a non-Newtonian liquid. These will act as a solid when a force is applied but return to a liquid state once the force is removed. Therefore, all compaction works using Blown Sand (type 2) shall be undertaken **without** the use of vibratory mechanisms as this will soften the mainly cohesive underlying alluvial clays and silts.

The layer thickness and number of passes should be confirmed when the choice of compaction plant has been decided upon.

6.2.2.4 Crushed Concrete

In addition to the above, the concrete, which will be excavated out of the ground is to be crushed. The method of compaction specification as per Table 6/4 of HA Series 600 is recommended based on the Class that the concrete will be crushed to.

6.2.3 General

The Contractor shall not import or use fill materials which would, either in themselves or in combination with other materials or groundwater, give rise to health and environmental hazards, damage to buildings/structures or instability in the filling.

Fill shall be placed evenly over the full width and fullest possible extent of the fill area and the contractor shall control and direct construction plant and other vehicular traffic uniformly over them. Damage to the prepared fill materials by construction plant and vehicular traffic will need to be made good with material having the same characteristics and strength as the material had before it was damaged. Subject to inspection, further site stripping may be required before these remedial filling works.

Whenever fill is to be deposited against the face of a natural slope or sloping earthwork face, such faces shall be benched in maximum 500mm height steps, at a gradient of no steeper than 1 in 3 (vertical/horizontal) immediately before placing the subsequent fill. Areas of fill shall be benched into adjacent areas in accordance with BS6031:2009 'Code of Practice for Earthworks'.

All stockpiles shall be provided with side slope angles no greater than 1:2.5 (vertical/horizontal) and shall be smoothed with a bladed bucket to promote rainfall runoff.

The base of any excavation or surface prepared to accept fill material shall be proof-rolled using appropriate compaction plant as dictated by the fill type and methodology, as previously stated and again with the proviso that vibratory mechanisms are not used. Any soft spots encountered must be investigated and removed as necessary and replaced with suitable compacted fill materials.

SECTION 7 Compliance Testing

7.1 Principal Method of Testing

Appropriate in situ testing should be undertaken to verify that the required standard of compaction has been achieved in the fill. A systematic procedure for inspection and acceptance shall be adopted to record conformance of the placed fill and be approved by a supervising engineer.

Where appropriate, In-situ density tests will be undertaken to determine the maximum dry density of compacted fill. The supervising Engineer should ensure that the stockpile material awaiting compaction has been inspected/tested to confirm its moisture content is suitable for compaction.

In situ testing by plate load test should also be carried out on the initial filling formation level, at the final formation following completion, and at intermediate levels within the fill at no greater than 600mm vertical lifts. The spatial frequency/distribution of tests shall be specified by the supervising engineer.

A 600mm diameter plate shall be used, stressed to 2.5 times the maximum design loading. The frequency of testing shall be 1 test per 400m².

If the total settlement is greater than 10mm on any one test, further testing and/or removal replacement of fill will be undertaken at the discretion of the supervising engineer. Changes to the testing regime, type of fill (import requirement) and method of compaction may be required.

SECTION 8 Environmental Monitoring and Mitigation

To minimise the environmental impact of the works on adjacent businesses and sensitive receptors, a programme of measures should be implemented by the Contractor during the site preparatory and development works. The actions that are to be enabled to monitor and mitigate the works are as follows.

Further mitigation measures may be required following discussions with an asbestos specialist.

8.1 Dust Mitigation

Appropriate measures shall be implemented at all times during the remediation works, to minimise any dust emissions.

Mobile water bowsters and sprayers shall be available on site at all times to water unpaved haul roads and working areas. An adequate supply of water shall be maintained on site at all times to allow for dust suppression activities to be carried out at short notice. Where mobile water bowsters are not effective in suppressing dust, then the use of vapour masts shall be considered.

A wheel wash or equivalent facilities may be required during the works, to be constructed in accordance with current guidance.

Regular inspections of the public highways adjacent to the site shall be carried out. If deemed necessary by the supervising engineer, the highway shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site. If significant amounts of any detritus have been deposited on the public highway, then operations may need to be temporarily suspended until appropriate cleaning operations have been undertaken by the Contractor.

8.2 Noise

The requirements of BS 5228 1-2:2009 'Code of practice for noise and vibration control on construction and open sites' shall be adhered to at all times.

All machinery shall be fitted with effective silencers and shall be serviced at regular intervals. No items of plant shall be operated with engine covers raised.

8.3 Surface / Perched Water

The contractor shall make necessary arrangements to prevent surface / perched water entering the drainage reens on and off site. It is likely that perched water encountered in excavations will require treatment before being discharged into the public sewers under permit.

SECTION 9 Contractors Responsibilities

The following regulations, guidance and legislation relating to the works should be complied with at all times:

- The Construction, Design and Management Regulations, 2015 and the Pre-tender and Construction Phase Health and Safety Plans.
- The Control of Substances Hazardous to Health Regulations

9.1 Surveying

The Contractor should be responsible for the following survey work:

- Surveying the base and extent of all excavations following proof-rolling and prior to placement of any fill to be engineered.
- Areas of localised over-dig, i.e. areas required to remove soft spots or unsuitable soils etc
- The finished surface (finished levels)
- Interim surveys to be undertaken during the infilling works to provide information on issues such as progress and earthworks quantities etc
- The location and elevation of test and sample locations
- A final isopachyte plot showing final thickness of placed fill materials

9.2 General

The Contractor shall also be responsible for the following:

- Provision of health and welfare facilities
- Obtaining relevant consents, where appropriate
- Environmental monitoring and mitigation measures
- Providing plant for use as kentledge for plate bearing tests

Annex A
Trial Pit Logs

Trial Pit Log

Trial Pit No:
 TPA
 Sheet 1 of 1

Project Name: Afan Lido

Project No:
 14647

Co-ords: -
 Level:

Date:
 16/07/2021

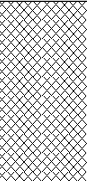
Location: Aberavon, Neath Port Talbot

Dimensions:

Depth
 0.60

Scale:
 1:25
 Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.60			MADE GROUND. Grey clayey very sandy GRAVEL with low cobble content. Gravel and cobbles are angular concrete and brick.
							End of Pit at 0.600m
							1
							2
							3
							4
							5

Stability:

Remarks:

Trial Pit Log

Trial Pit No:
TPB
 Sheet 1 of 1

Project Name: Afan Lido

Project No:
 14647

Co-ords: -
 Level:

Date:
 16/07/2021

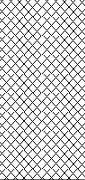
Location: Aberavon, Neath Port Talbot

Dimensions:

Depth
 0.60

Scale:
 1:25
 Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.60			MADE GROUND. Grey very sandy GRAVEL. Gravel is angular concrete and brick. Occasional metal fragments.	
							End of Pit at 0.600m	
								1
								2
								3
								4
								5

Stability:

Remarks:



Trial Pit No:
TPC
Sheet 1 of 1

Project No:
14647

Co-ords: -
Level:

Date:
16/07/2021

Location: Aberavon, Neath Port Talbot

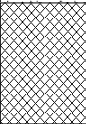
Dimensions:

Depth
0.60

Scale:
1:25

Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			REINFORCED CONCRETE	1 2 3 4 5
							MADE GROUND. Dark brown very gravelly SAND with medium cobble content. Gravel and cobbles are angular brick and concrete.	
							End of Pit at 0.600m	

Stability:	
------------	--

Remarks:

Trial Pit Log

Trial Pit No:
 TPD
 Sheet 1 of 1

Project Name: Afan Lido

Project No:
 14647

Co-ords: -
 Level:

Date:
 16/07/2021

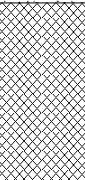
Location: Aberavon, Neath Port Talbot

Dimensions:

Depth
 1.00

Scale:
 1:25
 Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			Reinforced CONCRETE
				0.80			MADE GROUND. Dark brown gravelly SAND with medium cobble content. Gravel and cobbles are angular brick and concrete.
				1.00			Yellow slightly gravelly slightly silty SAND.
							End of Pit at 1.000m

Stability:

Remarks:

Trial Pit Log

Trial Pit No:
TPE
 Sheet 1 of 1

Project Name: Afan Lido

Project No:
 14647

Co-ords: -
 Level:

Date:
 16/07/2021

Location: Aberavon, Neath Port Talbot

Dimensions:

Depth
 0.70

Scale:
 1:25
 Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			REINFORCED CONCRETE.
				0.40			MADE GROUND. Light grey SAND & GRAVEL of angular concrete.
				0.70			Light yellowish brown silty SAND.
							End of Pit at 0.700m

Stability:

Remarks:

Trial Pit Log

Trial Pit No:
TPF
 Sheet 1 of 1

Project Name: Afan Lido

Project No:
 14647

Co-ords: -
 Level:

Date:
 16/07/2021

Location: Aberavon, Neath Port Talbot

Dimensions:

Depth
 0.80

Scale:
 1:25
 Logged:

Client: Persimmon Homes West Wales

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			MADE GROUND. Grass over brown organic-rich silty slightly gravelly SAND. Some rootlets.	
				0.50			MADE GROUND. Brown silty gravelly SAND. Gravel is angular sandstone and concrete.	
				0.80			Light yellowish brown very silty gravelly SAND. Gravel is angular sandstone.	
							End of Pit at 0.800m	1
								2
								3
								4
								5

Stability:

Remarks:

Annex B
Geotechnical Test Results

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25113		

Site Ref / Hole ID:	Sample A	Depth (m):	0.5m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Greyish light brown clayey very sandy GRAVEL with low cobble content
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	ISO17892
Date Received:	19 July 2021	Date Tested:	21 July 2021

Test Results

Moisture Content (%)	3.2
----------------------	-----

Remarks:

QA Ref.

EN ISO 17892-
1:2014 E



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Approver

A Grogan

Date

23/07/2021

A Grogan, Laboratory Manager

Fig

MC

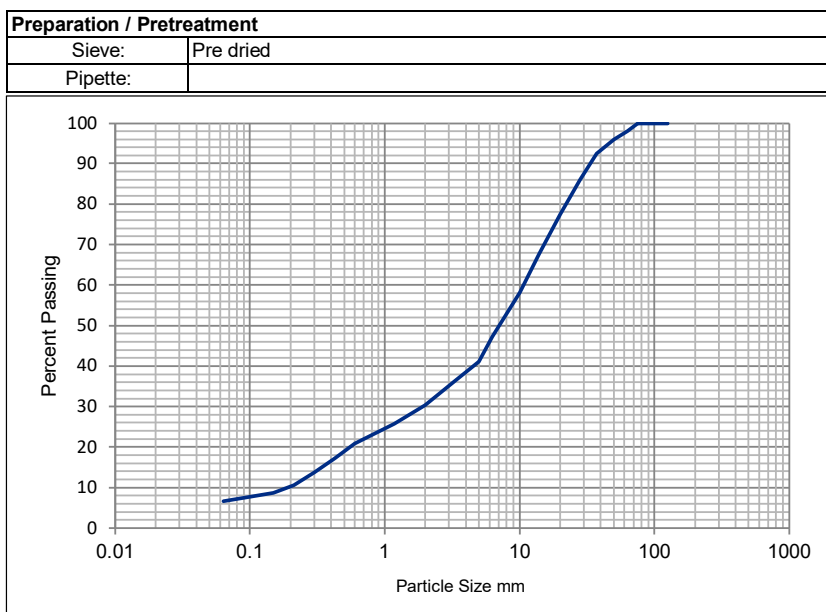
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25113		

Site Ref / Hole ID:	Sample A	Depth (m):	0.5m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Greyish light brown clayey very sandy GRAVEL with low cobble content
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	21 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	98
50	96
37.5	92
28	86
20	77
14	68
10	58
6.3	47
5.0	41
3.35	37
2.00	30
1.18	26
0.600	21
0.425	17
0.300	14
0.212	11
0.150	9
0.063	7



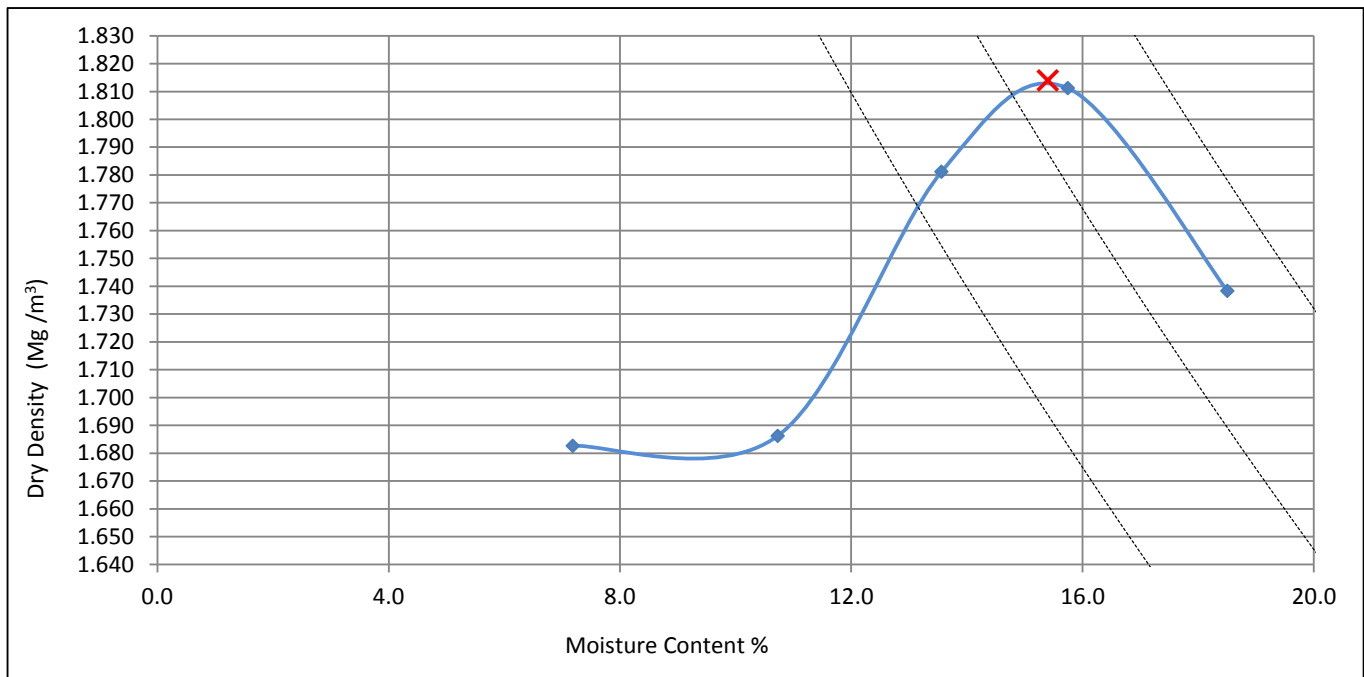
Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	2	N/A	
Gravel	68		
Sand	24	Dry mass of sample, kg	
Silt / Clay	7	12.6	N/A

Remarks:

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25113		

Site Ref / Hole ID:	Sample A	Depth (m):	0.5m
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Greyish light brown clayey very sandy GRAVEL with low cobble content
Location in Works:	N/A	Material Source:	Site Generated
Date Sampled:	Unknown	Material Supplier:	Site
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	27 July 2021



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m ³	2.65	assumed	Derived Parameters ✗
Material > 37.5mm	8	%	Maximum Dry Density, Mg/m ³
Material < 37.5mm > 20mm	15	%	Optimum Moisture Content %

Remarks:	Natural MC = 3.2%, Tested as an "X" sample due to oversize.
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TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No: D21401
Project Name: Afan Lido
ATS Sample No: 25114

Client: Terra Firma
Address: Deryn Court
5 Wharfdale Road
Cardiff
CF23 7HA

Site Ref / Hole ID: Sample B
Sample No:
Sampling Certificate Received: No

Depth (m): 0.5m
Sample Type: Disturbed
Material Description: Light brown slightly silty very sandy GRAVEL

Location in Works: N/A
Date Sampled: Unknown
Sampled By: Client
Date Received: 19 July 2021

Material Source: Unknown
Material Supplier: Unknown
Specification: ISO17892
Date Tested: 21 July 2021

Test Results

Moisture Content (%)	8.3
----------------------	-----

Remarks:

QA Ref.

EN ISO 17892-1:2014 E



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Approver

A Grogan

Date

23/07/2021

A Grogan, Laboratory Manager

Fig

MC

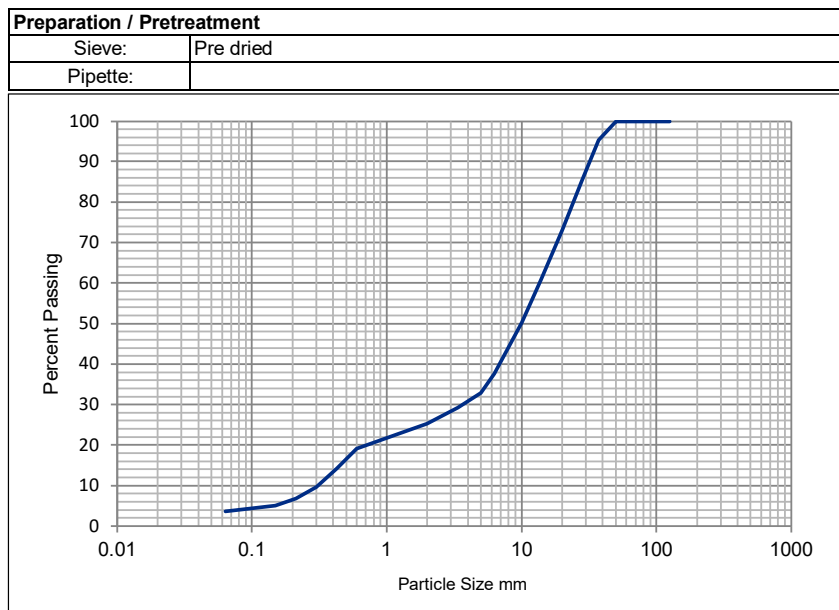
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25114		

Site Ref / Hole ID:	Sample B	Depth (m):	0.5m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Light brown slightly silty very sandy GRAVEL
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	23 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	95
28	85
20	73
14	61
10	50
6.3	38
5.0	33
3.35	29
2.00	25
1.18	23
0.600	19
0.425	14
0.300	10
0.212	7
0.150	5
0.063	4



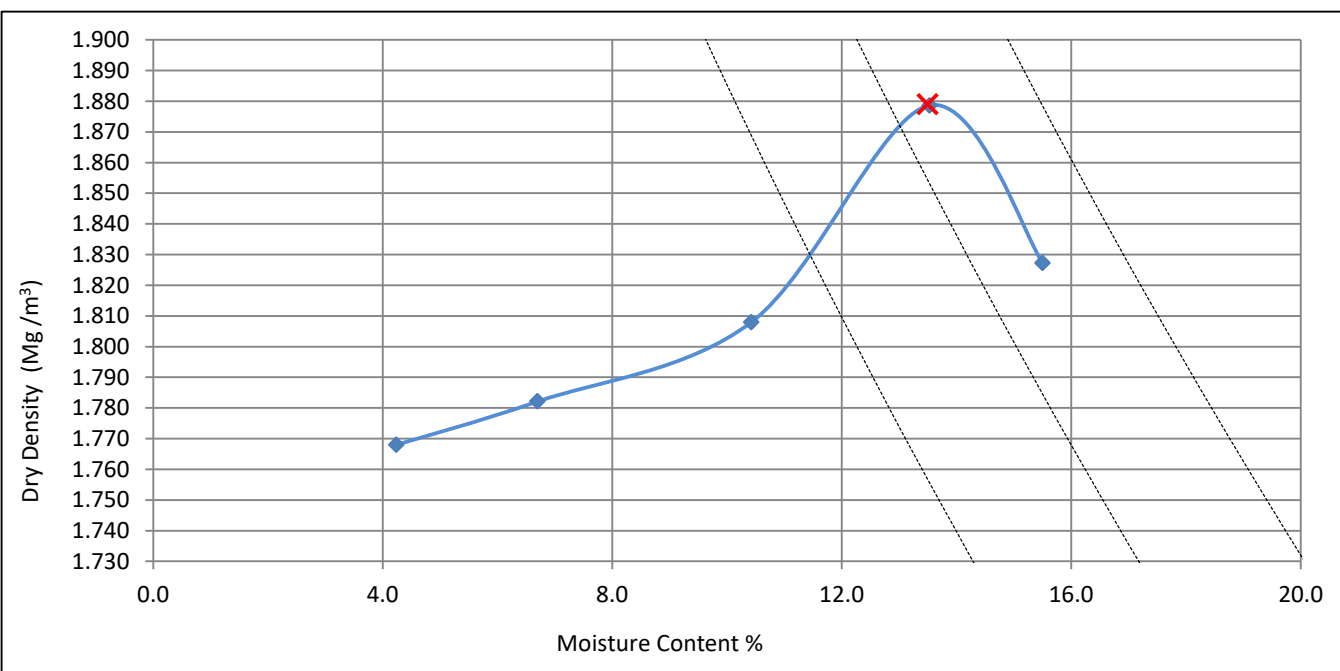
Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	75		
Sand	22	Dry mass of sample, kg	
Silt / Clay	4	14.7	N/A

Remarks:

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No: D21401	Client: Terra Firma	
Project Name: Afan Lido	Address: Deryn Court 5 Wharfdale Road Cardiff CF23 7HA	
ATS Sample No: 25114		

Site Ref / Hole ID: Sample B	Depth (m): 0.5m	
Sample No:	Sample Type: Bulk	
Sampling Certificate Received: No	Material Description: Light brown slightly silty very sandy GRAVEL	
Location in Works: N/A	Material Source: Site Generated	
Date Sampled: Unknown	Material Supplier: Site	
Sampled By: Client	Specification: BS1377	
Date Received: 19 July 2021	Date Tested: 22 July 2021	



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m ³	2.65	assumed	Derived Parameters ✗
Material > 37.5mm	5	%	Maximum Dry Density, Mg/m ³
Material < 37.5mm > 20mm	22	%	Optimum Moisture Content %

Remarks:	Natural MC = 8.3%
----------	-------------------

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25115		

Site Ref / Hole ID:	Sample C	Depth (m):	0.5m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Grey brown silty very gravelly SAND with low cobble content
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	ISO17892
Date Received:	19 July 2021	Date Tested:	21 July 2021

Test Results

Moisture Content (%)	7.1
----------------------	-----

Remarks:

QA Ref.

EN ISO 17892-1:2014 E



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Approver

A Grogan

Date

23/07/2021

A Grogan, Laboratory Manager

Fig

MC

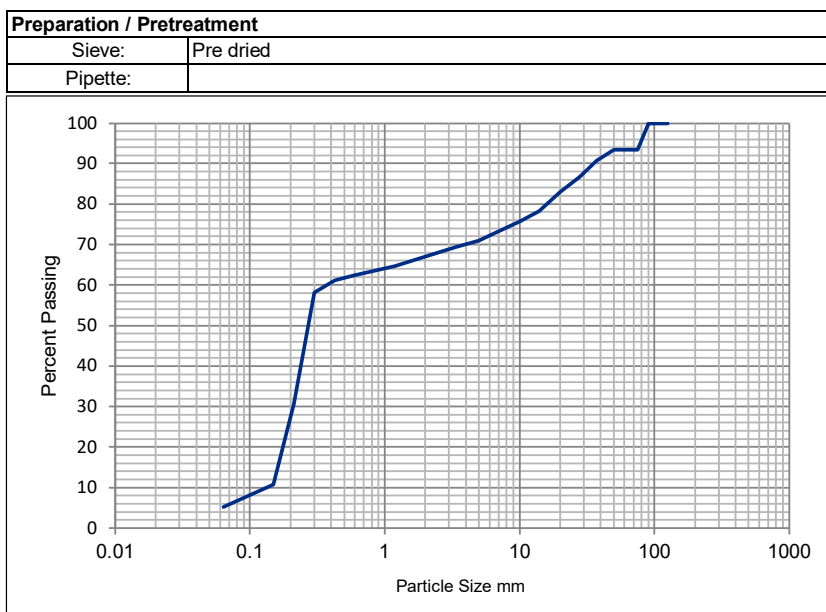
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfedale Road Cardiff CF23 7HA
ATS Sample No:	25115		

Site Ref / Hole ID:	Sample C	Depth (m):	0.5m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Grey brown silty very gravelly SAND with low cobble content
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	23 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	93
63	93
50	93
37.5	91
28	87
20	83
14	78
10	76
6.3	73
5.0	71
3.35	69
2.00	67
1.18	65
0.600	62
0.425	61
0.300	58
0.212	31
0.150	11
0.063	5



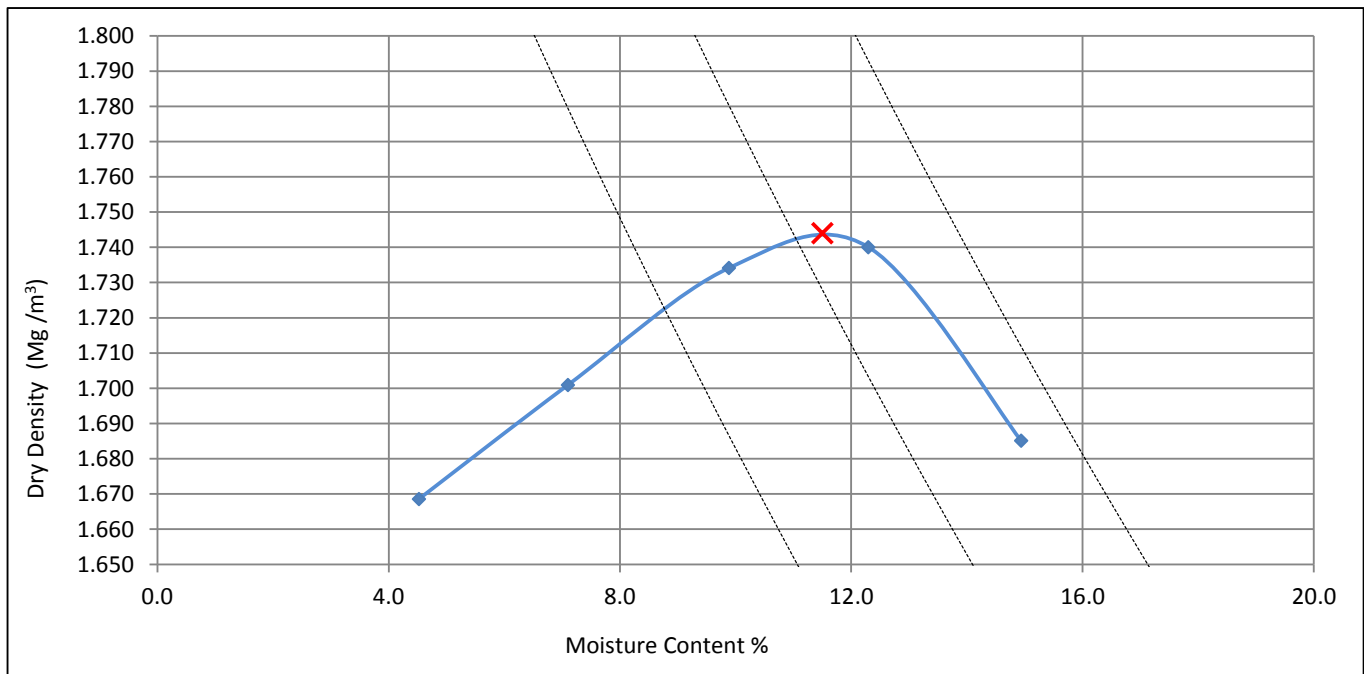
Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	7	N/A	
Gravel	26		
Sand	62	Dry mass of sample, kg	
Silt / Clay	5	9.9	N/A

Remarks:

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25115		

Site Ref / Hole ID:	Sample C	Depth (m):	0.5m
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Grey brown silty very gravelly SAND with low cobble content
Location in Works:	N/A	Material Source:	Site Generated
Date Sampled:	Unknown	Material Supplier:	Site
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	26 July 2021



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m ³	2.30	assumed	Derived Parameters ✗
Material > 37.5mm	9	%	Maximum Dry Density, Mg/m ³
Material < 37.5mm > 20mm	8	%	Optimum Moisture Content %

Remarks:	Natural MC = 7.1%
----------	-------------------

QA Ref.

BS1377 - 4

Rev. 2.0



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Approver

L Davis

L Davis, Quality Manager

Date

27/07/2021

Fig.

COMP

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No: D21401 Project Name: Afan Lido ATS Sample No: 25116	Client: Terra Firma Address: Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
--	--

Site Ref / Hole ID: Sample D Sample No: Sampling Certificate Received: No Location in Works: N/A Date Sampled: Unknown Sampled By: Client Date Received: 19 July 2021	Depth (m): 0.9m Sample Type: Disturbed Material Description: Yellow slightly gravelly slightly silty SAND Material Source: Unknown Material Supplier: Unknown Specification: ISO17892 Date Tested: 21 July 2021
--	--

Test Results

Moisture Content (%)	3.6
----------------------	-----

Remarks:

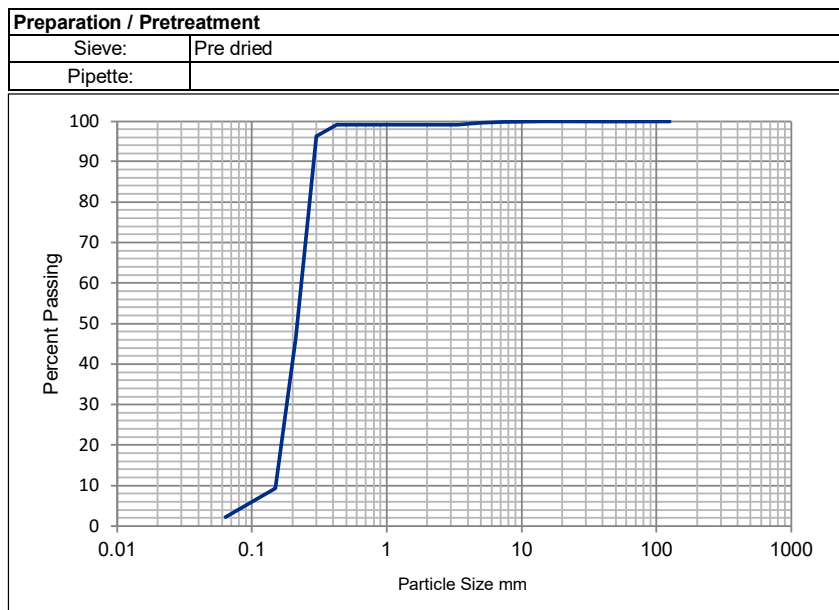
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25116		

Site Ref / Hole ID:	Sample D	Depth (m):	0.9m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Yellow slightly gravelly slightly silty SAND
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	22 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	99
2.00	99
1.18	99
0.600	99
0.425	99
0.300	96
0.212	47
0.150	9
0.063	2



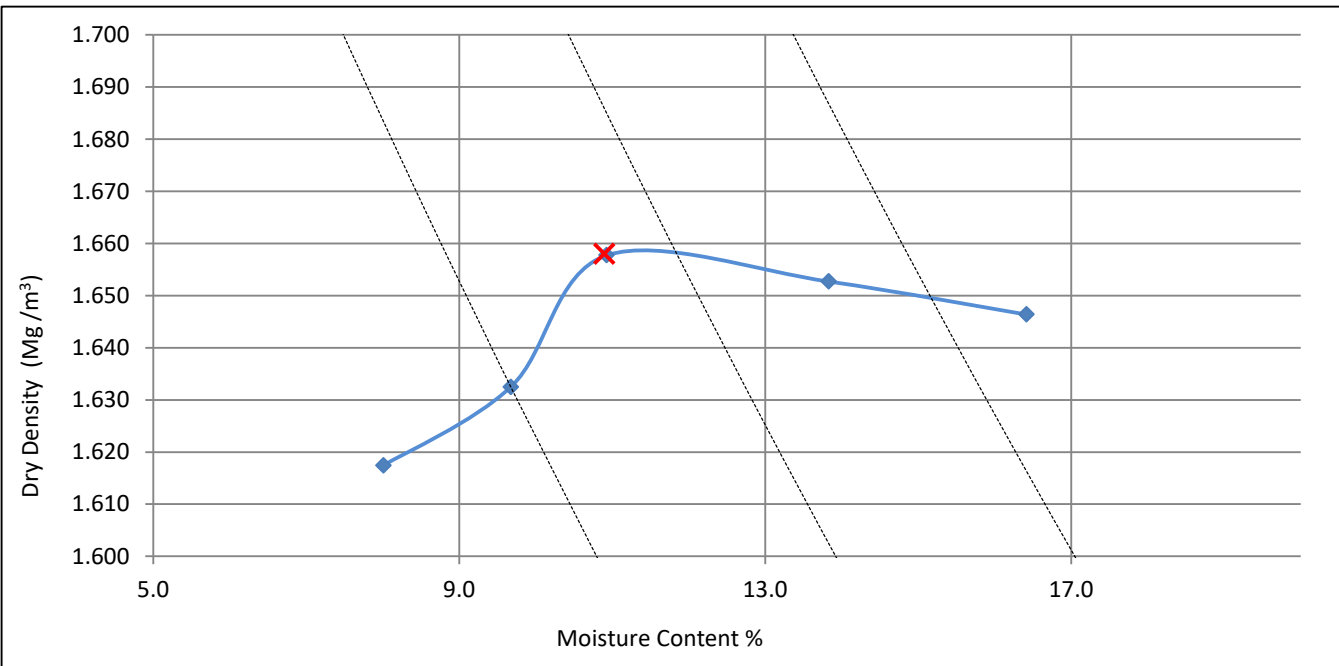
Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	1		
Sand	97	Dry mass of sample, kg	
Silt / Clay	2	0.9	N/A

Remarks:

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No: D21401	Client: Terra Firma	
Project Name: Afan Lido	Address: Deryn Court 5 Wharfdale Road Cardiff CF23 7HA	
ATS Sample No: 25116		

Site Ref / Hole ID: Sample D	Depth (m): 0.9m	
Sample No:	Sample Type: Bulk	
Sampling Certificate Received: No	Material Description: Yellow slightly gravelly slightly silty SAND	
Location in Works: N/A	Material Source: Site Generated	
Date Sampled: Unknown	Material Supplier: Site	
Sampled By: Client	Specification: BS1377	
Date Received: 19 July 2021	Date Tested: 22 July 2021	



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m³	2.20	assumed	Derived Parameters ✖
Material > 37.5mm	0	%	Maximum Dry Density, Mg/m³
Material < 37.5mm > 20mm	0	%	Optimum Moisture Content %

Remarks:	Natural MC = 3.6%
----------	-------------------

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25117		

Site Ref / Hole ID:	Sample E	Depth (m):	0.6m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Yellow slightly gravelly slightly silty SAND
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	ISO17892
Date Received:	19 July 2021	Date Tested:	21 July 2021

Test Results

Moisture Content (%)	2.9
----------------------	-----

Remarks:

QA Ref.

EN ISO 17892-1:2014 E



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Approver

A Grogan

Date

23/07/2021

A Grogan, Laboratory Manager

Fig

MC

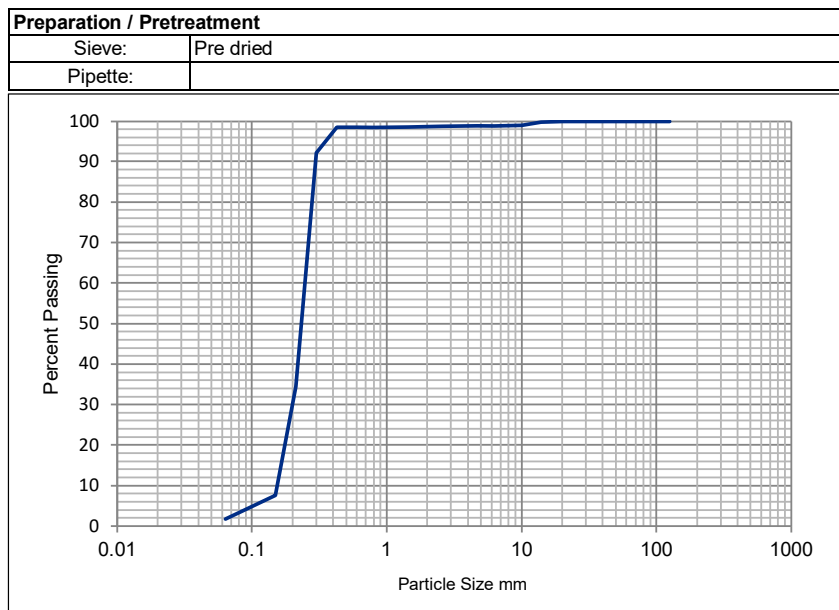
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25117		

Site Ref / Hole ID:	Sample E	Depth (m):	0.6m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Yellow slightly gravelly slightly silty SAND
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	23 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	99
6.3	99
5.0	99
3.35	99
2.00	99
1.18	99
0.600	98
0.425	98
0.300	92
0.212	34
0.150	8
0.063	2



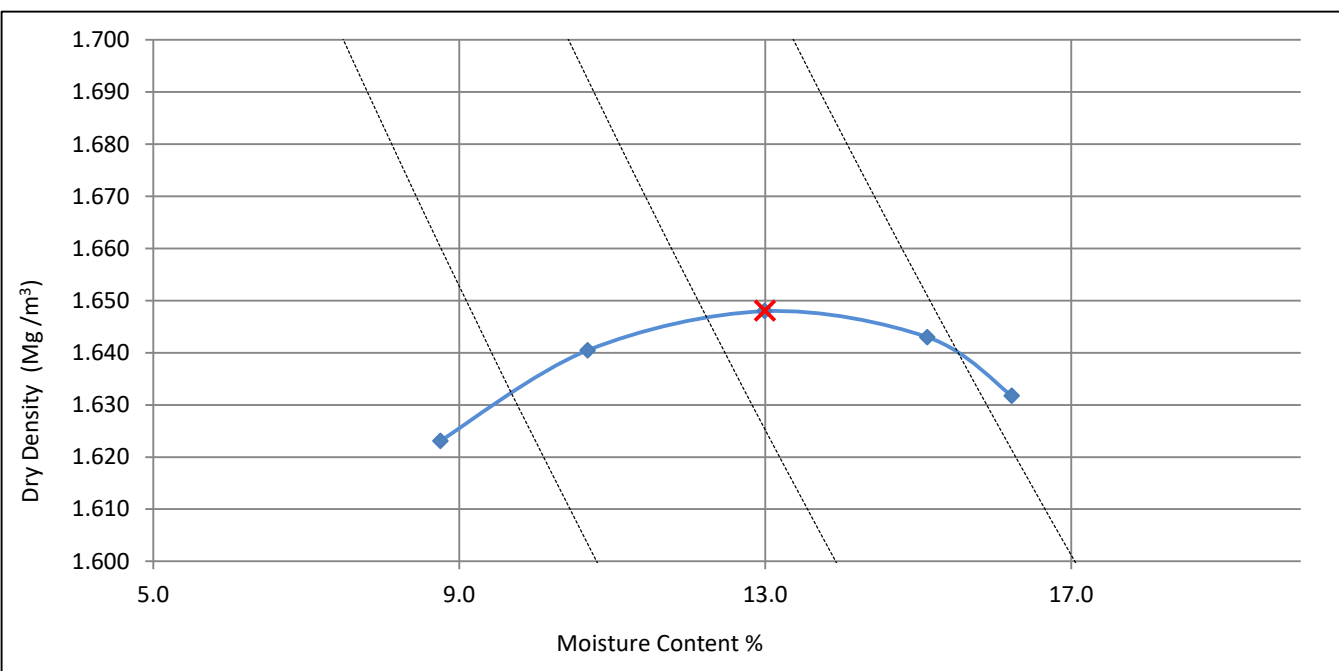
Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	1		
Sand	97	Dry mass of sample, kg	
Silt / Clay	2	1.0	N/A

Remarks:

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No: D21401	Client: Terra Firma	
Project Name: Afan Lido	Address: Deryn Court 5 Wharfdale Road Cardiff CF23 7HA	
ATS Sample No: 25117		

Site Ref / Hole ID: Sample E	Depth (m): 0.6m	
Sample No:	Sample Type: Bulk	
Sampling Certificate Received: No	Material Description: Yellow slightly gravelly slightly silty SAND	
Location in Works: N/A	Material Source: Site Generated	
Date Sampled: Unknown	Material Supplier: Site	
Sampled By: Client	Specification: BS1377	
Date Received: 19 July 2021	Date Tested: 21 July 2021	



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m³	2.20	assumed	Derived Parameters ✖
Material > 37.5mm	0	%	Maximum Dry Density, Mg/m³
Material < 37.5mm > 20mm	0	%	Optimum Moisture Content %

Remarks:	Natural MC = 2.9%
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TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25118		

Site Ref / Hole ID:	Sample F	Depth (m):	0.7m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Brown gravelly very silty SAND
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	ISO17892
Date Received:	19 July 2021	Date Tested:	23 July 2021

Test Results

Moisture Content (%)

13.5

Remarks:

QA Ref.

EN ISO 17892-1:2014 E



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Approver

A Grogan

A Grogan, Laboratory Manager

Date

27/07/2021

Fig

MC

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25118		

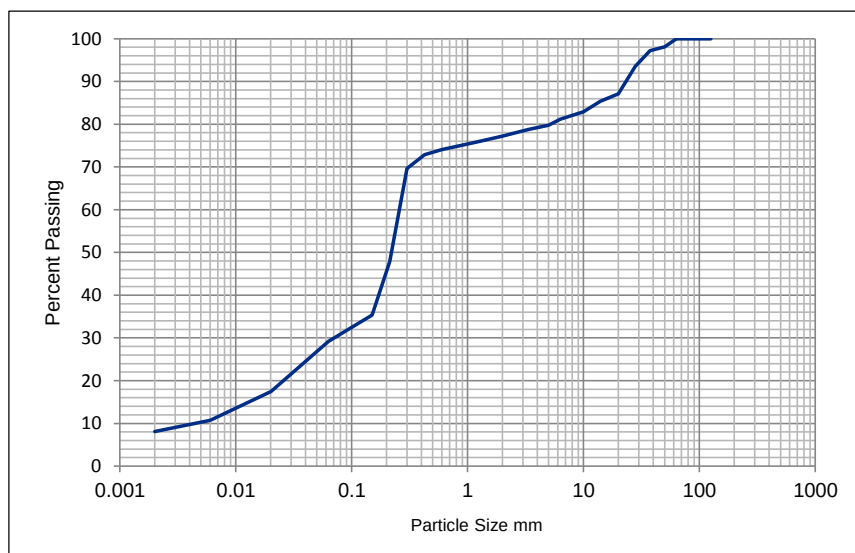
Site Ref / Hole ID:	Sample F	Depth (m):	0.7m
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Brown gravelly very silty SAND
Location in Works:	N/A	Material Source:	Unknown
Date Sampled:	Unknown	Material Supplier:	Unknown
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	27 July 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	98
37.5	97
28	94
20	87
14	85
10	83
6.3	81
5.0	80
3.35	79
2.00	77
1.18	76
0.600	74
0.425	73
0.300	70
0.212	48
0.150	35
0.063	29

Sedimentation	
Particle Size mm	% Passing
0.0201	17
0.0060	11
0.0020	8

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	as BS1377



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D_{60} / D_{10}
Cobbles / Boulders	0	2.65 assumed	
Gravel	23	Dry mass of sample, kg	
Sand	48		
Silt	21		
Clay	8	10.8	

Remarks:

QA Ref.

BS1377 - 2
Rev. 1.0



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Andrew Grogan

A Grogan, Laboratory Manager

Date

27/07/2021

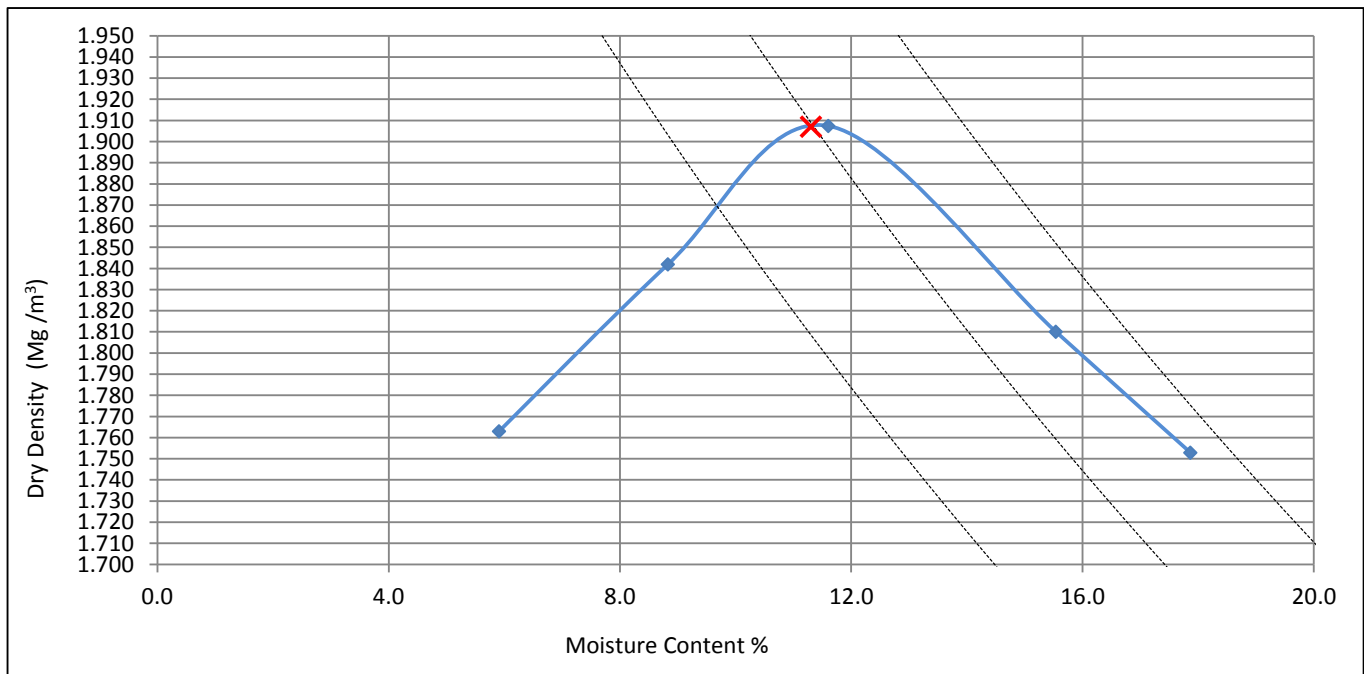
Fig

PSD

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21401	Client:	Terra Firma
Project Name:	Afan Lido	Address:	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	25118		

Site Ref / Hole ID:	Sample F	Depth (m):	0.7m
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Brown gravelly very silty SAND
Location in Works:	N/A	Material Source:	Site Generated
Date Sampled:	Unknown	Material Supplier:	Site
Sampled By:	Client	Specification:	BS1377
Date Received:	19 July 2021	Date Tested:	26 July 2021



Test Method:	BS 1377: part 4: 1990: clause 3.5, 4.5kg rammer in a 1 litre mould
Preparation:	Original sample was natural, single specimen tested

Particle Density, Mg/m ³	2.60	assumed	Derived Parameters ✖
Material > 37.5mm	3	%	Maximum Dry Density, Mg/m ³
Material < 37.5mm > 20mm	10	%	Optimum Moisture Content %

Remarks:	Natural MC = 13.5%
----------	--------------------

QA Ref.

BS1377 - 4

Rev. 2.0



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Approver

L Davis

L Davis, Quality Manager

Date

27/07/2021

Fig.

COMP

Drawings



Job Number:

14647

Job Title:

Afan Lido, Aberavon

Drawing Title:

Trial Pit Layout

Drawing Number:

01

Scale:

Not To Scale

Legend:

 Trial Pit Location

North

