clarkebond

Phase 2 Ground Investigation

New Waste Building, Connon Bridge

E05284

SUEZ Recycling and Recovery UK Ltd

Report No.	Date.
E05284-CLB-00-XX-RP-GT-002	15 February 2021

Project
New Waste Building, Connon Bridge

Client Name
SUEZ Recycling and Recovery UK Ltd

Issue Date	Status	Comments
29 May 2020	S02P01	For Information
28 February 2021	S02 P02	Client comments
15 February 2021	S02 P03	Revised development plan

Report Prepared by:

Nick Edwards
BSc (Hons) MSc FGS
Geotechnical Engineer

Approved for Issue by:

Tim Thornburn
BSc (Hons) PgDip
Principal Geotechnical Engineer

Issuing Office

	The Cocoa House, 129 Cumberland Road, Bristol, BS1 6UY Tel: +44 (0)117 929 2244
X	GF Suite, Bickleigh House, Park Five Business Centre, Exeter, EX2 7HU Tel: +44 (0)1392 369098
	7 Hatchers Mews, Bermondsey Street, London, SE1 3GS Tel: +44(0)20 7939 0959

Contents

Appendices

Executive Summary

Client	SUEZ Recycling and Recovery UK Ltd
Site Location	The site is located 8km south west of Liskeard at approximate National Grid Reference 217677 062155 (Postcode: PL14 4NP).
Proposed Development	The proposed development comprises a new waste transfer building north of the existing Refuse Transfer Station (RTS) building, a new pump room and firefighting water tank to the west and redevelopment of the existing clinical waste building.
Site History	The site was agricultural greenfield up until the development of the adjacent landfill in the early 1990s. Associated with the landfill development were ancillary buildings indicated on the 2001 mapping, more recently becoming a recycling centre from 2010 until present day.
Ground Conditions	Superficial Deposits: None Bedrock Geology: Saltash Formation. Thin veneer of surface Made Ground over silty gravel of the weathered slate bedrock. No groundwater was encountered during the investigation.
Hydrogeology & Hydrology	Bedrock Geology: Secondary A aquifer No Source Protection Zones within 500m of the site No surface water within 250m of the site.
Investigation Works	Six trial pits, geotechnical and chemical laboratory testing. No access to the northern part of the site due to slopes and vegetation.
Geotechnical Considerations	Traditional spread foundations constructed at a minimum depth of 0.75m within competent natural strata. A safe bearing capacity of 150kPa would be appropriate for the weathered slate. Foundations constructed on intact bedrock can be designed to a safe bearing capacity of 250kPa. Soils are non-shrinkable. Design Sulphate Class DS-1 and ACEC class AC-1s. For low rise construction on mass concrete foundations, this corresponds to a concrete type of GEN1. A ground bearing floor slab will be suitable. Full radon protection measures are required. Design CBR of 5%. Conventional mechanical backhoe excavators should prove suitable for excavation within the weathered Saltash Formation.
Contamination Considerations	Comparison of the results against Generic Assessment Criteria (GAC) revealed no elevated concentrations and risks to human health or the environment are unlikely to be present. No asbestos was detected. No remedial actions are required.
Waste Categorisation for Disposal	The Saltash Formation soils are likely to class as **Inert waste**.

1 Introduction

1.1 Introduction and Brief

Clarkebond (UK) Limited was commissioned by SUEZ Recycling and Recovery UK Ltd to undertake a Phase 2 Ground Investigation for a proposed New Waste Building at an existing Refuse Transfer Station at Connon Bridge, Liskeard. This report builds upon the initial findings of the Phase 1 Assessment which was undertaken in March 2020.

1.2 Proposals

The new facility is to comprise of a new waste transfer station north west of the existing building to provide additional waste material handling/storage capacity. It is also proposed to construct a clinical waste building adjacent to the north east elevation of the building. All of the bays are covered and within the enclosed building and the building fully enclosed with an automated door rapid roller shutter door to be fully compliant with regulations. A new fire water tank is proposed to the west of the existing building. Upgrades to the drainage are also included. A plan showing the proposed development is included as Appendix A.

1.3 Scope of Works

The objectives of the investigation were to determine the sub-surface conditions in respect of:

- Geotechnical recommendations including foundations for proposed structures, floor slabs, soil shrinkability, excavation stability, dewatering and buried concrete classes
- A conceptual site model and contamination generic risk assessment (GQRA)Contamination assessment to consider potential significant pollutant linkages arising from the historic land uses on and off site to support any planning applications and the design process.
- An outline waste classification for surplus soils.

1.4 Limitations

This report is provided for the benefit only of the party to whom it is addressed and we do not accept responsibility to any third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, subsoils are inherently variable and hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed as part of this assessment. In particular, it should be noted that groundwater levels vary due to seasonal and other effects, and may at times differ to those measured during the investigation.

2 Site Setting

2.1 Location and Description

The site is located 8km south west of Liskeard at approximate National Grid Reference 217677 062155 (Postcode: PL14 4NP as shown in Figure 2.1.

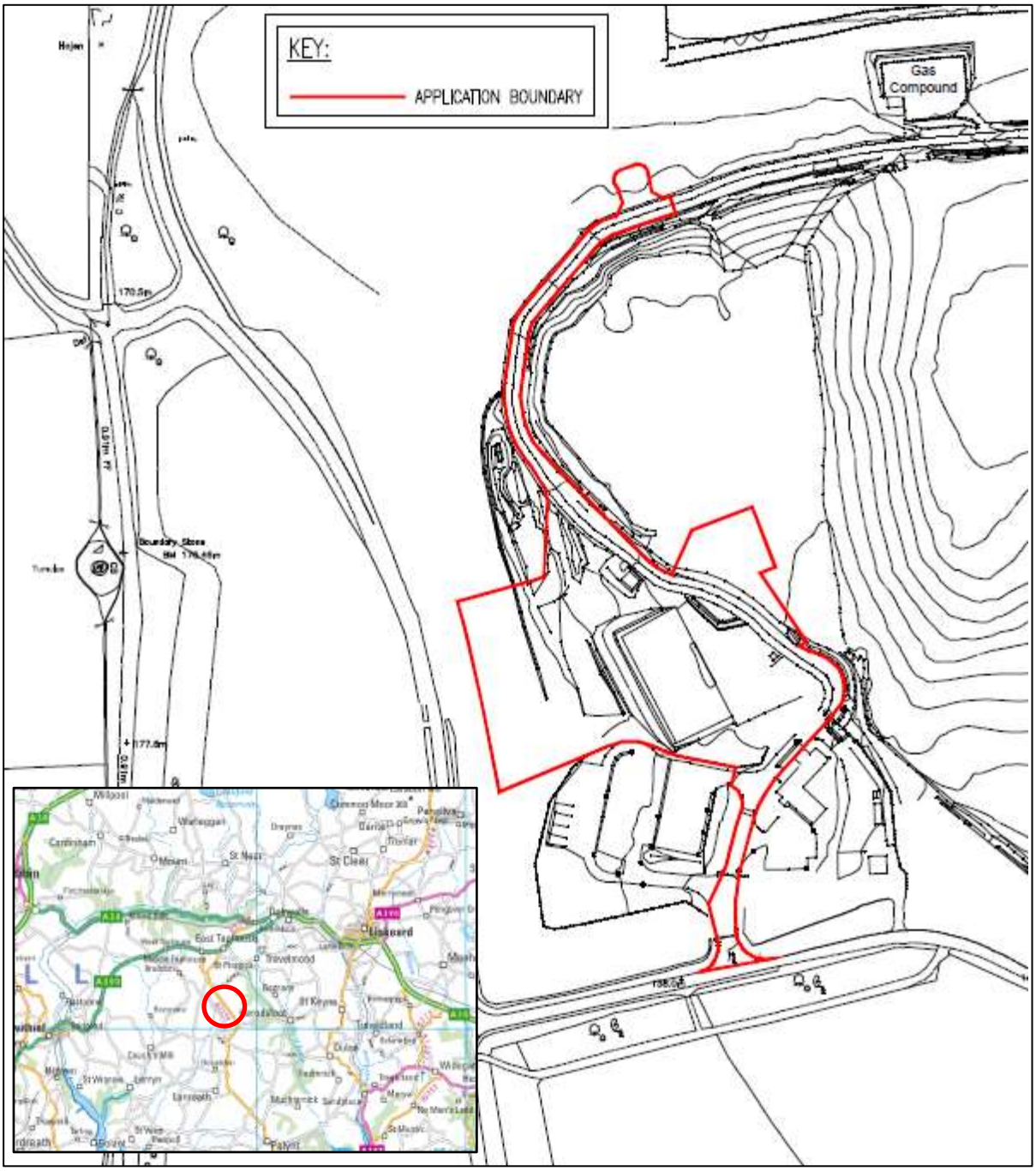


Figure 2.1 Site Location

The area of the proposed development is approximately triangular in shape and lies to the north of the existing building. The building has been cut into an existing slope and therefore the site slopes at approximately 1 in 10 to the east. Semi-mature species of trees were observed on-site along the western boundary.

The site is bounded to the north and east by the historic landfill, to the south by the access road with agricultural farmland beyond and to the west by B3359 with farmland beyond.

2.2 Geology

The British Geological Survey Digital Geological Map of Great Britain at 1:50,000 scale indicates that the site is directly underlain by bedrock of the Saltash Formation (slate and siltstone).

2.3 Hydrology and Hydrogeology

There are two surface water features within 500m of the site. These features include a river WB catchment on site for the West Looe River and 408m north is the West Looe River. Therefore the potential risk to such receptors is deemed to be moderate.

Guidance from the Environment Agency indicates that the bedrock strata is designated as a Secondary A aquifer. As such the groundwater sensitivity is regarded as high.

There are no active groundwater abstractions that lie within 500m of the site boundary. There is an historic groundwater abstraction located 5m east of the site boundary.

The site is not located within 500m of a Source Protection Zone (SPZ).

3 Site Investigation

3.1 General

An intrusive site investigation using mechanically excavated trial pits was carried out by Clarkebond Ltd to determine sub-surface conditions and allow recovery of samples for laboratory geotechnical and chemical testing. Access to the northern part of the site was not possible due to steep slopes and vegetation. In situ CBR tests and trial pits were intended to be undertaken in this area.

A plan showing the trial pit locations is presented in Appendix B.

3.2 Trial Pitting

Six trial pits (designated TP01 to TP06) were excavated to depths of ranging from 1.90m BGL to 2.30m BGL using a JCB 3CX on 30th April 2020.

The trial pits were logged by a geotechnical engineer and samples were taken from the resulting spoil for geotechnical and chemical analysis. On completion the pits were backfilled with excavated spoil and compacted.

Detailed trial pits logs and photographs are included in Appendix C.

3.3 Sample Collection and Analysis

Samples obtained during the investigation were subjected to geotechnical and chemical testing at appropriate UKAS accredited laboratories.

Samples were submitted for geotechnical laboratory testing to characterise the engineering properties of the soil. The following testing was scheduled on selected samples:

- 3 x Moisture Contents.
- 4 x BRE SD1 Greenfield suite.
- 3 x Particle Size Distributions.
- 3 x 2.5kg CBR mould compaction tests
- 1 x 4.5kg compaction.

Testing was carried out in accordance with the procedures outlined in BS EN ISO 14688-1:2018, 14688-2:2018 and 14689:2018 (i.e. Eurocode 7). Geotechnical laboratory test data is presented in Appendix D.

Soil samples were sent for chemical analysis to i2 Analytical to be analysed for:

- Six full suites comprising arsenic, cadmium, copper, chromium, lead, mercury, nickel, selenium, zinc, Speciated PAH, speciated Total Petroleum Hydrocarbons (TPHCWG), Soil organic matter content (SOM), pH and soluble sulphate.
- Six samples were subject to asbestos screens and ID.

- One soil sample was also submitted for waste acceptance criteria (WAC) testing to assist with determining the acceptability for landfill classes of the soil.

Environmental sample collection was carried out in accordance with Clarkebond Standard Operating Procedures and BS EN ISO 22475-1:2006.

The chemical laboratory test results are presented in Appendix E.

4 Ground Conditions

4.1 General

The results of this investigation were consistent with the anticipated geology. A veneer of Made Ground overlying weathered gravel, cobbles and boulders of weak slate overlying weak thinly bedded slate of the Saltash Formation.

The following table provides a summary of the strata encountered and the depth to the base of each stratum in metres encountered in the exploratory holes.

Table 4.1 Typical Strata

Stratum	Depth to Base (m bgl)					
	TP01	TP02	TP03	TP04	TP05	TP06
Made Ground	0.30	0.15	0.55	0.25	0.20	0.60
Gravel and cobbles of weak slate	1.50	1.40	1.30	1.30	1.20	1.70
Gravel, cobbles and boulders of weak slate	1.80*	-	1.90*	-	1.90	2.10*
Weak, thinly bedded Slate.	-	2.30*	-	2.30*	2.30*	-
Groundwater	Dry	Dry	Dry	Dry	Dry	Dry

*refusal at base of hole

4.2 Strata Encountered

Made Ground

The Made Ground typically comprised pale orange / pink / grey slightly clayey, angular, fine to coarse slate gravel.

Saltash Formation

The Made Ground was underlain by the solid geology of the Saltash Formation. This was weathered to slightly silty angular gravel, cobbles and boulders of slate. This was underlain by weak, thinly bedded slate.

4.3 Groundwater

No groundwater was encountered during the investigation.

4.4 Contamination Indications

There were no visual or olfactory indications of contamination or asbestos noted during the site works.

5 Geotechnical Assessment

5.1 Introduction

The proposed development comprises a new waste transfer building north of the existing Refuse Transfer Station (RTS) building, a new pump room and firefighting water tank to the west and redevelopment of the existing clinical waste building. An access road will be constructed in the west of the site. Upgrades to the drainage are also included.

A proposed development plan is included in Appendix A.

5.2 Foundation Assessment

5.2.1 Foundation Design Principles

The two primary factors controlling the performance of foundations are bearing capacity and settlement. Usually the settlement tolerances of the structure are considerably less than the settlement that would be expected as the ultimate bearing capacity of the soils is approached. Therefore it is usually tolerable settlement that dictates the bearing pressure for foundation design. In general, the ultimate bearing capacity is usually divided by a safety factor of 3 for an allowable bearing capacity in order to maintain total settlement within tolerable limits for most structures, which is generally accepted to be 25mm. However, it should be noted that total settlements are usually less than this value as the average actual imposed load will be less than the design load.

All foundations should be inspected by a suitably qualified and competent person to ensure that foundations are placed in competent material capable of supporting the intended loads and below any desiccated clay soils.

5.2.2 Foundations

Traditional foundations will be suitable, and should be taken down through any soft or loose materials and constructed in competent natural strata at a minimum foundation depth of 0.75m below existing ground level. A safe bearing capacity of 150kPa would be appropriate for the weathered slate. Foundations constructed on intact bedrock can be designed to a safe bearing capacity of 250kPa.

Total settlements for foundations designed to the above pressures are likely to be in the order of 15 to 25mm, most of which would occur during construction. There would be a reduction in settlements with foundation depth, as the soil strength increases. Imposing a lower bearing pressure than the safe bearing capacity would also reduce settlement.

5.3 Shrinkable Soils

The soils encountered on site are non-shrinkable.

5.4 Floor Slab

A ground bearing floor slab would be appropriate.

The site lies in a high radon area and full radon protection measures are required for new buildings or extensions.

Guidance from the HSE states that radon surveys should be conducted in any workplace where its location and characteristics suggest that elevated levels may be found and significant exposures to employees and/or other persons are possible. Inexpensive surveys can be carried out by leaving small plastic passive detectors in rooms or occupied locations of interest. The PHE website contains up-to-date details of validated laboratories capable of supplying such detectors for undertaking radon measurements. Delivery and return of the dosemeters is usually by post.

The Building Regulations 2004 (England, includes 2010 and 2013 amendments), the Building Regulations 2010 (Wales, includes 2017 amendments), the Building (Scotland) Regulations 2004 and Building Regulations (Northern Ireland) 2000, supported by BRE report BR211 describe where new buildings and extensions (workplaces and dwellings) might need to incorporate protective measures installed during construction.

Since even new buildings with protective measures may have high radon levels, employers must still test as described above.

There is also a former landfill to the east of the site, which has an active gas management system.

The existing RTS building has full radon protection measures installed. These comprise:

- 1200 gauge polyethene membrane, tape sealed. Minimum 150mm overlaps.
- Radon control sumps.
- 110mm dia plastic pipe with sealed joints to terminate above ground level.

These details should be incorporated within the proposed building.

5.5 Retaining Walls

It is understood that a reinforced concrete cantilever retaining will be constructed to accommodate the development.

Design parameters are presented in Table 5.1.

Table 5.1 Design Parameters for Retaining Wall Design (unfactored)

Soil Type	Characteristic Values		Bulk Density kNm^3
	Friction Angle °	Effective Cohesion kPa	
Weathered slate	32	0	19
Intact slate	34	0	20

5.6 Concrete protection

Buried concrete classification is based on guidelines provided in BRE Special Digest 1 (BRE, 2005).

Chemical Analysis was undertaken on four soil samples for pH, water soluble sulphate, total sulphate and total sulphur. An assessment for total potential sulphate indicates that the soils are not considered to be pyritic and the design class should be based on soluble sulphates.

The pH values were 6.8 to 7.1 with water soluble sulphate concentrations of 7mg/l to 12mg/l Therefore it is recommended that a Design Class of DS1 and AC1s should be assumed for buried concrete in accordance with BRE Special Digest 1 assuming natural ground and static groundwater conditions.

For low rise construction on mass concrete foundations, this corresponds to a concrete type of GEN1. It is recommended that the concrete supplier confirm the necessary concrete type based on its intended use and the chemical test results in Appendix E.

5.7 Excavations

Conventional mechanical backhoe excavators should prove suitable for excavation within the weathered Saltash Formation.

The weathered soils were recovered as gravel and cobble sized fragments and may be subject to spalling and collapse within excavations and concrete should be poured as soon as possible and temporary support may be required. Entry into shallow excavations by personnel should be minimised, and excavation stability should be assessed by suitably qualified and experienced staff and shoring used when required. Entry into deeper excavations should not be permitted unless full support is provided.

No groundwater was encountered during the investigation undertaken in April 2020.

5.8 Pavement Design

Laboratory CBR tested was undertaken on three recompacted samples. This gave CBR values of 18% to 47%. The results indicate that where the weathered slate is excavated and re-compacted, it would provide a suitable formation for road construction.

For the in situ weathered slate, equilibrium CBR values for various materials are given in Interim Advice Note 73/06 "Design Guidance for Road Pavement Foundations (Draft HD25)" produced by the Highways Agency and these are summarised in Table 5.2 assuming a high water table and thin pavement construction.

Table 5.2 Typical CBR Values

Soil Type	PI (%)	Equilibrium CBR (%)
Heavy clay	50-70	2
Silty clay	30	3
Sandy clay	10-20	3-4
Silt	-	1
Sands and gravels		> 5%

The near surface soils are predominantly gravel of the weathered slate. Based on Table 5.2 it is recommended that a design CBR of 5% is adopted for these soils.

All Topsoil / Made Ground should be removed and the formation level should be proof rolled to identify any loose or soft spots, which should be removed and replaced with compacted granular fill. The conditions prevailing at the time of construction will affect the CBR of the sub-grade soil and its strength. Research has shown the importance of the equilibrium moisture content of the sub-grade. The relationship between soil suction and the moisture content shows that a soil that becomes wet during construction will retain water and will therefore be weaker under the pavement in the equilibrium condition than a foundation that has remained dry, particularly for soils of low to medium plasticity. Consequently the formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

6 Contamination Assessment

6.1 Summary

Comparison of the results against Generic Assessment Criteria (GAC) revealed no elevated concentrations and risks to human health or the environment are unlikely to be present.

No asbestos was detected.

No remedial actions are required.

No access to the northern part of the site was possible, however the ground conditions were consistent over the remainder of the site and excluding any materials that may have been imported to this area, significantly differing ground conditions are not expected in the north of the site.

A standard H&S personal hygiene plan should suffice (wearing of gloves, washing of hands before eating etc). Excessive dust generation should be avoided.

Details of the test results and comparison with guideline values is presented in the following sections.

6.2 Tier 1 Generic Quantitative Risk Assessment - Soil Risks to Humans

6.2.1 General

A generic quantitative risk assessment (GQRA) has been undertaken using the geochemical results for the soil samples retained from the site. The approach to human health risk assessment adopted in this report is consistent with the Environment Agency's Model Procedures (CLR11) and other relevant guidance (including SR3, BS10175:2001 and NPPF).

The laboratory soil data has been compared to relevant and applicable critical concentrations as outlined in the guidance. These criteria can be either Generic Assessment Criteria (GAC) or Site Specific Assessment Criteria (SSAC). For the purpose of this generic quantitative risk assessment, GAC will be used. The GACs been derived from the following:

- DEFRA C4SL Health Criteria Values (March 2014),
- Cl:AIRE/EIC/AGS Soil Generic Assessment Criteria for Human Health Risk assessment, January 2010 and
- The LQM/CIEH S4ULs for Human Health Risk Assessment. Ref: S4UL3269, released January 2015, Land Quality Press, Nottingham

The site is non-residential therefore a '***commercial'*** end use has been assumed for the assessment.

To ascertain a preliminary assessment of the contaminative nature of the near surface materials across the site, seven soil samples were retained during the site investigation works and submitted for laboratory analysis.

The chemical analysis was undertaken at i2 Analytical laboratories. The results are included in Appendix E.

6.2.2 Metals

Table 6.1 summarises the results of heavy metal concentrations within the soil samples compared to GAC values.

Table 6.1 Values for Metals in Soils

Determinant	GAC	Concentration Range		No. samples tested	No. samples exceed GAC
		Min	Max		
Arsenic	640	20	28	6	0
Boron (w/s)	240000	<0.2	<0.2	6	0
Cadmium	190	<0.2	<0.2	6	0
Chromium (total)	8600	36	51	6	0
Copper	68000	0	<4	0	0
Lead	2330	19	49	6	0
Mercury	58	21	31	6	0
Nickel	980	<0.3	<0.3	6	0
Selenium	12000	47	65	6	0
Zinc	730000	<1	<1	6	0

Results in mg/kg . GACs are LQM GAC unless stated otherwise.

6.2.3 Organics – TPH

Table 6.2 summarises the results of Speciated Hydrocarbons concentrations within the soil samples compared to GAC values.

Table 6.2 Values for Speciated Hydrocarbons in Soils

Determinant	GAC	Concentration Range		No. samples tested	No. samples exceed GAC
		Min	Max		
EC>5-6 Aliphatic	1000000	<0.1	<0.1	6	0
EC>6-8 Aliphatic	1000000	<0.1	<0.1	6	0
EC>8-10 Aliphatic	41000	<0.1	<0.1	6	0
EC>10-12 Aliphatic	41000	<1	<1	6	0
EC>12-16 Aliphatic	41000	<2	<2	6	0
EC>16-35 Aliphatic	81000	<10	<10	6	0
EC>35-44 Aliphatic	81000	0	<8.4	0	0
EC>5-7 Aromatic	180000	<0.1	<0.1	6	0
EC>7-8 Aromatic	180000	<0.1	<0.1	6	0
EC>8-10 Aromatic	16000	<0.1	<0.1	6	0
EC>10-12 Aromatic	16000	<1	<1	6	0
EC>12-16 Aromatic	16000	<2	<2	6	0
EC>16-21 Aromatic	12000	<10	<10	6	0
EC>21-35 Aromatic	12000	<10	<10	6	0
EC>35-44 Aromatic	12000	<8.4	<8.4	6	0

Results in mg/kg. GACs are LQM S4UL for SOM of 1% unless stated otherwise.

6.2.4 Organics – PAHs

Table 6.3 summarises the results of speciated Poly Aromatic Hydrocarbons (PAH) concentrations within the soil samples compared to GAC values.

Table 6.3 Values for Speciated PAH in Soils

Determinant	GAC	Concentration Range		No. samples tested	No. samples exceed GAC
		Min	Max		
Acenaphthene	39000	<0.1	<0.1	6	0
Acenaphthylene	39000	<0.1	<0.1	6	0
Anthracene	200000	<0.1	<0.1	6	0
Benz(a)anthracene	89	<0.1	<0.1	6	0
Benzo(a)pyrene	13	<0.1	<0.1	6	0
Benzo(b)fluoranthene	92	<0.1	<0.1	6	0
Benzo(ghi)perylene	590	<0.05	<0.05	6	0
Benzo(k)fluoranthene	130	<0.1	<0.1	6	0
Chrysene	130	<0.05	<0.05	6	0
Dibenz(a,h)anthracene	12	<0.1	<0.1	6	0
Fluoranthene	8100	<0.1	<0.1	6	0
Fluorene	26000	<0.1	<0.1	6	0
Indeno(1,2,3-cd)pyrene	56	<0.1	<0.1	6	0
Naphthalene	13000	<0.05	<0.05	6	0
Phenanthrene	8100	<0.1	<0.1	6	0
Pyrene	20000	<0.1	<0.1	6	0

Results in mg/kg. GACs are LQM S4UL for SOM of 1% unless stated otherwise.

7 Waste Assessment

Assessment (including WAC) testing has been undertaken on a sample of the weathered slate. The results are included in Appendix E.

The sample met the **inert** criteria.

All producers of waste have a **duty of care** to ensure that any waste they produce is handled safely and within the law. They must **check** that anyone they pass waste on to is **authorised** to take it. This includes the authorised site earmarked to handle the waste and any haulier (licensed waste carrier) used to transport the waste between the sites.

Records of all waste transferred or received must keep for at least two years.

In order to prevent excessive costs and reduce the environmental impact of the development, it is recommended that removal of wastes from the site, including waste soils, is kept to a minimum by:

- firstly trying to balance cut/fill earthworks operations
- and then by employing U1 Waste Exemptions (use of waste in construction)
- and/or Definition of Waste: Industry Code of Practice (DoWCoP) assessment,
- exporting to a soil treatment hub,
- with the last resort being disposal to a licensed waste disposal site (subject to Landfill Tax).

Clarkebond's DoWCoP *Qualified Persons* can assist with these assessments.

Transfer for Reuse on Another Site
Surplus soils become waste as soon as they leave site, unless they are being transferred to another "development" or "construction" site for reuse. Such transfer means that such soils do not class as waste, provided that a waste assessment is completed (e.g. by a DoWCoP Qualified Person) to prove compliance within the 4nr (DoWCoP type) factors.

Soil types can be transferred as follows:

- **Utilising DoWCoP**: Currently only **natural soils** can be transferred via a DoWCoP.
- **Utilising U1 Waste Exemption:** Limited quantities of both **natural soils** and **Made Ground** can be transferred via a U1, provided that they pose no risks to humans, or the environment.

Certain other materials may also be reused on other "Construction" sites by employing a *U1 Waste Exemption*.

Disposal to Licensed Waste Sites
To evaluate the various on-site soils for potential off-site disposal, soils are classified in accordance with the Hazardous Waste Directive (HWD) that enables the provision of a European Waste Catalogue (EWC) Code for use during offsite disposal and a Hazardous or Non-Hazardous

Classification. Non-Hazardous material is suitable for disposal in a Non-Hazardous landfill; however, disposal to an Inert Landfill requires further Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457–3. Material classed as Hazardous also requires WAC testing to assign a suitable hazardous classification.

The Landfill Regulations require that all Hazardous and Non-Hazardous solid waste must be treated prior to offsite disposal to landfill. You can define 'treatment' by using the following 'three-point test'. All three criteria must be satisfied for all of the waste to qualify as being treated:

1. It must be a physical, thermal, chemical or biological process including sorting.
2. It must change the characteristics of the waste.
3. It must do so in order to:
    a. Reduce its volume; or
    b. Reduce its hazardous nature; or
    c. Facilitate its handling; or
    d. Enhance recovery.

8 Summary

Traditional spread foundations constructed at a minimum depth of 0.75m within competent natural strata. A safe bearing capacity of 150kPa would be appropriate for the weathered slate. Foundations constructed on intact bedrock can be designed to a safe bearing capacity of 250kPa.

Soils are non-shrinkable.

Design Sulphate Class DS-1 and ACEC class AC-1s. For low rise construction on mass concrete foundations, this corresponds to a concrete type of GEN1.

A ground bearing floor slab will be suitable. Full radon protection measures are required.

Design CBR of 5%.

Conventional mechanical backhoe excavators should prove suitable for excavation within the weathered Saltash Formation.

Comparison of the results against Generic Assessment Criteria (GAC) revealed no elevated concentrations and risks to human health or the environment are unlikely to be present.

No remedial actions are required.

The Saltash Formation soils are likely to class as Inert waste.

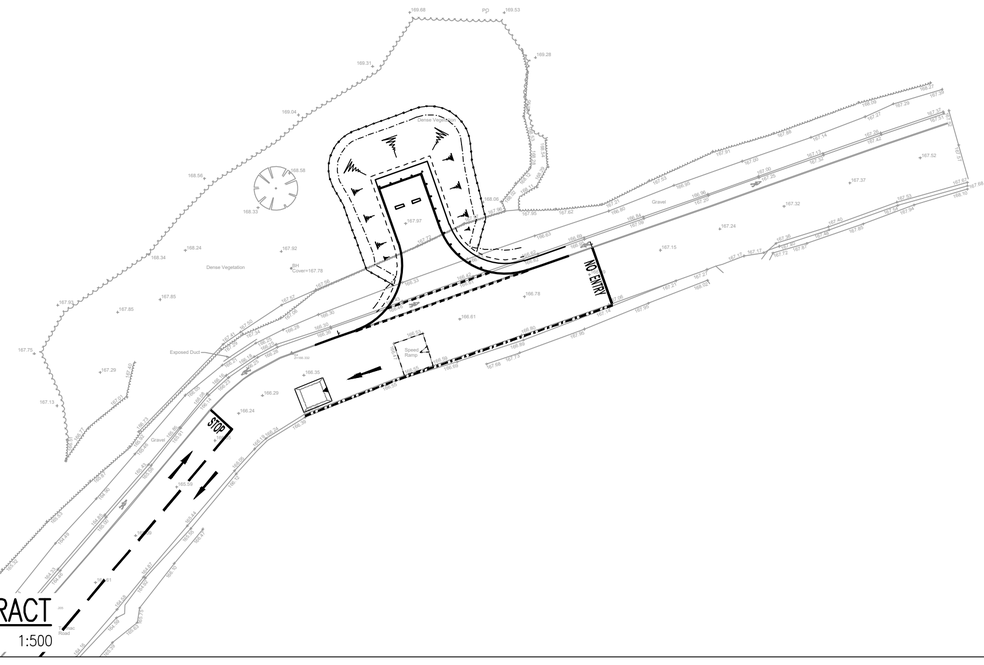
Appendices

A Proposed Development Plan

REFER TO VIEWPORT EXTRACT FOR CONTINUATION

N

TURNING HEAD EXTRACT
1:500



CDM RESIDUAL RISKS

The work shown on this drawing is both familiar to the designers and routinely safely built in similar circumstances by competent contractors.

Risks are not considered significant.

~~Relevant data is included in the Pre-Construction Information Pack~~

Signed: JH Date: MAY 2020

NOTES:

1. DO NOT SCALE THIS DRAWING FOR CONSTRUCTION PURPOSES.
2. CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER
3. SURVEY AND SITE INFORMATION SHOWN IS TAKEN FROM QUADRANT SURVEYS DRAWING NO 20.028 – 01/06–06/06 DATED MARCH 2020 + KEMP ENGINEERING & SURVEYING DRAWING NO 20–9284–001 DATED OCTOBER 2020. CLARKEBOND TAKE NO RESPONSIBILITY FOR ITS CONTENT OR ACCURACY.
4. ALL LEVELS SHOWN ARE TO ORDNANCE DATUM.

THIS DRAWING IS FOR PLANNING APPLICATION USE ONLY. SCHEME INFORMATION SHOWN IS SUBJECT TO FINAL DESIGN AND APPROVALS

0 10 20 30 40 50
SCALE 1:500 (A1) METRES

Rev	Detail	By	Chk	Date
P03	UPDATED TO SUIT CLIENT COMMENTS	JH	MKR	30.10.20
P02	UPDATED TO SUIT CLIENT COMMENTS	JH	MKR	24.07.20

Revisions

Client: suez

Project: PROPOSED WASTE TRANSFER BUILDING, CONNON BRIDGE, LISKEARD, CORNWALL

Drawing Status: PLANNING APPROVAL

clarkebond
MULTIDISCIPLINARY ENGINEERING CONSULTANTS
GF Suite, Bickleigh House,
Park Five Business Centre,
Sowton, Exeter EX2 7HU
tel +44 (0) 1392 369098
fax +44 (0) 1392 369100
e-mail exeter@clarkebond.com
web www.clarkebond.com
Bristol Exeter London

Drawing Title: PROPOSED OVERALL SITE PLAN

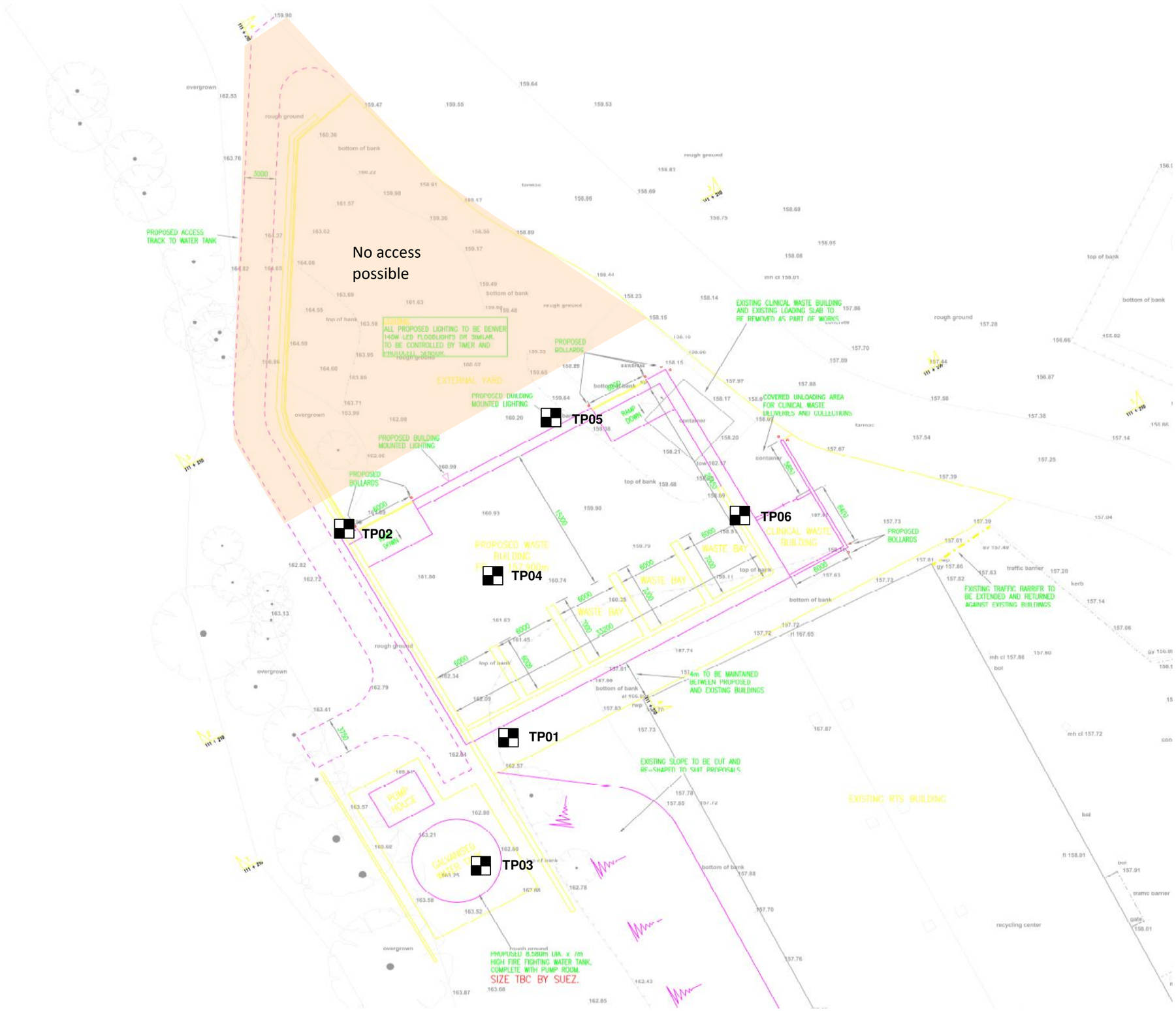
ClarkeBond Project No.	Status
E05284	S2

Project	Originator	Zone	Level	Type	Role	Drg No.
CNB	CB	XX	XX	DR	C	212

Scale	Date	
1/500 @ A1	06/2020	P03
Drawn: JH	Checked: MKR	Sheet Size: A1

DWG INFO: N:\BS1192\E05284 - CONNON BRIDGE\01_WIP\DR_DRAWING\E05284-CNB-212-PROPOSED_OVERALL_SITE_PLAN

B Exploratory Hole Plan



DO NOT SCALE THIS DRAWING FOR CONSTRUCTION PURPOSES.

CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER.

Key

Machine Excavated Trial Pit

Hole Locations Approximate. Sizes exaggerated for clarity.

clarkebond

MULTIDISCIPLINARY ENGINEERING CONSULTANTS

The Cocoa House
129 Cumberland Road
Bristol BS1 6UY

tel +44 (0) 117 929 2244
fax +44 (0) 117 929 3095
e-mail bristol@clarkebond.com
web www.clarkebond.com

Bristol Exeter London

Client
SUEZ Recycling and Recovery UK

Project
Proposed Waste Transfer Building
Connon Bridge, Liskeard

Drawing Title
Trial Pit Location Plan

Purpose of Issue
Information

Clarkebond Project No.	*Status*
E05284	S2

Project	*Originator*	*Volume*	*Level*	*Type*	*Role*	*Dwg No.*
E05284	CLK	XX	XX	DR	GE	0001

Scale	*Date*	Revision
N/A	04/05/2020	P1

Drawn	*Checked*	*Sheet Size*
TT		A3

C Exploratory Hole Logs

clarkebond

Trial Pit Log

Trial Pit No.: **TP01**

Project Name:	Connon Bridge	Co-Ordinates: 217664 E 62133 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 162.50	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.10	ES		0.30	162.20		MADE GROUND Pale orange / pink / grey slightly clayey angular fine to coarse slate gravel.		
			1.50	161.00		Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION		
			1.80	160.70		Pink grey slightly silty angular tabular GRAVEL, COBBLES and BOULDERS of weak slate. WEATHERED SALTASH FORMATION		
						End of Pit at 1.80m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

General Remarks:
No groundwater encountered. Some overbreak below 1.50m.

Logged By: TT

Approved By: TT

Scale: 1:25

Stability:

Shoring: None

Method/Plant Used: JCB 3CX

Sheet 1 of 1

clarkebond

Trial Pit Log

Trial Pit No.: **TP02**

Project Name:	Connon Bridge	Co-Ordinates: 217648 E 62154 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 161.90	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
			0.15	161.75		MADE GROUND Grey very clayey angular fine to coarse slate gravel.		
0.60 - 1.00	B					Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION	0.5	
1.00	DS						1.0	
			1.40	160.50		Weak very thinly to thinly bedded closely fractured pink grey SLATE. Recovered as silty angular tabular gravel, cobbles and boulders. SALTASH FORMATION	1.5	
							2.0	
			2.30	159.60		End of Pit at 2.30m	2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	

General Remarks:
No groundwater encountered. Pit stable.

Logged By: TT

Approved By: TT

Scale: 1:25

Stability:

Shoring: None

Method/Plant Used: JCB 3CX

Sheet 1 of 1

clarkebond

Trial Pit Log

Trial Pit No.: **TP03**

Project Name:	Connon Bridge	Co-Ordinates: 217663 E 62120 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 163.20	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.10	ES					MADE GROUND Grey clayey angular fine to coarse slate gravel.		
			0.55	162.65				
0.70	ES					Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION		
1.00	DS							
			1.30	161.90		Pink grey slightly silty angular tabular GRAVEL, COBBLES and BOULDERS of weak slate. WEATHERED SALTASH FORMATION		
			1.90	161.30		End of Pit at 1.90m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

General Remarks:
No groundwater encountered. Pit stable.

Logged By: TT

Approved By: TT

Scale: 1:25

Stability:

Shoring: None

Method/Plant Used: JCB 3CX

Sheet 1 of 1

clarkebond

Trial Pit Log

Trial Pit No.: **TP04**

Project Name:	Connon Bridge	Co-Ordinates: 217662 E 62151 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 161.50	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.10	ES		0.25	161.25		MADE GROUND MADE GROUND: Grey clayey angular fine to coarse slate gravel.		
0.90 - 1.20 1.00	B DS		1.30	160.20		Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION		
			2.30	159.20		Weak very thinly to thinly bedded closely fractured pink grey SLATE. Recovered as silty angular tabular gravel, cobbles and boulders. SALTASH FORMATION End of Pit at 2.30m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Stability:

Shoring: None

General Remarks:
No groundwater encountered. Some overbreak below 1.30m.
Hard digging in slate.

Method/Plant Used: JCB 3CX

Logged By: TT

Approved By: TT

Scale: 1:25

Sheet 1 of 1

clarkebond

Trial Pit Log

Trial Pit No.: **TP05**

Project Name:	Connon Bridge	Co-Ordinates: 217668 E 62168 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 160.10	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
			0.20	159.90		MADE GROUND Pale orange / pink / grey slightly clayey angular fine to coarse slate gravel.		
0.50	ES					Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION	0.5	
1.00 - 1.20	B						1.0	
1.20	DS		1.20	158.90		Pink grey slightly silty angular tabular GRAVEL, COBBLES and BOULDERS of weak slate. WEATHERED SALTASH FORMATION	1.5	
			1.90	158.20		Weak very thinly to thinly bedded closely fractured pink grey SLATE. Recovered as silty angular tabular gravel, cobbles and boulders. SALTASH FORMATION	2.0	
			2.30	157.80		End of Pit at 2.30m	2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	

General Remarks:
No groundwater encountered. Some overbreak below 1.90m.
Hard digging in slate.

Logged By: TT

Approved By: TT

Scale: 1:25

Stability:

Shoring: None

Method/Plant Used: JCB 3CX

Sheet 1 of 1

clarkebond

Trial Pit Log

Trial Pit No.: **TP06**

Project Name:	Connon Bridge	Co-Ordinates: 217689 E 62155 N	Start: 30/04/2020
Project Number:	E05284	Ground Level (m OD): 158.70	End: 30/04/2020

Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.10	ES		0.20	158.50		MADE GROUND Grey clayey angular fine to coarse slate gravel.		
			0.60	158.10		MADE GROUND Pale orange / pink / grey slightly clayey angular gravel and cobbles of weak slate.		
			1.70	157.00		Pale pink orange grey slightly silty angular GRAVEL AND COBBLES of weak slate. WEATHERED SALTASH FORMATION		
			2.10	156.60		Pink grey slightly silty angular tabular GRAVEL, COBBLES and BOULDERS of weak slate. WEATHERED SALTASH FORMATION		
						End of Pit at 2.10m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

General Remarks:
No groundwater encountered. Some overbreak below 1.70m.

Logged By: TT

Approved By: TT

Scale: 1:25

Stability:

Shoring: None

Method/Plant Used: JCB 3CX

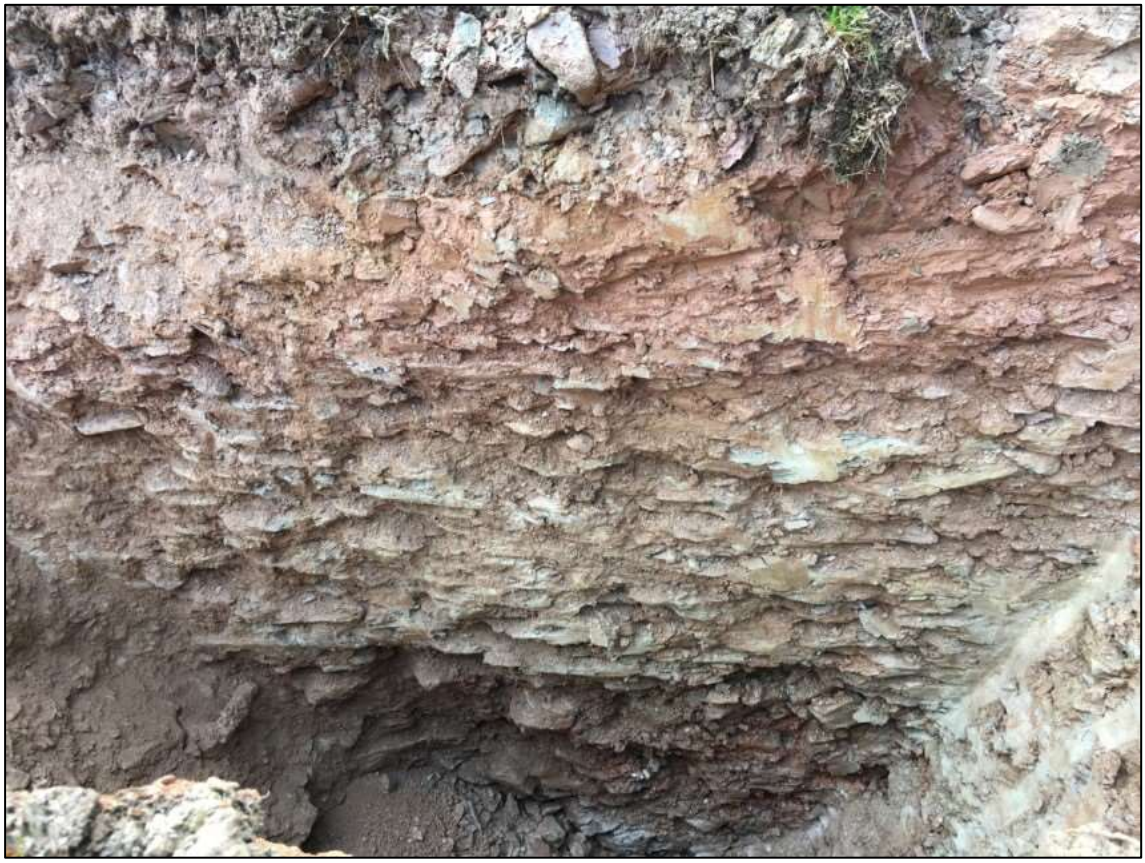
Sheet 1 of 1

TP01

TP01

TP01

TP02



TP02

TP02

TP03

TP03

TP03

TP04

TP04

TP04

TP05

TP05

TP05

TP06

TP06

TP06

D Geotechnical Test Certificates

Test Report

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Job No:	12418	**Date Received:**	06/05/20
Job Name:	Connon Bridge, Liskeard	**Date Sent:**	29/05/20
Client Name:	ClarkeBond Exeter	**Transmittal Number:**	T5636
Client Job No:	0	**Senders Initials:**	DT
Client Address	GF Suite, Bickleigh House, Park Five Buisiness Centre, Sowton, Exeter, EX2 7HU	**Report Revision No.**	1
		Sampled by SWG lab staff?	NO

Ref.	Test Detail	No. of Tests / Report No.
A1	BS1377: Part 2: 1990: Clause 3 - Moisture Content - UKAS Accredited	3
A9	BS1377: Part 2: 1990: Clause 9.2 / 9.3 - Particle Size Distribution - UKAS Accredited	3
B6.2	BS1377: Part 4: 1990: Clause 7 - Determination of the California Bearing Ratio - 4.5kg method - UKAS Accredited	3

Sampling not performed by South West Geotechnical laboratory staff. Results apply to the samples as received.

Approved Signatories:

David Trowbridge (Laboratory Manager)

Dan Ayre (Quality Manager)

Matt Stokes (Senior Technician)

8260
Accredited to
ISO/IEC
17025:2017

Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Summary of Classification Test Results

Project No.	Project Name
12418	Connon Bridge, Liskeard
Client Job No.	**Client**
12418	Clarke Bond

8260
Accredited to
ISO/IEC
17025:2017

Hole No.	Sample Type	Sample Top	Sample Base	Sample Ref	Soil Description	*mc* Cl.3.2 %	Passing 425µm %	LL %	PL Cl5.3 %	PI Cl5.4 %	Particle density Mg/m3	Remarks
TP02	B	0.60	1.00	-	Pinkish brown very silty very sandy GRAVEL	13	-	-	-	-	-	
TP04	B	0.90	1.20	-	Pinkish brown very silty very sandy GRAVEL with cobble	12	-	-	-	-	-	
TP05	B	1.00	1.20	-	Pinkish brown very silty very sandy GRAVEL	12	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	

Preparation Clauses: Particle Density (BS1377:Part 1: 1990: CL7.4.4) Atterberg Limits (BS1377:Part 1: 1990: CL7.4.3) Moisture Content (BS1377: Part 1: 1990: CL7.3.3 & 7.4.2)

Key

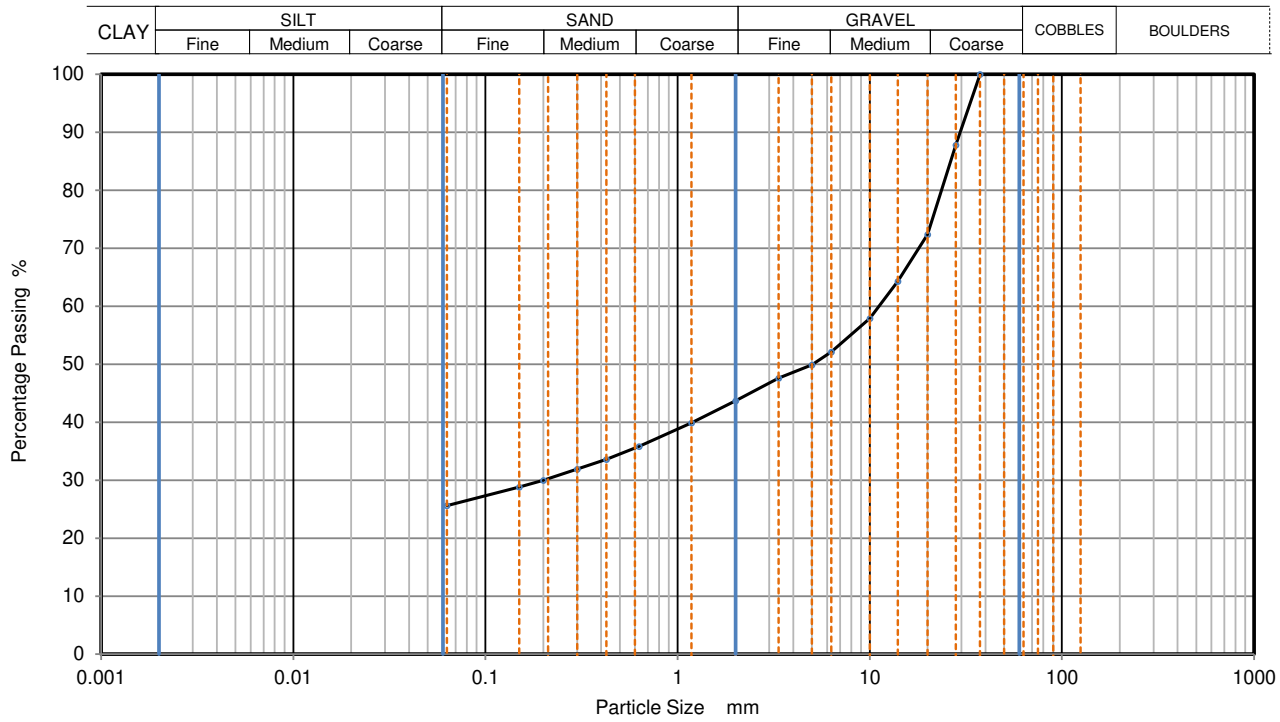
Atterberg Limits BS1377-2:1990
4pt cone (CL.4.3) unless :
1pt - single point test (CL.4.4)
4.2.3 - Natural
4.2.4 - Sieved
Moisture Content (mc) %

Particle density BS1377-2:1990
sp - small pyknometer CL.8.3
gj - gas jar CL.8.2

Date	Approved By	Page No.	1
29/05/2020	Dan Ayre - Quality Manager	KL001R Index Summary	

PARTICLE SIZE DISTRIBUTION

Project No.	12418		
Borehole/Pit No.	TP02		
Project Name	Connon Bridge, Liskeard	Sample No.	-
Soil Description	Pinkish brown very silty very sandy GRAVEL	Depth, m	0.60
Specimen Reference	2	Specimen Depth	m
Sample Type	B		
Test Method	BS1377:Part 2:1990, clause 9.2		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	88		
20	72		
14	64		
10	58		
6.3	52		
5	50		
3.35	48		
2	44		
1.18	40		
0.63	36		
0.425	34		
0.3	32		
0.2	30		
0.15	29		
0.063	26		

Dry Mass of sample, g	2689

Sample Proportions	% dry mass
Very coarse	0
Gravel	56
Sand	18
Fines <0.063mm	26

Grading Analysis		
D100	mm	37.5
D60	mm	11.1
D30	mm	0.201
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

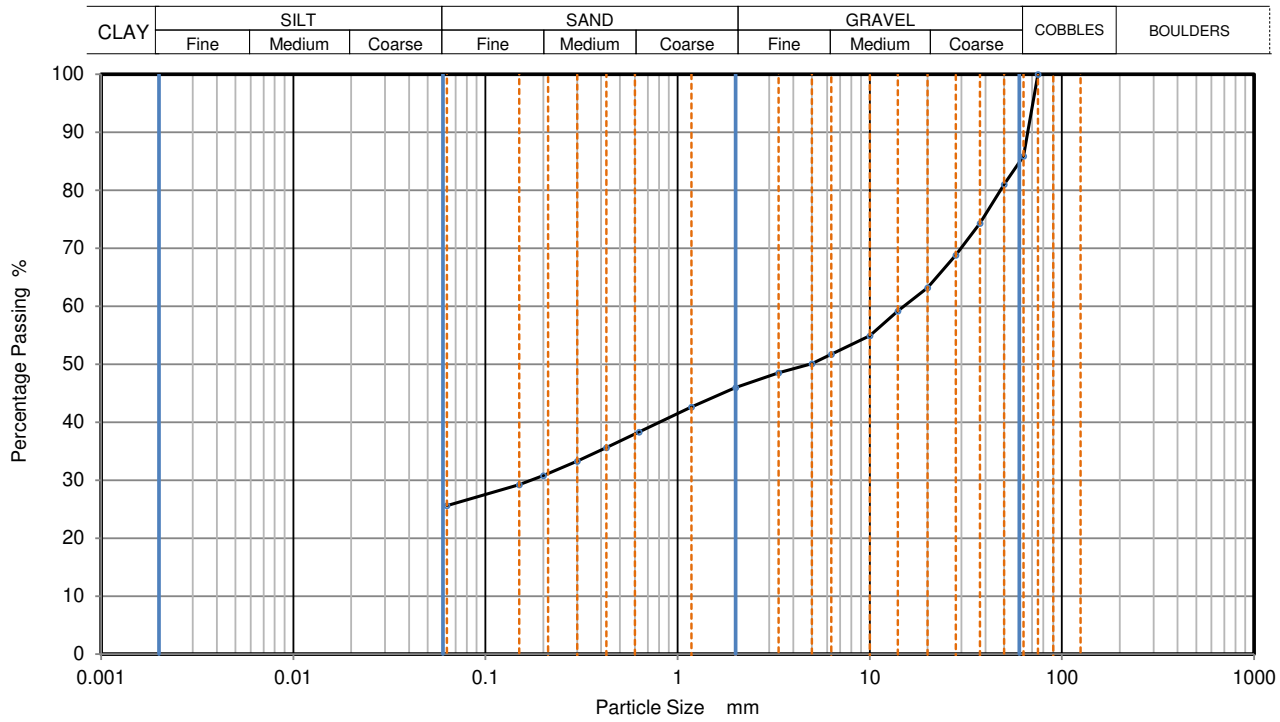
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Dan Ayre - Quality Manager	29/05/2020	KL002R PSD

PARTICLE SIZE DISTRIBUTION

				Project No.	12418
				Borehole/Pit No.	TP04
Project Name	Connon Bridge, Liskeard			Sample No.	-
Soil Description	Pinkish brown very silty very sandy GRAVEL with cobble			Depth, m	0.90
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	86		
50	81		
37.5	74		
28	69		
20	63		
14	59		
10	55		
6.3	52		
5	50		
3.35	49		
2	46		
1.18	43		
0.63	38		
0.425	36		
0.3	33		
0.2	31		
0.15	29		
0.063	26		

Dry Mass of sample, g	3608

Sample Proportions	% dry mass
Very coarse	14
Gravel	40
Sand	20
Fines <0.063mm	26

Grading Analysis		
D100	mm	75
D60	mm	15.1
D30	mm	0.173
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

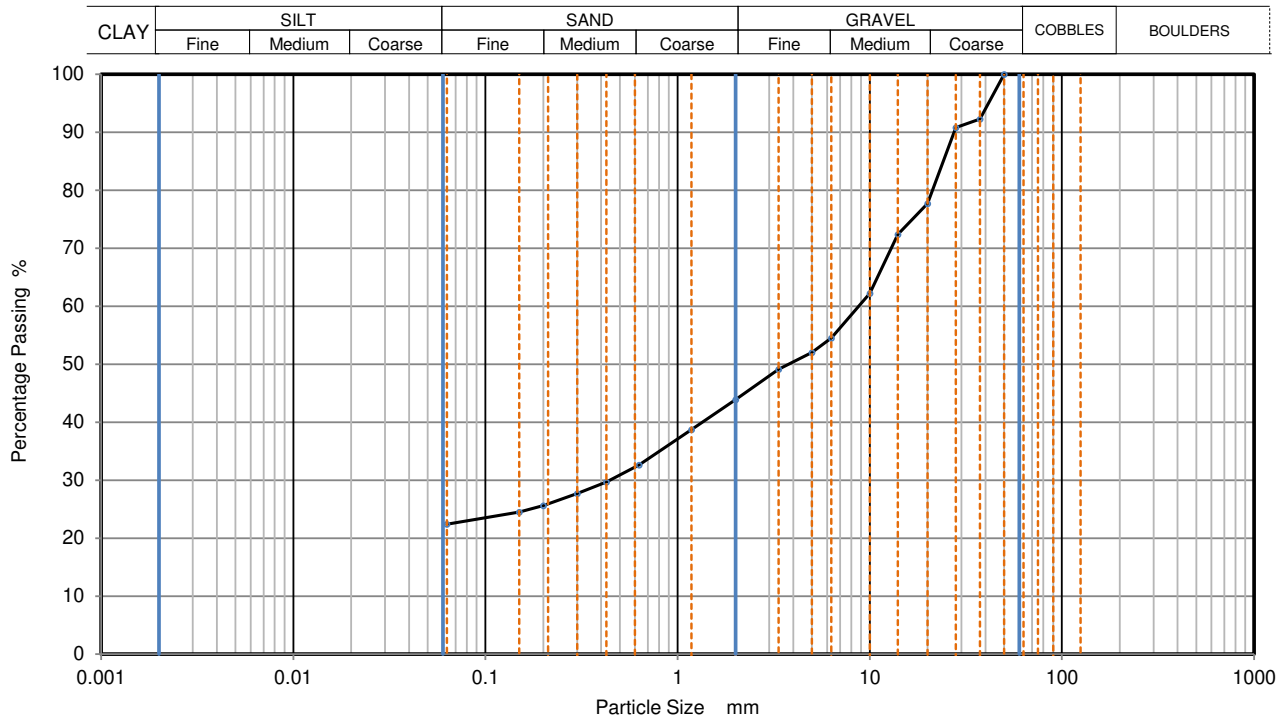
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Dan Ayre - Quality Manager	29/05/2020	KL002R PSD

PARTICLE SIZE DISTRIBUTION

				Project No.	12418
				Borehole/Pit No.	TP05
Project Name	Connon Bridge, Liskeard			Sample No.	-
Soil Description	Pinkish brown very silty very sandy GRAVEL			Depth, m	1.00
Specimen Reference	2	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
50	100		
37.5	92		
28	91		
20	78		
14	72		
10	62		
6.3	55		
5	52		
3.35	49		
2	44		
1.18	39		
0.63	33		
0.425	30		
0.3	28		
0.2	26		
0.15	25		
0.063	22		

Dry Mass of sample, g	4904

Sample Proportions	% dry mass
Very coarse	0
Gravel	56
Sand	22
Fines <0.063mm	22

Grading Analysis		
D100	mm	50
D60	mm	8.76
D30	mm	0.441
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Dan Ayre - Quality Manager	29/05/2020	KL002R PSD

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

California Bearing Ratio (CBR)

BS1377 : Part 4 : 1990, clause 7

Project No.	12418				
Borehole/Pit No.	TP02				
Project Name	Connon Bridge, Liskeard	Sample No.	-		
Soil Description	Pinkish brown very silty very sandy GRAVEL	Depth m	0.60	-	1.00
Client Job No.	-	Specimen Depth	- m	Sample Type	B
Client	Clarke Bond	KeyLAB ID	SWG1202005067		

Specimen Preparation in accordance with BS1377:Part 1:1990 CL7.6.5	
Condition	REMOULDED
Details	Recompacted with specified standard effort using 4.5kg rammer

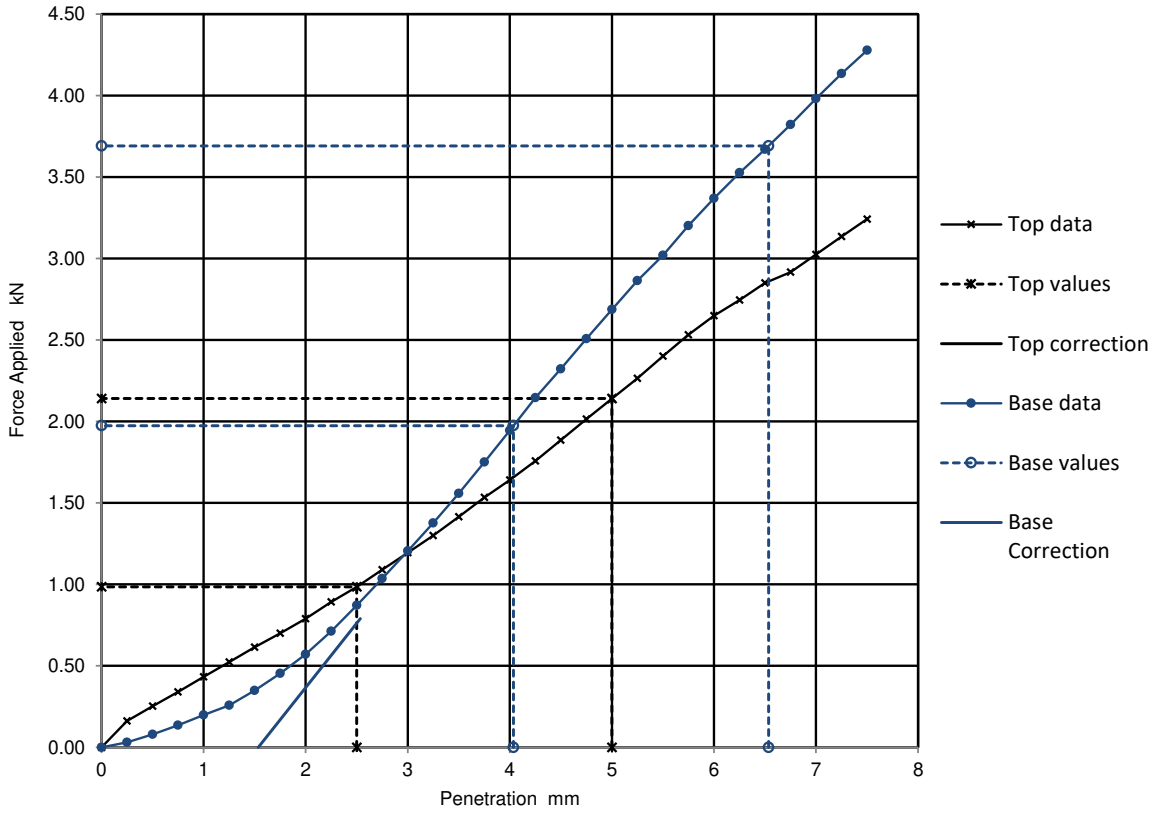
Soaking details	Not soaked	
Period of soaking		days
Time to surface		days
Amount of swell recorded		mm
Dry density after soaking		Mg/m3

Material retained on 20mm sieve removed (%)	22

Initial Specimen details	Bulk density	2.25	Mg/m3
	Dry density	1.99	Mg/m3
	Moisture content	13	%

Surcharge applied	6	kg
	4	kPa

Force v Penetration Plots



	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Accepted CBR	Moisture Content %
TOP	No	7.5	11	11	18	15
BASE	Yes	15	18	18		14

Note: If the top and bottom CBR results are <10% different from the average then the average CBR is reported. If the CBR results are >10% different from the average result, the highest value is accepted.

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Test specific remarks	Date	Approved	Lab Sheet Reference
	29/05/20	Dan Ayre - Quality Manager	KL010R CBR

Unit 3 Brooklands, Howden Road, Tiverton, Devon, EX16 5HW

California Bearing Ratio (CBR)

BS1377 : Part 4 : 1990, clause 7

Project No.	12418		
Borehole/Pit No.	TP04		
Project Name	Connon Bridge, Liskeard	Sample No.	-
Soil Description	Pinkish brown very silty very sandy GRAVEL with cobble	Depth m	0.90 - 1.20
Client Job No.	-	Specimen Depth	- m
Sample Type	B		
Client	Clarke Bond	KeyLAB ID	SWG1202005068

Specimen Preparation in accordance with BS1377:Part 1:1990 CL7.6.5	
Condition	REMOULDED
Details	Recompacted with specified standard effort using 4.5kg rammer

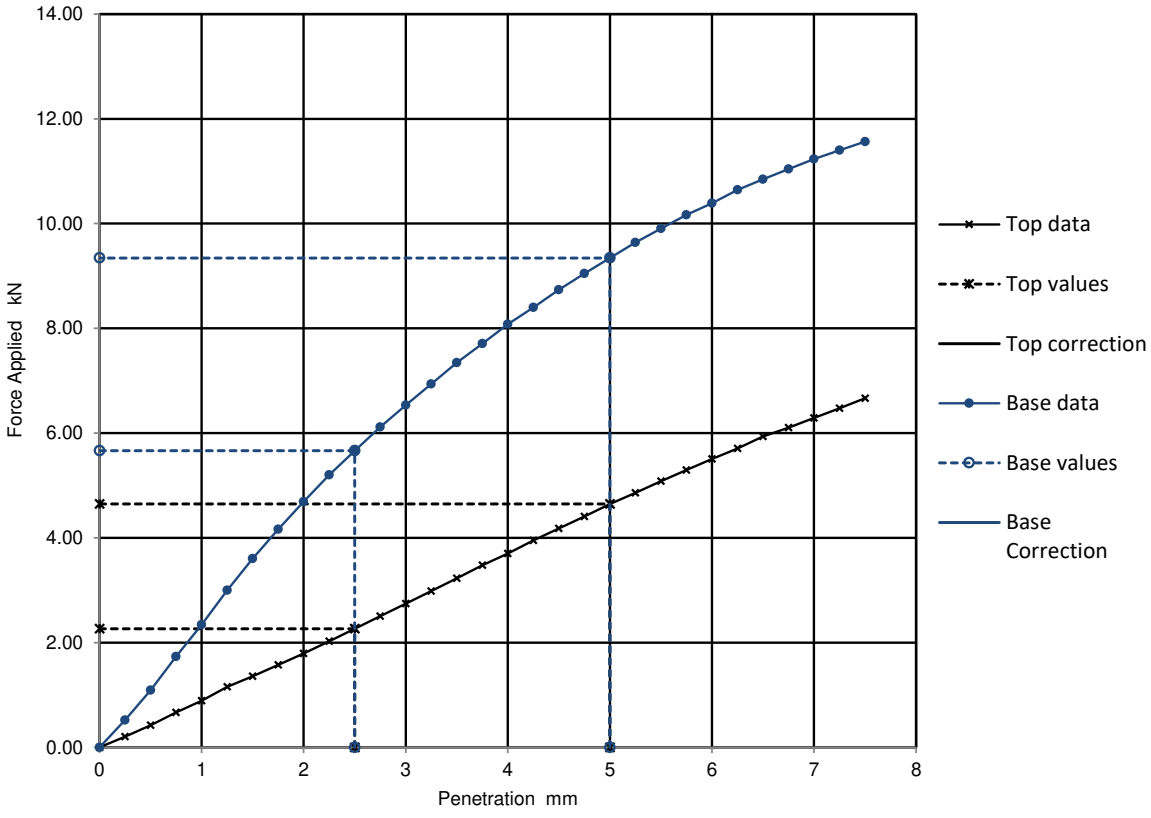
Material retained on 20mm sieve removed (%)	30

Initial Specimen details	Bulk density	2.25	Mg/m3
	Dry density	2.00	Mg/m3
	Moisture content	12	%

Soaking details	Not soaked	
Period of soaking		days
Time to surface		days
Amount of swell recorded		mm
Dry density after soaking		Mg/m3

Surcharge applied	6	kg
	4	kPa

Force v Penetration Plots



	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Accepted CBR	Moisture Content %
TOP	No	17	23	23	47	15
BASE	No	43	47	47		13

Note: If the top and bottom CBR results are <10% different from the average then the average CBR is reported. If the CBR results are >10% different from the average result, the highest value is accepted.

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Test specific remarks	Date	Approved	Lab Sheet Reference
	29/05/20	Dan Ayre - Quality Manager	KL010R CBR

California Bearing Ratio (CBR)

BS1377 : Part 4 : 1990, clause 7

Project No.	12418				
Borehole/Pit No.	TP05				
Project Name	Connon Bridge, Liskeard			Sample No.	-
Soil Description	Pinkish brown very silty very sandy GRAVEL			Depth m	1.00 - 1.20
Client Job No.	-	Specimen Depth	- m	Sample Type	B
Client	Clarke Bond			KeyLAB ID	SWG1202005069

Specimen Preparation in accordance with BS1377:Part 1:1990 CL7.6.5	
Condition	REMOULDED
Details	Recompacted with specified standard effort using 4.5kg rammer

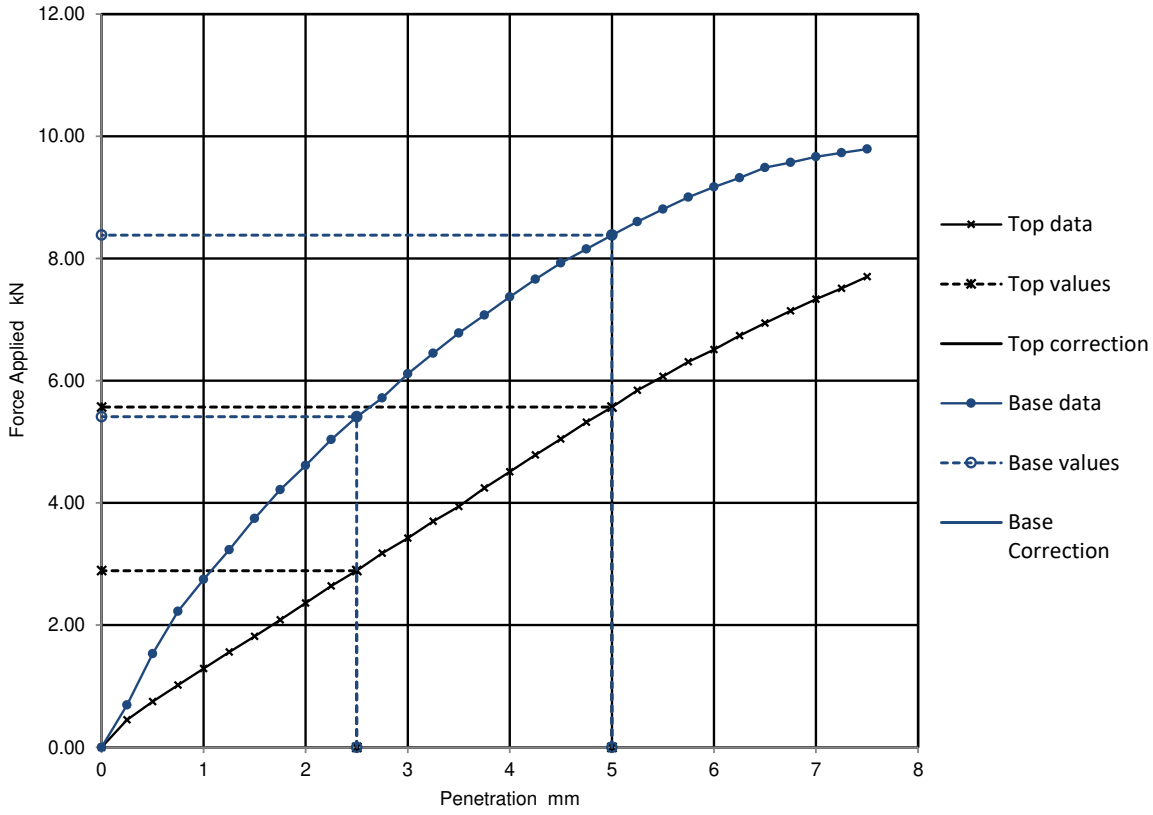
Soaking details	Not soaked	
Period of soaking		days
Time to surface		days
Amount of swell recorded		mm
Dry density after soaking		Mg/m3

Material retained on 20mm sieve removed (%)	24	

Initial Specimen details	Bulk density	2.29	Mg/m3
	Dry density	2.04	Mg/m3
	Moisture content	13	%

Surcharge applied	6	kg
	4	kPa

Force v Penetration Plots



	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Accepted CBR	Moisture Content %
TOP	No	22	28	28	42	14
BASE	No	41	42	42		13

Note: If the top and bottom CBR results are <10% different from the average then the average CBR is reported. If the CBR results are >10% different from the average result, the highest value is accepted.

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Test specific remarks	Date	Approved	Lab Sheet Reference
	29/05/20	Dan Ayre - Quality Manager	KL010R CBR

E Chemical Test Certificates

Tim Thornburn
Clarkebond
129 Cumberland Road
Bristol
BS1 6UY

e: timthornburn@clarkebond.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-98485

Project / Site name:	Connon Bridge	**Samples received on:**	05/05/2020
Your job number:	E05284	**Samples instructed on:**	05/05/2020
Your order number:	P09382	**Analysis completed by:**	13/05/2020
Report Issue Number:	1	**Report issued on:**	13/05/2020
Samples Analysed:	10 soil samples		

Signed: Karolina Marek

Karolina Marek
Head of Reporting Section

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-98485

Project / Site name: Connon Bridge

Lab Sample Number				1504673	1504674	1504675	1504676	1504677
Sample Reference				TP01	TP02	TP03	TP03	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.10	0.70	1.00
Date Sampled				30/04/2020	30/04/2020	30/04/2020	30/04/2020	30/04/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	10	9.7	8.9	9.9
Total mass of sample received	kg	0.001	NONE	0.80	0.90	1.0	1.0	0.90
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Not-detected	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.4	6.8	7.8	7.2	7.0
Total Sulphate as SO_4	%	0.005	MCERTS	-	< 0.005	-	-	0.010
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.011	0.0089	0.0083	0.010	0.011
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	8.9	-	-	11.1
Total Sulphur	%	0.005	MCERTS	-	< 0.005	-	-	0.007
Organic Matter	%	0.1	MCERTS	1.8	-	0.5	0.3	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	< 0.80	< 0.80	-
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	27	-	24	20	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42	-	45	49	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	49	-	23	28	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	27	-	28	30	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	50	-	58	60	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	-	100	110	-

Analytical Report Number: 20-98485

Project / Site name: Connon Bridge

Lab Sample Number				1504673	1504674	1504675	1504676	1504677
Sample Reference				TP01	TP02	TP03	TP03	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.10	0.70	1.00
Date Sampled				30/04/2020	30/04/2020	30/04/2020	30/04/2020	30/04/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	< 8.4	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	< 8.4	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-

Analytical Report Number: 20-98485

Project / Site name: Connon Bridge

Lab Sample Number				1504678	1504679	1504680	1504681	1504682
Sample Reference				TP04	TP04	TP05	TP05	TP06
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.70	1.20	0.10
Date Sampled				30/04/2020	30/04/2020	30/04/2020	30/04/2020	30/04/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	7.4	7.8	9.5	8.4	12
Total mass of sample received	kg	0.001	NONE	0.90	1.0	1.1	1.1	0.90
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.2	7.1	7.1	7.0	8.0
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.006	-	< 0.005	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.012	0.0074	0.0073	0.021
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	11.9	-	7.3	-
Total Sulphur	%	0.005	MCERTS	-	< 0.005	-	< 0.005	-
Organic Matter	%	0.1	MCERTS	0.6	-	0.4	-	1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	< 0.80	-	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	24	-	25	-	28
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	-	51	-	41
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22	-	19	-	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	-	28	-	31
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	47	-	65	-	56
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	97	-	120	-	110

Analytical Report Number: 20-98485

Project / Site name: Connon Bridge

Lab Sample Number				1504678	1504679	1504680	1504681	1504682
Sample Reference				TP04	TP04	TP05	TP05	TP06
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.70	1.20	0.10
Date Sampled				30/04/2020	30/04/2020	30/04/2020	30/04/2020	30/04/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	-	< 8.4	-	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10

Analytical Report Number : 20-98485

Project / Site name: Connon Bridge

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1504673	TP01	None Supplied	0.10	Light brown loam and clay with gravel and vegetation.
1504674	TP02	None Supplied	1.00	Light brown clay.
1504675	TP03	None Supplied	0.10	Brown clay.
1504676	TP03	None Supplied	0.70	Brown clay.
1504677	TP03	None Supplied	1.00	Brown clay.
1504678	TP04	None Supplied	0.10	Brown clay and sand with gravel.
1504679	TP04	None Supplied	1.00	Brown clay.
1504680	TP05	None Supplied	0.70	Brown clay.
1504681	TP05	None Supplied	1.20	Brown clay.
1504682	TP06	None Supplied	0.10	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 20-98485

Project / Site name: Connon Bridge

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Tim Thornburn
Clarkebond
129 Cumberland Road
Bristol
BS1 6UY

e: timthornburn@clarkebond.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-98853

Project / Site name:	Connon Bridge	**Samples received on:**	05/05/2020
Your job number:	E05284	**Samples instructed on:**	07/05/2020
Your order number:	P09382	**Analysis completed by:**	15/05/2020
Report Issue Number:	1	**Report issued on:**	15/05/2020
Samples Analysed:	10:1 WAC sample		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

i2 Analytical
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**20-98853**						
					Client:	**CLARKEBOND**	
Location	**Connon Bridge**						
Lab Reference (Sample Number)	1506492 / 1506493				**Landfill Waste Acceptance Criteria**		
					Limits		
Sampling Date	30/04/2020				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP03						
Depth (m)	0.70						
Solid Waste Analysis							
TOC (%)**	0.3				3%	5%	6%
Loss on Ignition (%) **	1.1				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.2				100	--	--
pH (units)**	7.8				--	>6	--
Acid Neutralisation Capacity (mol / kg)	0.33				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0011			< 0.0110	0.5	2	25
Barium *	0.0042			0.0370	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0012			0.011	0.5	10	70
Copper *	0.0052			0.046	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	< 0.0004			< 0.0040	0.5	10	30
Nickel *	0.0008			0.0066	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0093			0.081	4	50	200
Chloride *	1.9			17	800	15000	25000
Fluoride	0.17			1.5	10	150	500
Sulphate *	4.5			40	1000	20000	50000
TDS*	26			220	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	8.07			70.9	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	91						
Moisture (%)	8.9						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.
*= UKAS accredited (liquid eluate analysis only)
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation
** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 20-98853

Project / Site name: Connon Bridge

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1506492	TP03	None Supplied	0.70	Brown clay.

The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-98853

Project / Site name: Connon Bridge

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 20-98853

Project / Site name: Connon Bridge

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

clarkebond

MULTIDISCIPLINARY ENGINEERING CONSULTANTS

The Cocoa House
129 Cumberland Road
Bristol
BS1 6UY

tel: +44 (0)117 929 2244

GF Suite
Bickleigh House
Park Five Business Centre
Exeter EX2 7HU

tel: +44 (0)1392 369098

7 Hatchers Mews
Bermondsey Street
London
SE1 3GS

tel: +44(0)20 7939 0959

www.clarkebond.com