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# TECHNICAL REPORT

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**GROUND INVESTIGATION  
AT  
LOGISTICS SITE, BAE SAMLESBURY,  
BALDERSTONE, LANCASHIRE  
FOR  
AEW ARCHITECTS & DESIGNERS LIMITED**

**REPORT NO.6019  
JUNE 2015**



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**GROUND INVESTIGATION AT LOGISTICS SITE, BAE SAMLESBURY,  
BALDERSTONE, LANCASHIRE**

**CLIENT: AEW ARCHITECTS AND DESIGNERS LIMITED**

**ENGINEER: TRP CONSULTING**

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## **1. INTRODUCTION**

This report has been prepared in accordance with an email, dated 23<sup>rd</sup> March 2015 from the Engineer on behalf of the Client.

The brief was set out in our estimate, dated 23<sup>rd</sup> March 2015, with amendments as the investigation proceeded and includes:

- 5 No. cable percussive boreholes
- 8 No. trial pits
- 2 No. soakaway tests
- 7 No. in-situ CBR tests
- 6 No. modulus of subgrade reaction tests.
- Geotechnical laboratory testing
- Contamination analysis
- Installation of standpipes followed by groundwater and ground gas monitoring
- Provision of an interpretative report on the above.

### **1.1 Site Location and Description**

The site is located in the north eastern quadrant of the BAE Samlesbury complex, as indicated on the appended Figure 2. The approximate National Grid Reference of the centre of the site is SD628314.

As shown on Figure 3, the site comprises an approximately rectangular shaped grassed area measuring some 200m by 235m and is bound to the north by the perimeter road, to the east and west by existing aerospace buildings and to the south by undeveloped land then the former runway.

The site is generally flat though an earth mound is present at the southern extent.

### **1.2 Proposed Development and Purpose of the Ground Investigation**

We understand that it is proposed to construct a new warehouse, access road, car parks and landscaping on the site.

The purpose of the investigation was to obtain an indication of the ground conditions, at the positions of the boreholes and trial pits, to assess the likelihood of a general pattern of strata being present below the site and to establish the load bearing characteristics of the strata deriving if possible an assessment of the suitability of appropriate founding techniques.

In addition a contamination assessment was required in order to determine necessary precautions and/or remedial measures required for the proposed development and to ascertain the need for any further sampling and analysis.

Ground gas monitoring and assessment was also required to determine necessary precautions and/or remedial measures.

## **2. INVESTIGATION**

### **2.1 Investigation Details**

Five 150mm diameter boreholes were put down by cable percussive boring techniques at the positions determined by the Client's Engineer and set out by Sub Surface North West Limited, as shown on Figure 3. The boreholes were put down to depths of between 10.45m and 15.45m, samples taken were logged in accordance with BS. EN. 14688 and 14689: 2002-2004 and the resulting Borehole Records are appended.

Eight trial pits were taken out by a mechanical excavator at the positions determined by the Client's Engineer and set out by Sub Surface North West Limited, as shown on Figure 3. The trial pits were excavated to depths of between 1.80m and 4.50m, representative samples were taken and the materials were logged in accordance with BS. EN. 14688 and 14689: 2002-2004. The resulting Trial Pit Records are appended.

### **2.2 Sub Surface Detail**

Details of the strata encountered in the ground investigation are given on the appended Borehole and Trial Pits Records. The exploratory holes found made ground overlying natural cohesive strata. A general summary of the strata found is as follows:

#### **2.2.1 Made Ground**

In the boreholes and trial pits TP5, TP6 and TP7 made ground was encountered to depths of between 0.20m and 0.70m and comprised dark brown and dark grey brown slightly gravelly slightly sandy clay with some roots and rootlets (topsoil) The gravel sized fragments were mainly fine to medium stone and localised coal and brick.

TP1 to TP4 were taken out in the area of the mound at the southern end of the site and in this area the made ground was encountered to depths of between 3.50m and in excess of 4.50m measured from the highest part of the mound. The made ground in this area comprised mainly dark brown slightly gravelly silty clay with rootlets with localised low brick and stone cobble and boulder content. The gravel sized fragments comprised brick and stone with localised burnt timber, slag, bituminous macadam, ceramics, glass, fabric and slate. TP4 was terminated in the made ground at a depth of 4.50m.

TP8 was taken out in the area of an infilled pond and in this area the made ground was encountered to a depth of 3.20m and comprised a zone of dark grey ashy slightly clayey gravel sized fragments of slag, then zones of brown, light grey and grey brown mottled slightly sandy slightly gravelly clay with low stone cobble content and with some rootlets, and zones of dark grey slightly clayey peat with low stone cobbles content. The gravel sized fragments comprised mainly stone and brick with localised ceramics and timber.

### 2.2.2 Drift Deposits

Drift deposits were encountered in all of the exploratory holes except TP4 and comprised mainly firm low strength becoming firm and stiff medium and high strength dark brown occasionally light grey and brown mottled locally gravelly silty clay. The gravel comprised mainly fine to coarse quartz, sandstone and siltstone. In TP3, TP5, TP6 and TP8 some plant remains and peat deposits were encountered within the shallow clay strata.

### 2.2.3 Groundwater

A summary of groundwater entries and levels are tabulated below:

TABLE 1 GROUNDWATER

Expl. Hole No.	Water Entry Depth (m)	Rate of Inflow	Depth to Standing Water Level* (m)
BH1	NR	NR	15.00
BH2	0.80	Seepage	DRY
BH3	NR	NR	15.00
BH4	NR	NR	15.45
BH5	NR	NR	10.45
TP1	2.00	Seepage	NR
TP2	1.80	Seepage	NR
TP3	1.80	Seepage	NR
TP3	2.30	Slow	NR
TP4	2.60	Seepage	NR
TP8	0.40	Seepage	NR

\* on completion  
NR = None Recorded

No groundwater was encountered in the remainder of the exploratory holes although it should be noted that they were only left open for a short period of time and groundwater levels and rates of inflow and may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in BH1, BH2 and BH5 found groundwater levels of between 0.20m and 5.80m.

## 3. SAMPLING, TESTING AND MONITORING

### 3.1 Sampling

Twenty five 100mm diameter undisturbed samples were taken at appropriate intervals in cohesive strata, for testing in the laboratory.

Small disturbed and bulk disturbed samples were obtained for the strata encountered and were subjected to careful examination. The samples will be retained for a period of one month after the issue of this report, for reference purposes, and then disposed of unless otherwise instructed.

### **3.2 Field Testing**

Fourteen hand shear vane tests were undertaken in the trial pits and the results are given on the appended Trial Pit Records.

Twenty six Standard Penetration Tests (SPTs) were performed in natural cohesive strata the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative states of compaction and consistency, where appropriate, given on the appended Borehole Records.

Seven insitu California Bearing Ratio (CBR) tests and six modulus of subgrade reaction tests were carried out at the positions shown on Figure 2 and the results are appended.

On completion of TP5 and TP7 soakaway tests were undertaken in the natural cohesive strata. Water was added to the pits from a bowser and water levels were subsequently monitored over a period of 330 minutes to 375 minutes. The details of the soakaway tests are appended.

### **3.3 Installations and Monitoring**

On completion of BH1, BH2 and BH5 hdpe standpipes were installed to depths of 6.00m, 6.00m and 6.00m respectively. The standpipes are slotted from 1.00m depth, have an internal diameter of 50mm and have removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken. Details of the installations are given on the appended Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on three of six scheduled occasions to date using portable equipment. A Gas Data GFM 435 was used for monitoring methane, carbon dioxide, oxygen, gas flows and atmospheric pressure. The results of the monitoring are given on the appended Ground Gas and Groundwater Monitoring Results sheet.

### **3.4 Laboratory Testing**

The following laboratory tests were carried out in accordance with BS.1377: 1990, where applicable, and the results are appended.

- Moisture content, plastic limit and liquid limit tests
- Quick undrained triaxial tests
- Oedometer consolidation tests
- Compaction tests using a 4.5kg rammer
- Soluble sulphate content and pH value tests

Contamination analyses have been performed on nineteen soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc, the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ethylbenzene/ toluene/ xylene (BTEX) suite and phenols. In addition the soil samples were subjected to the Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG) suite of analysis and fourteen samples were subjected to an asbestos screen.

Waste Acceptance Criteria (WAC) analysis has been undertaken on four soil samples.

Contamination analyses have been performed on three water samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc, the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ethylbenzene/ toluene/ xylene (BTEX) suite and phenols. In addition the water samples were subjected to the Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG) suite of analysis.

## **4. APPRAISAL AND RECOMMENDATIONS**

### **4.1 Comments on the Profile**

At the outset it should be appreciated that only a small proportion of the area to be developed has been sampled and consequently the recommendations made and opinions expressed in this report can only be applied to such conditions as were encountered in the exploratory holes.

In our opinion the exploratory holes indicate a nature and degree of similarity to the extent that we consider them likely to be representative of the natural ground conditions, although clearly no guarantee can be given.

Due to the nature of made ground localised variations in thickness and composition should be anticipated and hence interpolation or extrapolation from the exploratory holes to adjoining areas should only be undertaken with caution.

Details of the findings of the investigation are given on the appended Borehole and Trial Pit Records and a summary of the ground conditions is given in Section 2.2.

### **4.2 Foundations**

We understand that it is proposed to construct a new warehouse on the site as depicted on Figure 3. However, at the time of writing this report no specific details regarding design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found made ground to depths of between 0.20m and 4.10m then mainly firm low strength becoming firm and stiff medium and high strength locally gravelly silty clay with localised plant remains and peat deposits within the shallow clay strata. The deeper made ground was encountered mainly at the southern extent of the site where the ground is mounded and in the area of an infilled pond at the northern end of the site.

We would not recommend founding in the made ground in its present condition because of its inherent variability in consistency and compaction, and in parts the nature of its constituents.

Providing there is sufficient load bearing capability we recommend that the proposed building is founded on strip footings for wall loads and pad foundations for column loads in the natural firm to stiff medium to high strength clays.

Atterberg limit tests on the cohesive strata indicate clays of low to high plasticity which are considered to have a low to medium susceptibility to shrinkage and swelling with varying moisture content. Given the above foundations should be taken down to a minimum 0.90m below finished ground level to avoid the zone which is subject to seasonal moisture content variation and frost action. If buildings are to be constructed adjacent to existing trees, trees are to be removed and/or trees are to be planted then the guidelines given in the National House Building Council (NHBC) Standards Chapter 4.2, 'Building Near Trees', should be followed for clays of medium shrinkage and swelling potential.

In any areas where the natural strata is at a depth of in excess of 0.90m foundations should be taken down to a minimum 0.10m below the base of the made ground unless the NHBC guidelines indicate a greater depth.

Taking the results of the field and laboratory tests we have determined the safe bearing capacity of the natural strata, as follows:

TABLE 2 SAFE BEARING CAPACITY

Expl Hole No.	Depth (m)	SPT 'N' Value	Shear Strength (kN/m <sup>2</sup> )	Safe Bearing Pressure (kN/m <sup>2</sup> )		Recommended Minimum Foundation Depth (m)
				Strip Footing	Square Pad	
BH1	1.35	8	32	60	70	2.00
	2.00	-	91	170*	205*	
	3.15	9	36	65	80	
BH2	1.20	-	110	205*	250*	0.90
	2.15	15	60	110	135	
	3.15	-	130	245	295	
BH3	1.35	14	56	105	125	0.90
	2.00	-	167	315*	380*	
	3.15	13	52	95	115	
BH4	1.20	-	180	340*	410*	0.90
	2.15	14	56	105	125	
	3.15	-	114	215	255	
BH5	1.20	-	169	320	385	0.90
	2.15	13	52	95	115	
	3.15	-	150	285	340	

\* Consideration must be given to weaker underlying strata which might be overstressed if loading is not reduced.



Appreciable variations in safe bearing capacity are indicated in Table 1 and as a consequence of this and the need to utilise a generally applicable safe bearing pressure to enable designs to be reasonably formulated we recommend that values of 105 kN/m<sup>2</sup> for strip footings and 125 kN/m<sup>2</sup> for square pads should not be exceeded for the recommended minimum foundation depth given.

All formation levels should be carefully inspected by an experienced and qualified engineer to confirm the appropriateness of the design figures used with any softer zones removed and replaced with lean mix concrete. The formation should then be blinded with lean mix concrete as soon as possible after exposure, if there is to be a delay before construction, to prevent water softening or disturbance.

It should be noted that the safe bearing pressures given for the cohesive strata do not take into consideration settlement. Settlement is dependent upon loading intensity, the width of footings/pads and the coefficient of volume compressibility (Mv) of the compressible strata. Mv values are given on the appended oedometer consolidation test results sheets.

In strata similar to that found in BH2 the oedometer consolidation tests indicate that, for a strip footing 1.0m wide at a depth of 0.90m and exerting a ground bearing pressure of 105 kN/m<sup>2</sup>, consolidation settlement in the order of 10 mm might be expected. Similarly oedometer consolidation tests indicate that, for a pad foundation 1.5m square at a depth of 0.90m exerting a ground bearing pressure of 125 kN/m<sup>2</sup>, consolidation settlement in the order of 15 mm might be expected. We recommend that detailed settlement calculations are carried out for the final design scheme.

If a greater safe bearing pressure is required than that determined above then piled foundations would need to be considered.

With regard to the choice of pile type, consideration could be given to driven piles, continuous flight auger (CFA) piles or cast in-situ bored piles with the driven pile option probably being the most economical. However, in considering piles driven to a pre-determined set in the more competent strata at depth, it is essential to ensure that any vibrations set up during the driving process are not transmitted to adjacent/ nearby buildings, structures or services. This is because adjacent/ nearby buildings, structures or services could well be founded at shallow depth and already be in a highly stressed state and susceptible to structural damage as a direct result of such induced vibration. Consequently, we recommend that any Specialist Piling Contractor tendering in respect of driven piles should be asked to confirm that the process to be adopted will not affect or cause damage to adjacent/ nearby buildings, structures or services. If such confirmation cannot be given then we would recommend using either CFA or cast in-situ bored piles.

Care must be taken to space the piles in any group to ensure the adequate utilisation of skin friction where this has been assumed in the calculation of the load bearing capacity of an individual pile. Checks must also be undertaken to confirm that the underlying ground supporting the pile group is not overstressed.

To provide assistance for estimating purposes only, we have undertaken a preliminary pile design calculation for a 15.45m long pile taking into consideration the ground conditions at BH1, as follows:

Preliminary Pile Design based on strata in BH1

Bored Cast In-situ or CFA Pile                      Factor of Safety: 2.5 (shaft), 3.0 (end)  
Dia. = 0.30m, Perimeter = 0.94m, Cross Section Area = 0.07m<sup>2</sup>, Length = 15.45m

0.00 to 0.20m	MADE GROUND	- ignore
0.20 to 2.00m	Low strength CLAY Allowable Shaft Friction Allowable Shaft Friction Load	c = 32 kN/m <sup>2</sup> = 10.2 kN/m <sup>2</sup> = <u>17 kN</u>
2.00 to 15.45m	Medium locally high strength CLAY Allowable Shaft Friction Allowable Shaft Friction Load	c = 75 kN/m <sup>2</sup> = 24.0 kN/m <sup>2</sup> = <u>303 kN</u>
15.45m	High strength CLAY Allowable End Bearing Allowable End Bearing Load	c = 92 kN/m <sup>2</sup> = 276 kN/m <sup>2</sup> = <u>19 kN</u>

Total Allowable Working Load = 17 + 303 + 19 = 339 kN

In order to use the load carrying capacity attributable to both shaft friction and end bearing, the final design figures should be checked to ensure that the ultimate shaft friction is greater than or equal to the allowable working load, otherwise end bearing only should be used.

To formulate the most satisfactory and economic scheme we suggest that competitive tenders and designs from Specialist Piling Contractors should be sought using the borehole information obtained.

#### 4.3 Floor Slab Construction

With regard to the design and construction of floor slabs we would recommend the removal of any topsoil and/or made ground and the level brought up as required using a graded granular hardcore placed and compacted in layers of not greater than 150mm followed by the construction of a concrete ground bearing floor slab.

#### 4.4 Excavations and Groundwater

In our opinion, there should be no particular difficulties in excavating the strata indicated in the exploratory holes utilising an appropriate and suitably sized mechanical excavator.

The trial pit sides were found to remain vertical and stable for the relatively short period that they were left open and unsupported.

It is recommended that all excavations to greater than 1.20m depth, or for shallower excavations where groundwater is encountered above this level, are closely supported, especially where man entry is required. Alternatively, where space permits, the excavations might be battered back to an appropriate angle.

Seepages and slow inflows were recorded in BH2 and TPs 1, 2, 3 and 8 at depths of between 0.40m and 2.60m. No groundwater entries were recorded encountered in the remainder of the exploratory holes although standing water levels of between 5.50 and 15.45m were recorded on completion of BHs 1, 3, 4 and 5. It should be noted that the exploratory holes were only left open for a short period of time and groundwater levels and rates of inflow and may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in BH1, BH2 and BH5 found groundwater levels of between 0.20m and 5.80m.

Should groundwater seepages occur and water accumulate in the excavation it should be able to be removed by pumping from a filtered sump.

#### **4.5 Buried Concrete**

For the design of buried concrete the recommendations given in Building Research Establishment (BRE) Special Digest 1 (September 2005 revision), "Concrete in Aggressive Ground", should be followed.

Determination of pH on the soil and groundwater samples gave values in the range of 6.9 to 8.4.

Soluble sulphate concentrations were also determined for the soil and groundwater samples and the results ranged from <0.01 to 1.70 g/l and 0.064 to 0.068 g/l respectively.

The results indicate that the Design Sulphate Class for the site should be DS-1, except for any concrete in the area of the backfilled pond (TP8) where it should be DS-3.

Our knowledge of the site and ground conditions indicates that the site is "brownfield" with potentially mobile groundwater.

Consequently, in accordance with the Design Sulphate Class for the site together with the site and groundwater conditions an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1 should be used as detailed on the appended extract, except in the area of the backfilled pond (TP8) where an ACEC classification of AC-3 should be used.

#### **4.6 Roads, Hardstandings and Car Parks**

Six insitu Modulus of Subgrade Reaction (MSR) tests were carried out using a 600mm diameter steel plate at a depth of 0.60m in the area of the proposed warehouse building at the positions shown on Figure 2. The results of the MSR tests are appended and a summary is as follows:

TABLE 3 MSR TEST RESULTS

Expl. Hole No.	Depth (m)	Moisture Content (%)	MSR Value $K_{752}$ (MN/m <sup>2</sup> /m)	Approx. CBR Value (%)	Description of Test Strata
PL1	0.60	20	36.2	4.9	Firm brown, orangish brown, grey, dark brown and greyish brown mottled slightly gravelly sandy silty CLAY with low siltstone and sandstone cobble content
PL2	0.60	12	27.3	3.0	Firm brown and grey mottled slightly gravelly sandy silty slightly friable CLAY.
PL3	0.60	21	21.8	2.0	Firm brown, grey and orangish brown slightly gravelly sandy silty CLAY with many lenses and bands of sand and with low siltstone cobble content.
PL4	0.60	21	29.7	3.4	Firm brown and grey mottled sandy silty CLAY.
PL5	0.60	26	19.4	1.6	Firm brown and grey mottled slightly gravelly slightly sandy silty CLAY with low siltstone and sandstone cobble content.
PL6	0.60	19	34.4	4.4	Firm brown, orangish brown and grey mottled sandy silty CLAY.

Given the above it would be advisable to design on a MSR value ( $k_{752}$ ) of 19.4 MN/m<sup>2</sup>/m and a CBR value of 1.6% for the ground bearing floor slabs and hardstanding within the proposed warehouse.

Seven insitu California Bearing Ratio (CBR) tests have been undertaken at a depth of 0.60m in the area of the proposed car parks and hardstanding, at the positions shown on Figure 2 and the results of the tests are appended. A summary of the insitu CBR test results is as follows:

TABLE 4 INSITU CBR RESULTS

Expl. Hole No.	Depth (m)	Moisture Content (%)	CBR Value (%)	Strata
CBR1	0.60	18	9.0	Firm brown slightly gravelly slightly sandy silty CLAY with some lenses of sand.
CBR2	0.60	21	4.8	Firm brown and occasionally grey mottled slightly gravelly slightly sandy silty CLAY.
CBR3	0.60	18	3.6	Firm brown and occasionally grey mottled slightly gravelly silty CLAY with occasional lenses of sand.
CBR4	0.60	22	2.9	Firm brown and occasionally orangish brown, grey, and dark brown mottled slightly gravelly slightly sandy silty CLAY.
CBR5	0.60	24	9.5	Firm brown and occasionally grey mottled slightly gravelly silty CLAY.
CBR6	0.60	27	3.0	Firm brown and greyish brown mottled slightly gravelly slightly sandy silty CLAY
CBR7	0.60	28	3.7	Firm brown and greyish brown slightly sandy silty friable CLAY.

It should be noted that the above values are generally moisture dependent and it is possible that the CBR values would reduce with increased moisture content; this being particularly so for cohesive strata.

Given the above it would be advisable to design on a CBR value of 2.9% for the proposed car parks and external hard standing. If there is to be a delay before construction, to prevent water softening, loosening and disturbance, the formation strata should not be exposed.

#### **4.7 Contamination Considerations**

At the outset it should be noted that this contamination investigation has been undertaken in order to provide an initial risk assessment on the level of contamination present. Based upon the findings of this investigation additional sampling, analysis and assessment may be required.

It should be appreciated that the suite of determinants consist of a range of common contaminants and the analysis is restricted to these in the absence of historical evidence of the source of the made ground. However, the absence of other specific contaminants cannot be guaranteed.

##### **4.7.1 Assessment (Soil)**

In order to provide an assessment of the presence of contamination nineteen soil samples have been analysed for a suite of determinants and the results are appended.

Levels of the determinants has been compared against published guideline values. The Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency published soil guideline values (SGVs) for mercury, selenium, benzene, toluene, ethylbenzene and xylene on 31 March 2009, arsenic and nickel on 12 May 2009 and cadmium and phenols in June 2009. In July 2009 Generic Assessment Criteria (GACs) were published by Land Quality Management Limited (LQM) in conjunction with the Chartered Institute of Environmental Health (CIEH). Contaminated Land: Applications in Real Environments (CL:AIRE) guideline values were also published in December 2009 to supplement the above. DEFRA published in March 2014 Category 4 Screening Levels (C4SLs) for arsenic, cadmium, lead, hexavalent chromium, benzo(a)pyrene and benzene. In November 2014 Suitable for Use Levels (S4ULs) were then published by LQM/ CIEH which superseded the GACs. The guideline values (SGVs, S4ULs, CL:AIRE and C4SLs) vary dependent upon the land use; allotment and residential use being the most sensitive and commercial/ industrial use being the least sensitive.

For the purposes of assessment, as the proposed development is a warehouse and associated car parking, hardstanding and landscaping, contamination analyses have been compared with the guideline values for a standard land use of commercial and industrial.

The contamination analysis determined no elevated levels of contaminants when compared with the guideline values for a standard land use of commercial and industrial. Guideline values for the assessment can be supplied directly to the Regulator, if requested.

An asbestos screen was undertaken on fourteen soil samples and no asbestos was detected.

In addition to the above, an assessment of risk to personnel who will come into contact with on-site materials throughout the site has been undertaken.

#### 4.7.2 Assessment (Groundwater)

Three samples of groundwater have been taken from the standpipes installed in BH1, BH2 and BH5 and analysed for a suite of determinants.

The groundwater analyses determined one slightly elevated level of selenium (11µg/l) in the sample taken from BH5 when compared with the United Kingdom Drinking Water Standards (10µg/l). None of the contaminants tested for exceeded the Environment Agency's Environmental Quality Standards (EA EQS).

The United Kingdom Drinking Water Standard is a post treatment standard and as such is very stringent. Given the significant thickness of relatively impermeable cohesive deposits between the site and the underlying aquifer, in our opinion the very slightly elevated level of selenium does not warrant any further consideration.

#### 4.7.3 Conclusions and Recommendations

Section 78a(2) of the Environmental Protection Act: 1990 as amended by the Contaminated Land (England) (Amendment) regulations 2012, and Section 86 of the Water Act 2003, defines CONTAMINATED LAND for the purposes of Part IIA as:

"any land which appears to the LOCAL AUTHORITY in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- (a) SIGNIFICANT HARM is being caused or there is a SIGNIFICANT POSSIBILITY of such harm being caused; or
- (b) SIGNIFICANT POLLUTION OF CONTROLLED WATERS is being, or is likely to be, caused"

Before a LOCAL AUTHORITY can make the judgement that land appears to be CONTAMINATED LAND on the basis that SIGNIFICANT HARM is being caused, or that there is a SIGNIFICANT POSSIBILITY of such harm being caused, the LOCAL AUTHORITY must identify a SIGNIFICANT POLLUTANT LINKAGE. This means that each of the following has to be identified:

- (a) a CONTAMINANT;
- (b) a relevant RECEPTOR (defined as living organisms, ecological systems, controlled waters or property); and
- (c) a PATHWAY by means of which either:
  - (i) the CONTAMINANT is causing SIGNIFICANT HARM to that RECEPTOR, or
  - (ii) there is a SIGNIFICANT POSSIBILITY of such harm being caused by that CONTAMINANT to that RECEPTOR

*It should be noted that the words in capitals have a legal definition within the legislation.*

Without a clear identification of all three elements of the pollutant linkage, land cannot be identified as contaminated under the regime.

The National Planning Policy Framework states that, "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990". Therefore, the general principles detailed above apply to this assessment.

Our assessment, based on the results of the analyses undertaken only, indicates that there are no contaminants requiring remediation and/or precautions to be taken for the proposed development.

Should it be necessary to remove on-site materials from the site, classification of the waste should be undertaken before submitting the appended Waste Acceptance Criteria (WAC) analyses to appropriate waste carriers and/ or waste disposal site operators to determine the most appropriate tip to use and the associated costs.

SGVs, S4ULs, CL:AIRE and C4SLs assume long term contact with contamination and assess chronic health risk. The risk of short term acute exposure to site personnel is dealt with in the remit of the Health and Safety Executive under the Health and Safety at Work Act: 1974 and Regulations made under the Act, including the Control of Substances Hazardous to Health (COSHH) Regulations. The levels of contamination and risk to site personnel should be considered under the Construction Design and Management (CDM) Regulations at the planning stage and in the development of the designers and contractors Health and Safety Plans and Method Statements. The risk of contact with on-site soils should be minimised.

#### 4.8 Ground Gas Considerations

Ground gas monitoring has been undertaken on three of six scheduled occasions to date and the results of the monitoring visits are appended.

Ground gases: methane, carbon dioxide and oxygen and flow rate have been monitored and the ranges of ground gases and flow rate during the monitoring period are as follows:

TABLE 5 GROUND GAS CONCENTRATIONS AND FLOW RATE

Methane (% vol. in air)	Carbon Dioxide (% vol. in air)	Oxygen (% vol. in air)	Gas Flow Rate (litres/ hour)
0.0	0.0 – 2.7	14.1 – 20.6	<0.1 – 3.1

It can be seen from the monitoring that no elevated levels of methane and only slightly elevated levels of carbon dioxide and depleted levels of associated oxygen in BH5, have been detected.

Methane gas when present between 5% volume in air (Lower Explosive Limit - L.E.L.) and 15% volume in air (Upper Explosive Limit - U.E.L.) is potentially explosive and inflammable whilst carbon dioxide in conjunction with depleted oxygen is an asphyxiant. Both methane and carbon dioxide are a by-product of the anaerobic and aerobic decomposition of biodegradable materials.

The levels of gas have been assessed in accordance with British Standard 8485, "Code of practice for the characterisation and remediation from ground gas in affected developments", published in October 2007 (BS.8485:2007).

The characteristic hazardous gas flow rate ( $Q_{hgs}$ ) is calculated by dividing the maximum gas (methane or carbon dioxide) concentration by 100 and multiplying by the maximum flow rate in litres per hour (minimum 0.1 l/hr for Sub Surface monitoring equipment). For this site  $Q_{hgs} = 2.7/100 \times 3.1 = 0.084$  l/hr.

BS.8485:2007, Table 1, indicates that the site falls into Characteristic Situation CS2 (Low).

BS.8485:2007, Table 2, indicates that for a CS2 and the type of development proposed, protection and remedial measures giving a minimum score of 1.0 are required. BS.8485:2007 Table 3 indicates that the following combinations of protection and remedial measures could be considered:

- Reinforced concrete ground bearing floor slab. (Score 0.5)
- Taped and sealed membrane to reasonable levels of workmanship in line with current good practice with validation. (Score 0.5)

OR

- Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into the slab. (Score 1.5)

All excavations of greater than 1.20m depth should be routinely checked for air quality prior to man entry and appropriate precautions taken.

Any manholes, inspection chambers or other void spaces formed beneath the sites ground surface are potential ground gas traps. Precautions, as per the excavations above, should be taken.

It should be noted that it is our intention to update this section of the report on completion of the ground gas monitoring.

#### **4.9 Soakaways**

On completion of TP5 and TP7 soakaway tests were undertaken in the natural cohesive strata. Water was added to the pits from a bowser and water levels were subsequently monitored over a period of 330 to 375 minutes. Details of the soakaway tests are appended.

The soil infiltration rate was unable to be determined in either test due to the relative impermeability of the test strata in both trial pits and the influx of perched groundwater in TP7. Consequently in our opinion a soakaway drainage solution is unlikely to be viable on this site.

#### **4.10 Earthworks**

We understand it is proposed to undertake cut and fill earthworks as indicated on the appended Figure 4.

Trial pits TP5, TP6, PL4 and PL6 were taken out in the area of cut and four compaction tests have been carried out using a 4.5kg rammer in order to determine the dry density/moisture content relationship of the material to be reworked. The results of the compaction tests are appended and a summary is given in Table 6 below:



TABLE 6 DRY DENSITY/MOISTURE CONTENT RELATIONSHIP

Location	Depth (m)	Natural M.C. (%)	Optimum M.C. (%)	Max Dry Density (Mg/m <sup>3</sup> )	Sample Description
TP5	0.60	23	15	1.77	Orange brown, brown and light grey mottled sandy CLAY with lenses of light grey silty sand.
TP6	0.70	29	11	1.54	Orange brown and greyish brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
PL4	0.40	18	14	1.79	Orange brown, brown and yellow mottled slightly gravelly sandy CLAY. Gravel is fine to medium stone.
PL6	0.30	17	12	1.66	Dark greyish brown and brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium stone.

The above table indicates the following ranges were obtained:

- Natural Moisture Content 17% to 29%
- Optimum Moisture Content 11% to 15%
- Maximum Dry Density 1.54 to 1.79Mg/m<sup>3</sup>

The materials sampled and tested should be compacted in accordance with BS6031:2009 *Code of Practice for Earthworks* and the Department of Transport *Specification for Highway Works*.

1. Prior to the placement of any fill the surface should be scraped clear of any vegetation, topsoil, other deleterious material and any slurried or soft layers.
2. The material used for compaction should also have any vegetation, topsoil and other deleterious material removed from it.
3. The material should be compacted at a moisture content of  $\pm 2\%$  of the optimum moisture content to give a maximum of 5% air voids at the field moisture content.
4. It should be noted that the natural moisture content of the material tested is generally significantly greater than the optimum moisture content. Consequently, the earthworks should be carried out in drier weather which will allow for reducing the moisture content or alternatively quick lime can be mixed into the fill material.
5. Great care should be taken during earthworks to ensure that compaction does not take place during wet weather or the clays are over compacted as the material may be susceptible to slurring.
6. If any materials of differing nature and characteristics are to be considered for use, then additional testing will be required to confirm their suitability.

#### 4.11 General

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact the undersigned or Miss Anna Marsden at our Preston office.

SUB SURFACE CONSULTANTS LIMITED  
REPORT No. 6019  
JUNE 2015

D. B. Jones Cert. Nat. Sci., B.Sc.(Hons.), C.Env., MSEE., AIEMA., MIEnvSc.  
Senior Geoenvironmental Engineer  
For and on behalf of  
Sub Surface Consultants Limited

C. A. Marsden B.Sc.(Hons.), C.Eng., M.I.C.E.  
Director  
For and on behalf of  
Sub Surface Consultants Limited.

## **INSITU TEST RESULTS**



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## Standard Penetration Test Results

Site : LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Job Number

6019

Client : AEW ARCHITECTS & DESIGNERS LTD

Sheet

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Engineer: TRP CONSULTING LTD

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.20	1.35	1.65	SPT	1	1	2	2	2	2	N=8	No Recovery
BH1	3.00	3.15	3.45	SPT	2	2	2	2	2	3	N=9	
BH1	5.00	5.15	5.45	SPT	2	2	3	3	3	4	N=13	
BH1	7.50	7.65	7.95	SPT	2	2	3	3	4	4	N=14	
BH1	10.50	10.65	10.95	SPT	2	2	3	4	4	4	N=15	
BH1	13.50	13.65	13.95	SPT	2	3	4	4	5	5	N=16	
BH1	15.00	15.15	15.45	SPT	3	4	5	5	6	7	N=23	
BH2	2.00	2.15	2.45	SPT	2	2	3	3	4	5	N=15	
BH2	4.00	4.15	4.45	SPT	2	2	3	3	4	4	N=14	
BH2	7.00	7.15	7.45	SPT	2	2	3	3	3	3	N=12	
BH2	10.00	10.15	10.45	SPT	2	3	5	5	6	6	N=22	
BH3	1.20	1.35	1.65	SPT	2	2	3	3	4	4	N=14	
BH3	3.00	3.15	3.45	SPT	2	2	3	3	3	4	N=13	
BH3	5.00	5.15	5.45	SPT	2	2	3	3	3	3	N=12	
BH3	7.50	7.65	7.95	SPT	3	3	3	4	4	4	N=15	
BH3	10.50	10.65	10.95	SPT	3	4	4	4	5	5	N=18	
BH3	15.00	15.15	15.45	SPT	4	5	6	7	7	8	N=26	
BH4	2.00	2.15	2.45	SPT	3	3	3	3	4	4	N=14	
BH4	4.00	4.15	4.45	SPT	2	3	4	4	5	5	N=16	
BH4	6.00	6.15	6.45	SPT	2	2	3	3	3	3	N=12	
BH4	9.00	9.15	9.45	SPT	3	3	4	4	4	4	N=16	
BH4	12.00	12.15	12.45	SPT	3	4	5	6	6	6	N=23	
BH4	15.00	15.15	15.45	SPT	4	5	6	6	7	7	N=26	
BH5	2.00	2.15	2.45	SPT	2	3	3	3	3	4	N=13	
BH5	4.00	4.15	4.45	SPT	1	2	2	3	3	3	N=11	
BH5	7.00	7.15	7.45	SPT	2	3	4	4	5	5	N=16	
BH5	10.00	10.15	10.45	SPT	3	4	4	5	5	5	N=16	



**SUB SURFACE**  
 SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

**Insitu Test Results**

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTON, LANCS  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number: 6019  
 Sheet: 1 / 1

**Ground Gas and Groundwater Monitoring Results Sheet**

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (m bars)	Depth to Groundwater (m)
23/04/2015	BH1	0.0	0.0	20.6	<0.1	1010	0.60
	BH2	0.0	0.8	19.5	<0.1	1010	1.00
	BH5	0.0	0.9	19.2	<0.1	1010	5.80
12/05/2015	BH1*	–	–	–	–	–	0.20
	BH2	0.0	0.7	19.4	<0.1	1001	0.95
	BH5	0.0	<b>1.8</b>	<b>16.3</b>	<0.1	1002	4.35
28/05/2015	BH1	0.0	0.0	20.4	<0.1	1000	0.45
	BH2	0.0	0.7	19.2	3.1	1001	0.95
	BH5	0.0	<b>2.7</b>	<b>14.1</b>	<0.1	1001	3.85

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in **bold/italics**.  
 \*Water Level too high to allow readings to be taken.  
 The standpipes were purged of water during the monitoring visit on 20/05/15



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## Insitu Test Results

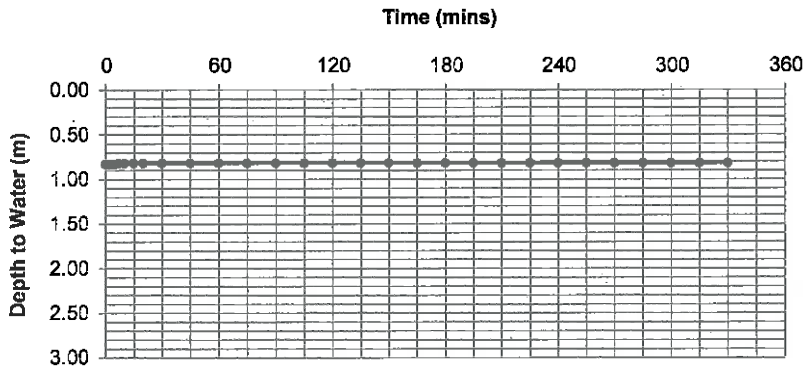
Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number: 6019  
Sheet: 1 / 1

### Soakaway Test

Hole No: TP5

TEST NO: 1  
DATE: 07/04/15



Time (min)	Depth (m)
0	0.83
0.5	0.83
1	0.83
2	0.83
3	0.83
4	0.83
5	0.83
7	0.82
10	0.82
15	0.82
20	0.82
30	0.82
45	0.82
60	0.82
75	0.82
90	0.82
105	0.82
120	0.82
135	0.82
150	0.82
165	0.82
180	0.82
195	0.82
210	0.82
225	0.82
240	0.82
255	0.82
270	0.82
285	0.82
300	0.82
315	0.82
330	0.82

Length of pit: L = 1.50 m  
 Width of pit: W = 0.47 m  
 Depth of pit: D = 1.80 m  
 Base area of pit: A = 0.71 m<sup>2</sup>

100% effective depth D100 = 0.83 m  
 75% effective depth D75 = 1.07 m  
 50% effective depth D50 = 1.32 m  
 25% effective depth D25 = 1.56 m

time to D75 T75 = — sec  
 time to D25 T25 = — sec

time from D75 to D25 t<sub>p75-25</sub> = — sec  
 (T25 - T75)

volume between D75 & D25 V<sub>p75-25</sub> = 0.34 m<sup>3</sup>  
 (A x (D25 - D75))

surface area to D50 inc. base a<sub>p50</sub> = 2.62 m<sup>2</sup>  
 ((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE f =  $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f = N/A\* m/sec

Test Strata:  
(see Trial Pit)

Remarks: \*Unable to determine soil infiltration rate due to relative impermeability of tests strata.



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## Insitu Test Results

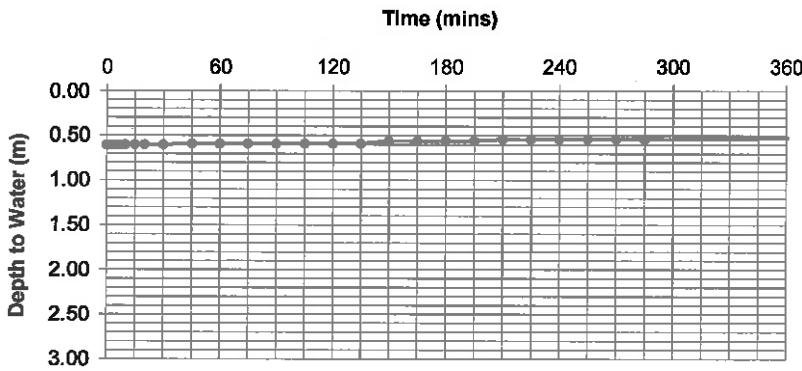
Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number  
6019  
Sheet:  
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### Soakaway Test

Hole No: TP7

TEST NO: 1  
DATE: 07/04/15



Time (min)	Depth (m)
0	0.61
0.5	0.61
1	0.61
2	0.61
3	0.61
4	0.61
5	0.61
7	0.61
10	0.60
15	0.60
20	0.60
30	0.60
45	0.59
60	0.59
75	0.59
90	0.59
105	0.59
120	0.59
135	0.59
150	0.56
165	0.56
180	0.56
195	0.56
210	0.54
225	0.54
240	0.54
255	0.54
270	0.54
285	0.54
375	0.52

Length of pit: L = 1.20 m  
 Width of pit: W = 0.47 m  
 Depth of pit: D = 1.80 m  
 Base area of pit: A = 0.56 m<sup>2</sup>

100% effective depth D100 = 0.61 m  
 75% effective depth D75 = 0.91 m  
 50% effective depth D50 = 1.21 m  
 25% effective depth D25 = 1.50 m

time to D75 T75 = — sec  
 time to D25 T25 = — sec

time from D75 to D25 t<sub>p75-25</sub> = — sec  
 (T25 - T75)

volume between D75 & D25 V<sub>p75-25</sub> = 0.34 m<sup>3</sup>  
 (A x (D25 - D75))

surface area to D50 inc. base a<sub>p50</sub> = 2.55 m<sup>2</sup>  
 ((2x(D-D50)x(W+L)) + A)

**SOIL INFILTRATION RATE** f =  $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$   
 f = N/A\* m/sec

Test Strata:  
(see Trial Pit)

Remarks: \*Unable to determine soil infiltration rate due to influx of groundwater



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Engineer: TRP CONSULTING

Job Number

6019

Sheet

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### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15

Position: CBR1

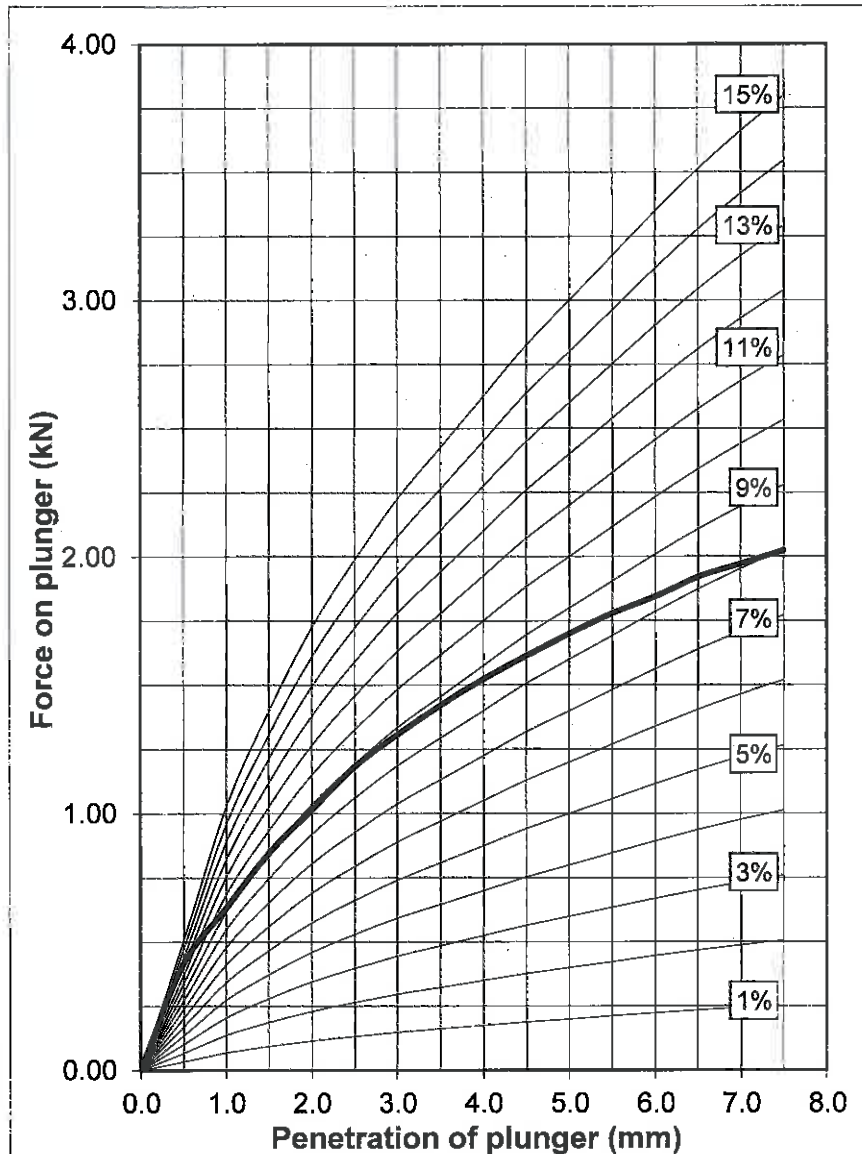
Sample No: 078

Depth: 0.60m

Description:

Firm brown slightly gravelly slightly sandy silty CLAY with some lenses of sand. Gravel is subrounded to rounded fine to medium siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	103.0	0.41
1.0	157.5	0.63
1.5	211.0	0.85
2.0	253.0	1.01
2.5	295.0	1.18
3.0	326.0	1.31
3.5	354.5	1.42
4.0	380.0	1.52
4.5	402.5	1.61
5.0	424.0	1.70
5.5	444.0	1.78
6.0	460.0	1.84
6.5	479.0	1.92
7.0	492.0	1.97
7.5	505.0	2.02



RESULTS Moisture Content = 18%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	1.18	13.2	9.0%
5.0	1.70	20.0	8.5%

In - Situ CBR value

**9.0%**

comments:

Operator

D.M

Checked

Approved





# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number  
**6019**  
Sheet:  
**2/7**

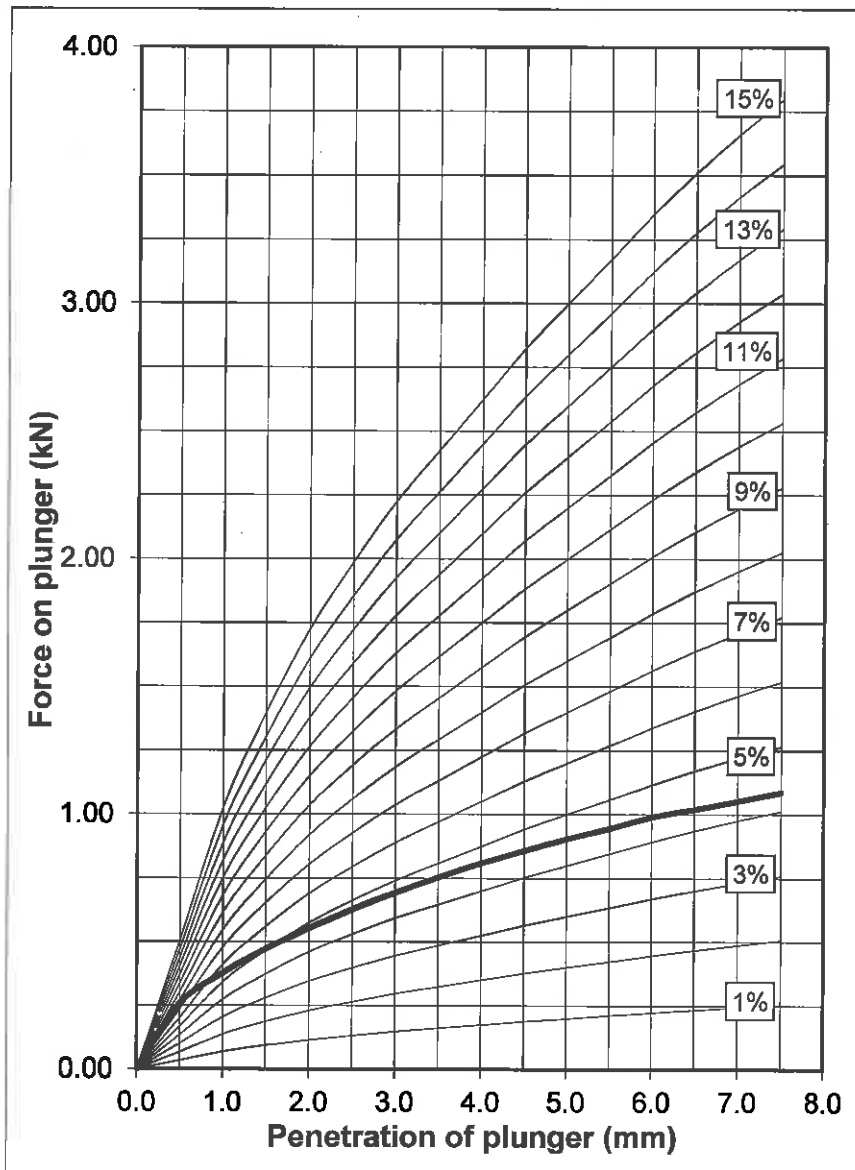
### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15 Position: CBR2 Sample No: 079 Depth: 0.60m

**Description:**

Firm brown and occasionally grey mottled slightly gravelly slightly sandy silty CLAY with many lenses of sand. Gravel is subangular to rounded fine to medium siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	64.0	0.26
1.0	94.0	0.38
1.5	117.5	0.47
2.0	138.0	0.55
2.5	156.5	0.63
3.0	173.0	0.69
3.5	188.0	0.75
4.0	202.0	0.81
4.5	214.0	0.86
5.0	225.5	0.90
5.5	236.0	0.95
6.0	247.0	0.99
6.5	254.5	1.02
7.0	262.5	1.05
7.5	271.0	1.09



**RESULTS** Moisture Content = 21%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	0.63	13.2	4.8%
5.0	0.90	20.0	4.5%

In - Situ CBR value **4.8%**

comments:

Operator  
D.M

Checked

Approved



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel: (01772) 561135 Fax (01772) 204907

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Engineer: TRP CONSULTING

Job Number

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### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15

Position: CBR3

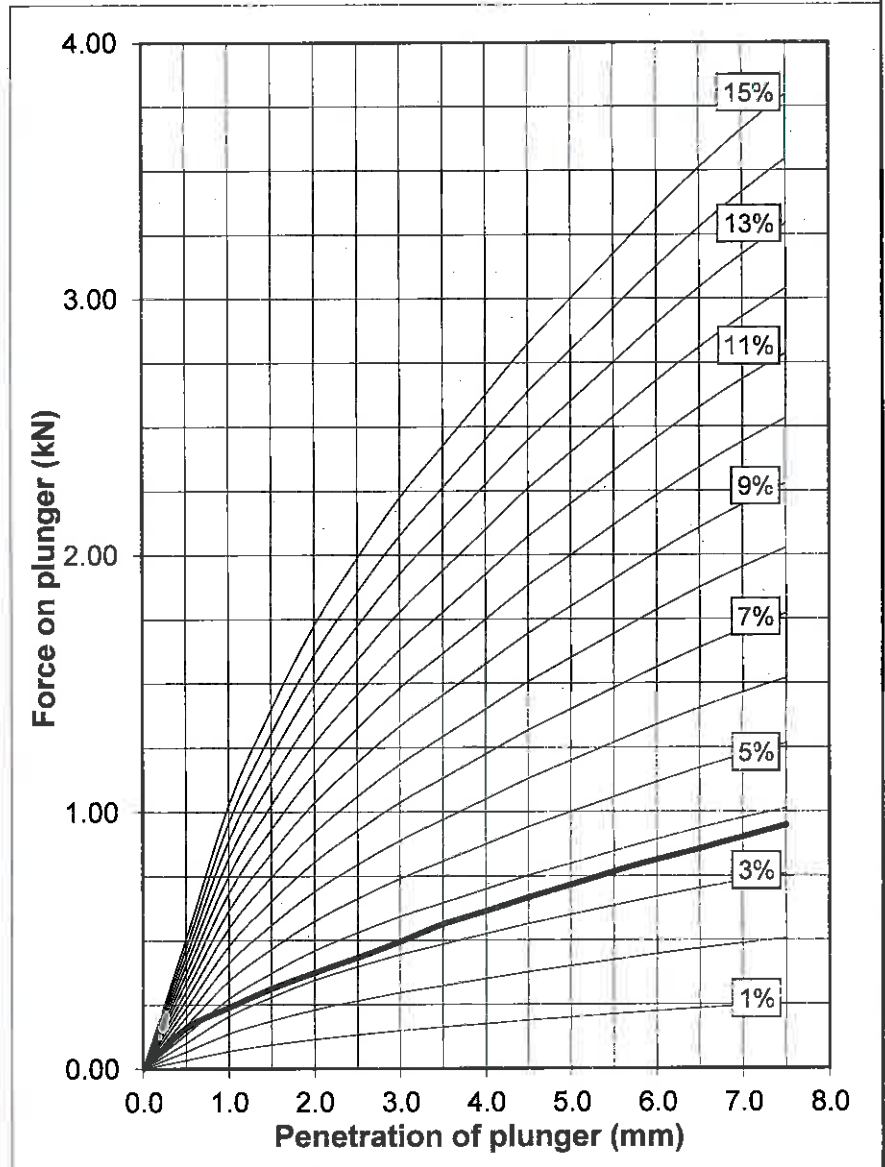
Sample No: 080

Depth: 0.60m

Description:

Firm brown and occasionally grey mottled slightly gravelly silty CLAY with occasional lenses of sand. Gravel is subrounded to rounded fine to medium siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	39.5	0.16
1.0	59.5	0.24
1.5	78.0	0.31
2.0	93.5	0.37
2.5	108.0	0.43
3.0	123.5	0.49
3.5	140.5	0.56
4.0	153.0	0.61
4.5	166.5	0.67
5.0	178.5	0.72
5.5	191.5	0.77
6.0	203.0	0.81
6.5	213.5	0.86
7.0	225.0	0.90
7.5	236.5	0.95



RESULTS Moisture Content = 18%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	0.43	13.2	3.3%
5.0	0.72	20.0	3.6%

In - Situ CBR value

**3.6%**

comments:

Operator

D.M

Checked

Approved



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number  
6019

Sheet:  
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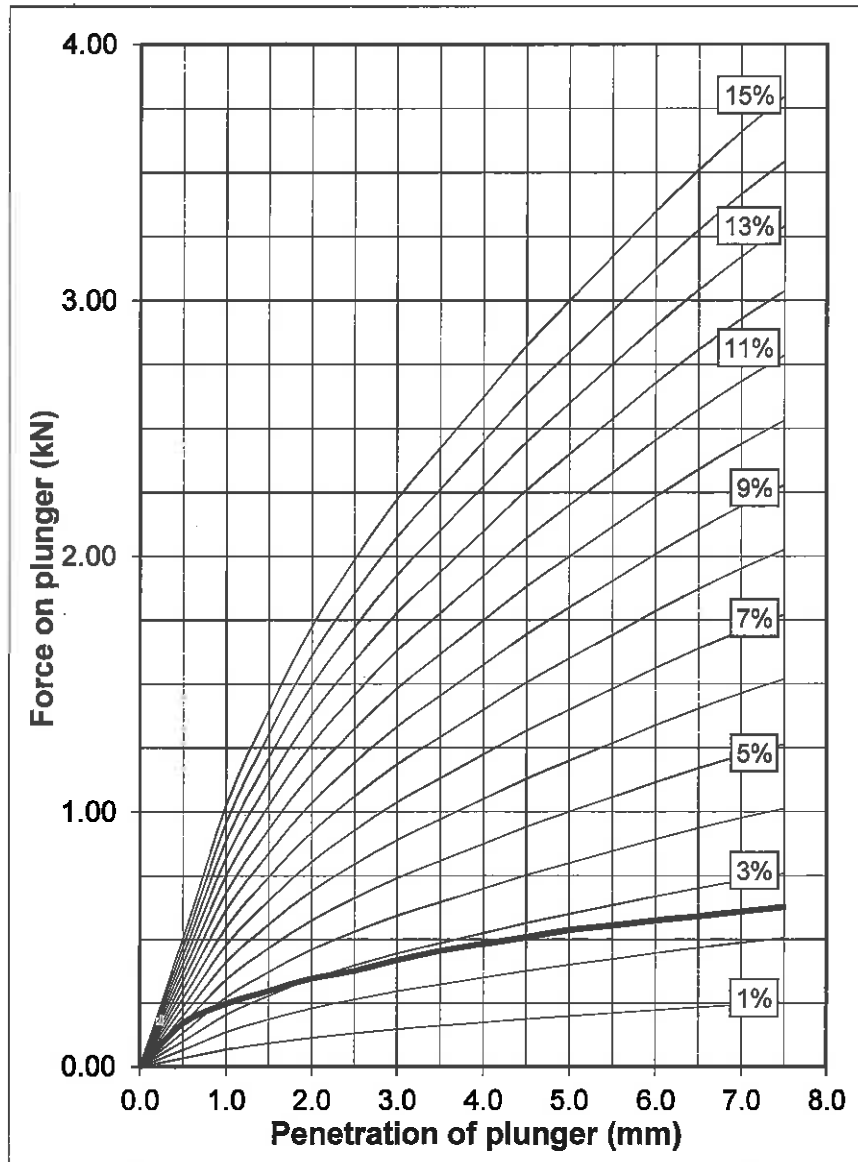
### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15 Position: CBR4 Sample No: 081 Depth: 0.60m

#### Description:

Firm brown and occasionally orangish brown, grey and dark brown mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	42.5	0.17
1.0	62.0	0.25
1.5	74.5	0.30
2.0	86.5	0.35
2.5	94.0	0.38
3.0	104.5	0.42
3.5	113.5	0.45
4.0	120.5	0.48
4.5	127.0	0.51
5.0	134.0	0.54
5.5	138.5	0.55
6.0	143.5	0.58
6.5	147.5	0.59
7.0	152.0	0.61
7.5	156.5	0.63



#### RESULTS Moisture Content = 22%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	0.38	13.2	2.9%
5.0	0.54	20.0	2.7%

In - Situ CBR value **2.9%**

comments:

Operator	Checked	Approved
D.M		



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS, Tel: (01772) 561135 Fax (01772) 204807

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number  
6019  
Sheet:  
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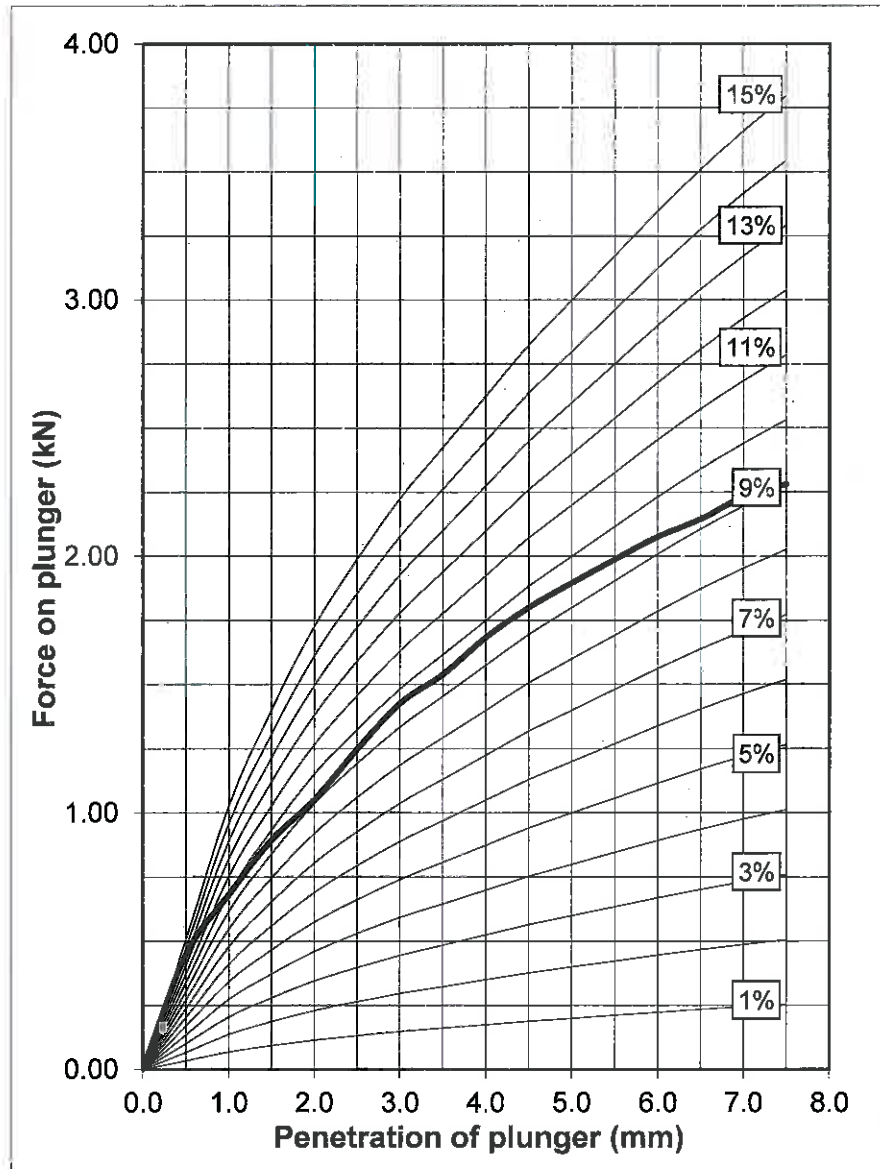
### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15 Position: CBR5 Sample No: 082 Depth: 0.60m

#### Description:

Firm brown and occasionally grey mottled slightly gravelly silty CLAY. Gravel is subrounded fine to medium siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	111.0	0.44
1.0	170.0	0.68
1.5	223.0	0.89
2.0	262.0	1.05
2.5	311.0	1.25
3.0	356.0	1.43
3.5	384.0	1.54
4.0	420.0	1.68
4.5	449.0	1.80
5.0	473.0	1.90
5.5	496.0	1.99
6.0	518.0	2.08
6.5	535.0	2.14
7.0	557.0	2.23
7.5	569.0	2.28



RESULTS Moisture Content = 24%

Pene-tration (mm)	Force kN	Standard Force kN	CBR %
2.5	1.25	13.2	9.4%
5.0	1.90	20.0	9.5%

In - Situ CBR value **9.5%**

comments:

Operator	Checked	Approved
D.M		



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## In - Situ Test Results

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
Engineer: TRP CONSULTING

Job Number  
**6019**  
Sheet:  
**6/7**

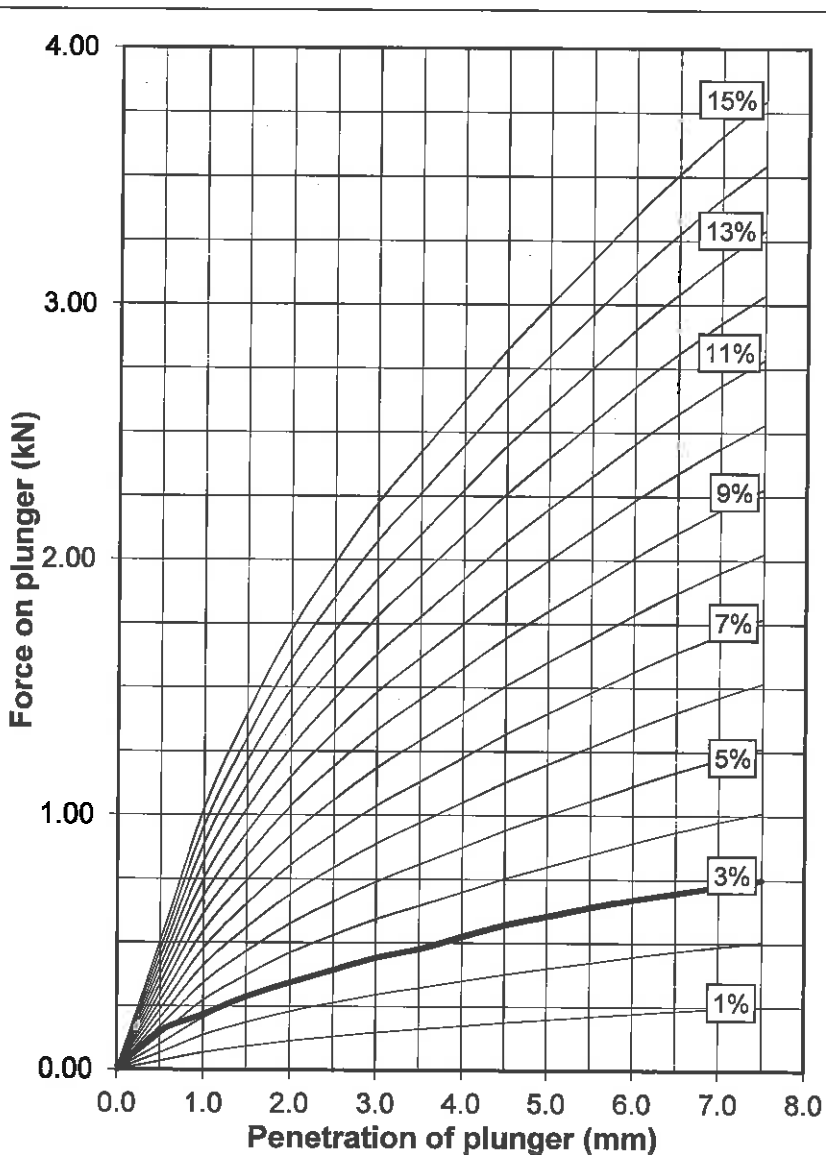
### IN - SITU CALIFORNIA BEARING RATIO

Date: 01/04/15 Position: CBR6 Sample No: 083 Depth: 0.60m

Description:

Firm brown and greyish brown mottled slightly gravelly slightly sandy silty CLAY with occasional roots and rootlets. Gravel is subangular to subrounded fine to medium siltstone, sandstone and quartz.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	37.5	0.15
1.0	54.0	0.22
1.5	72.0	0.29
2.0	85.5	0.34
2.5	98.0	0.39
3.0	110.0	0.44
3.5	118.5	0.47
4.0	131.0	0.52
4.5	142.5	0.57
5.0	151.0	0.61
5.5	160.0	0.64
6.0	167.5	0.67
6.5	174.0	0.70
7.0	180.5	0.72
7.5	187.0	0.75



**RESULTS** Moisture Content = 27%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	0.39	13.2	3.0%
5.0	0.61	20.0	3.0%

In - Situ CBR value **3.0%**

comments:	Operator	Checked	Approved
	D.M		



**SUB SURFACE**  
 SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
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**In - Situ Test Results**

Site: LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number  
6019  
 Sheet:  
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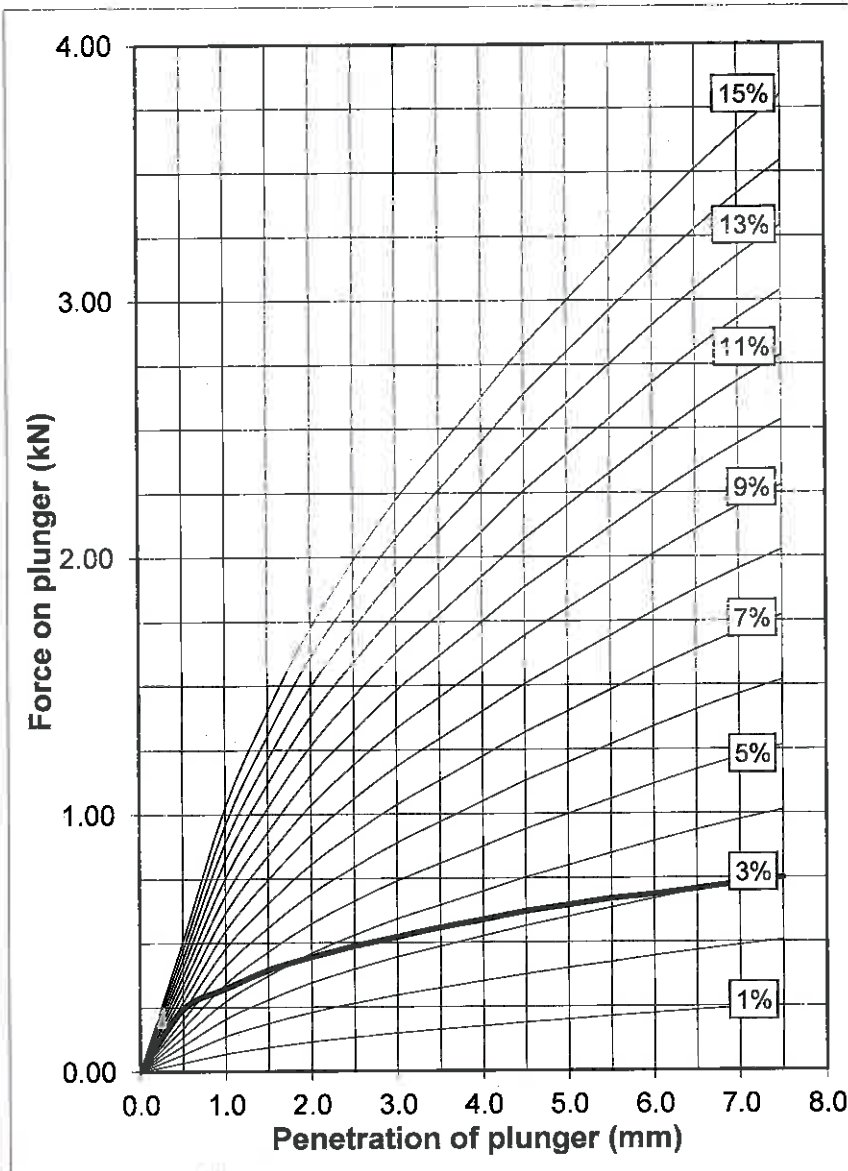
**IN - SITU CALIFORNIA BEARING RATIO**

Date: 01/04/15 Position: CBR7 Sample No: 084 Depth: 0.60m

Description:

Firm brown and greyish brown slightly sandy silty friable CLAY.

Penetration of Plunger mm	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	60.5	0.24
1.0	80.5	0.32
1.5	98.5	0.39
2.0	111.0	0.44
2.5	121.5	0.49
3.0	130.5	0.52
3.5	139.5	0.56
4.0	147.0	0.59
4.5	155.0	0.62
5.0	161.0	0.65
5.5	167.0	0.67
6.0	171.0	0.69
6.5	176.5	0.71
7.0	182.0	0.73
7.5	187.0	0.75



RESULTS Moisture Content = 28%

Penetration (mm)	Force kN	Standard Force kN	CBR %
2.5	0.49	13.2	3.7%
5.0	0.65	20.0	3.2%

In - Situ CBR value **3.7%**

comments:

Operator  
D.M

Checked

Approved



**SUB SURFACE LIMITED**  
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 3 Peel Street, Preston, PR2 2QS Tel. (01772) 561135 Fax (01772) 204907

**In-Situ Test**

Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number:  
6019  
 Sheet:  
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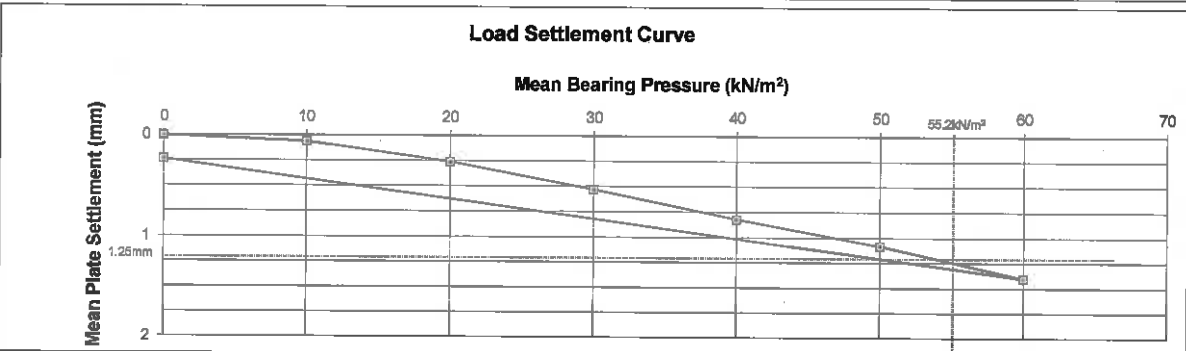
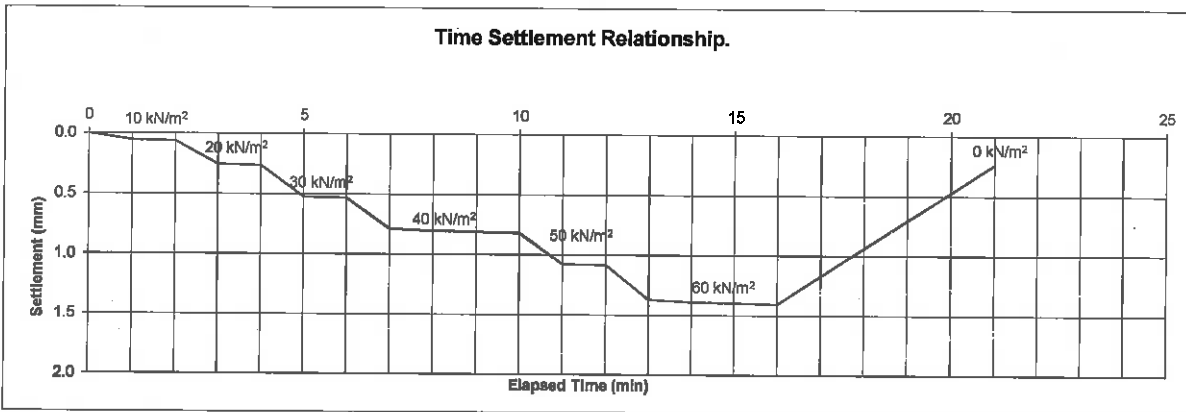
**Modulus of Subgrade Reaction Test**

Position: PL1      Sample No: 85      Depth: 0.60m      Date: 08-Apr-15  
 Plate Size: 600mm

**Description:**

Firm brown, orangish brown, grey, dark brown and greyish brown mottled slightly gravelly sandy silty CLAY with low siltstone and sandstone cobble content. Gravel is subangular to rounded fine to coarse siltstone, sandstone and quartz.

**Summary of Results:**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
10	0.062
20	0.262
30	0.530
40	0.820
50	1.082
60	1.403
0	0.237

Initial Seating Load: 5 kNm<sup>-2</sup>  
 Moisture Content: 20 %  
 Load @ 1.25mm Penetration: 55.2 kNm<sup>-2</sup>  
 Modulus of Subgrade Reaction: 36.2 MN/m<sup>2</sup>/m  
 Approximate CBR Value = 4.9 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM



Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number:  
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 Sheet:  
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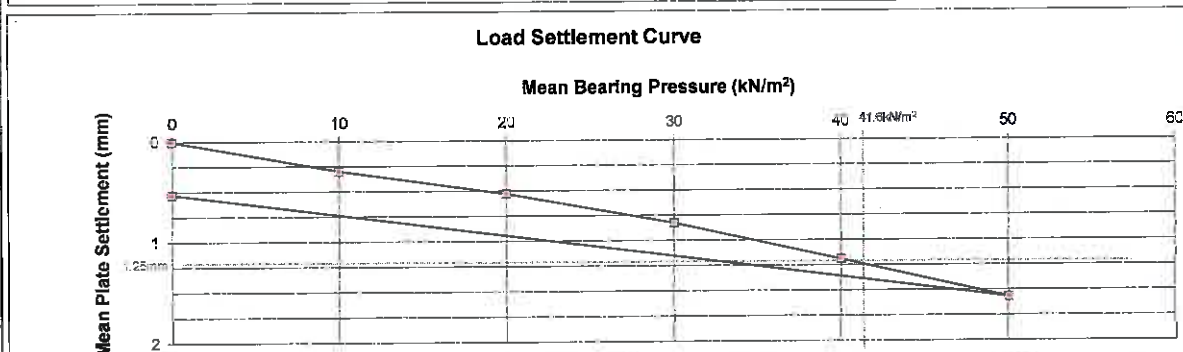
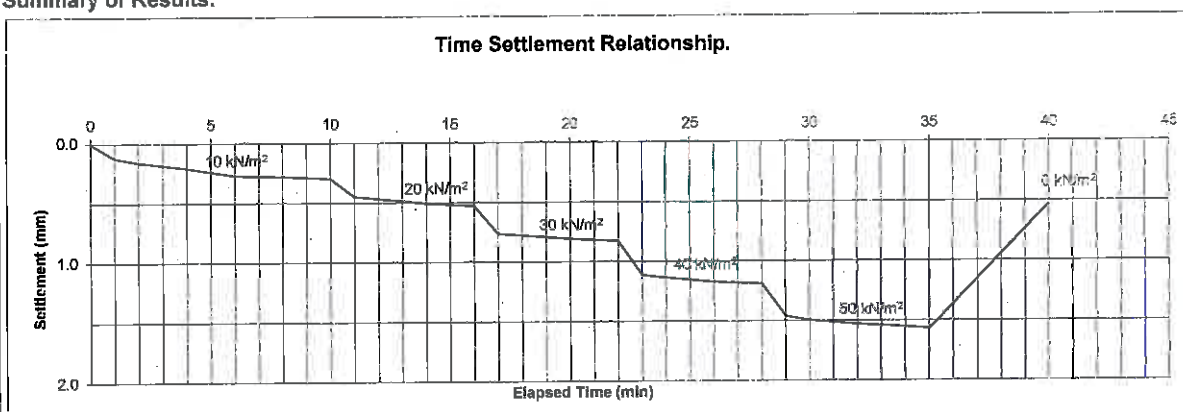
**Modulus of Subgrade Reaction Test**

Position: PL2 Sample No: 86 Depth: 0.60m Date: 07-Apr-15  
 Plate Size: 600mm

**Description:**

Firm brown and grey mottled slightly gravelly sandy silty slightly friable CLAY. Gravel is subangular to subrounded fine to coarse siltstone, sandstone and quartz.

**Summary of Results:**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
10	0.267
20	0.527
30	0.825
40	1.190
50	1.567
0	0.527

Initial Seating Load: 5 kNm<sup>-2</sup>  
 Moisture Content: 12 %  
 Load @ 1.25mm Penetration: 41.6 kNm<sup>-2</sup>  
 Modulus of Subgrade Reaction: 27.3 MN/m<sup>2</sup>/m

Approximate CBR Value = 3.0 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM





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In-Situ Test

Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number:  
6019  
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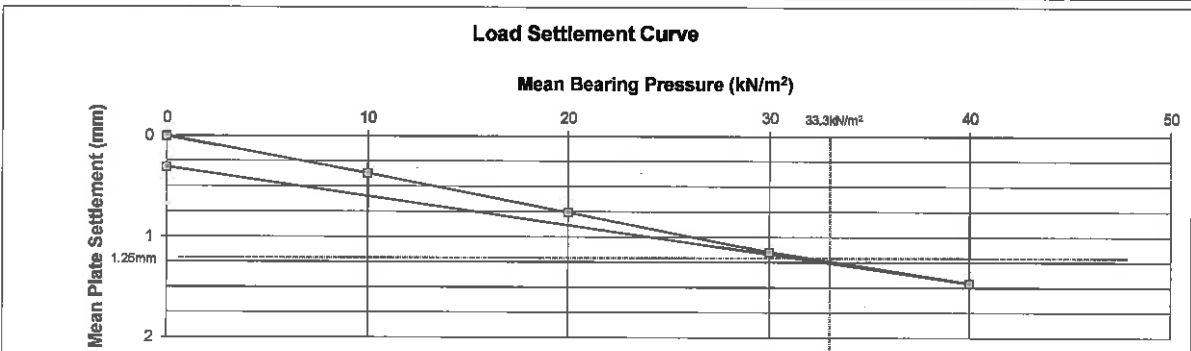
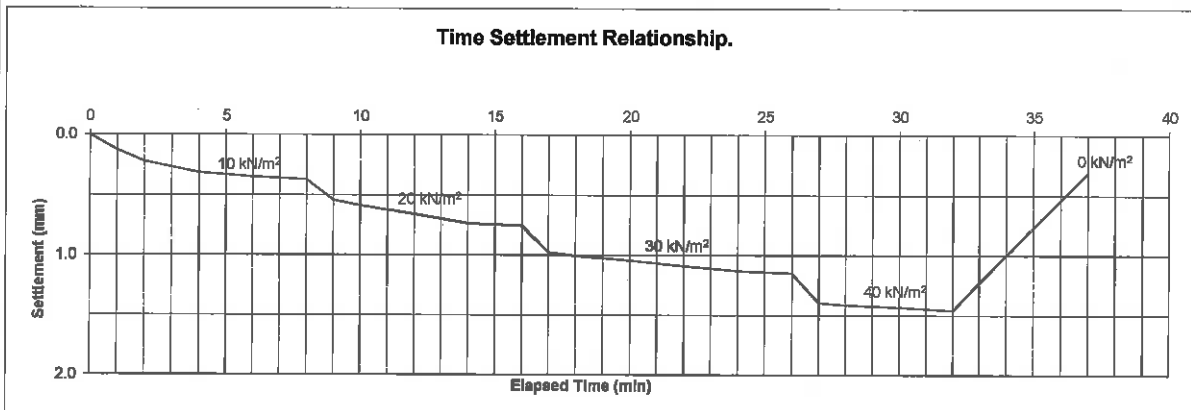
**Modulus of Subgrade Reaction Test**

Position: PL3 Sample No: 87 Depth: 0.60m Date: 07-May-15  
 Plate Size: 600mm

**Description:**

Firm brown, grey and orangish brown slightly gravelly sandy silty CLAY with many lenses and bands of sand and low siltstone cobble content. Gravel is subangular to subrounded fine to coarse siltstone, sandstone and quartz.

**Summary of Results:**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
10	0.370
20	0.755
30	1.148
40	1.457
0	0.308

Initial Seating Load: 5 kNm<sup>-2</sup>  
 Moisture Content: 21 %  
 Load @ 1.25mm Penetration: 33.3 kNm<sup>-2</sup>  
 Modulus of Subgrade Reaction: 21.8 MN/m<sup>2</sup>/m

Approximate CBR Value = 2.0 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM



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In-Situ Test

Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE

Job Number:  
8019

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

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Engineer: TRP CONSULTING

**Modulus of Subgrade Reaction Test**

Position: PL4 Sample No: 88 Depth: 0.60m Date: 08-Apr-15

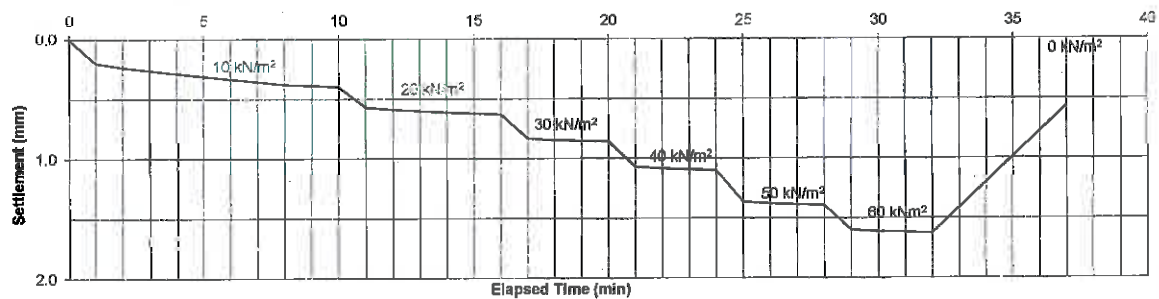
Plate Size: 600mm

Description:

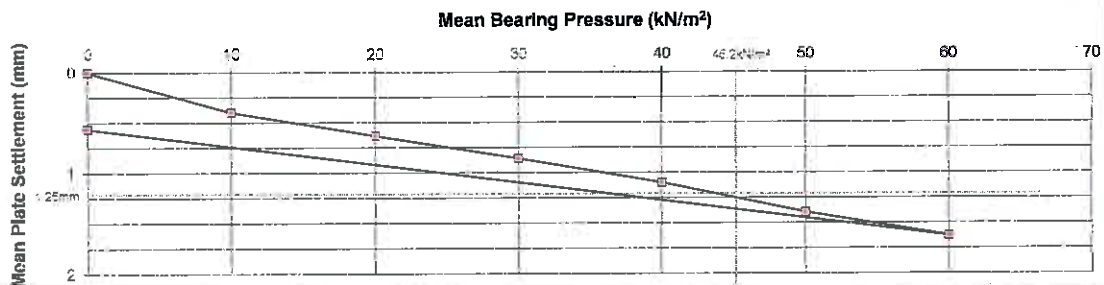
Firm brown and grey mottled sandy silty CLAY

**Summary of Results:**

**Time Settlement Relationship.**



**Load Settlement Curve**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
10	0.397
20	0.630
30	0.857
40	1.098
50	1.393
60	1.827
0	0.562

Initial Seating Load: 5 kNm<sup>-2</sup>  
 Moisture Content: 21 %  
 Load @ 1.25mm Penetration: 45.2 kNm<sup>-2</sup>  
 Modulus of Subgrade Reaction: 29.7 MN/m<sup>2</sup>/m

Approximate CBR Value = 3.4 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM



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In-Situ Test

Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE  
 Client: AEW ARCHITECTS AND DESIGNERS LIMITED  
 Engineer: TRP CONSULTING

Job Number:  
6019  
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**Modulus of Subgrade Reaction Test**

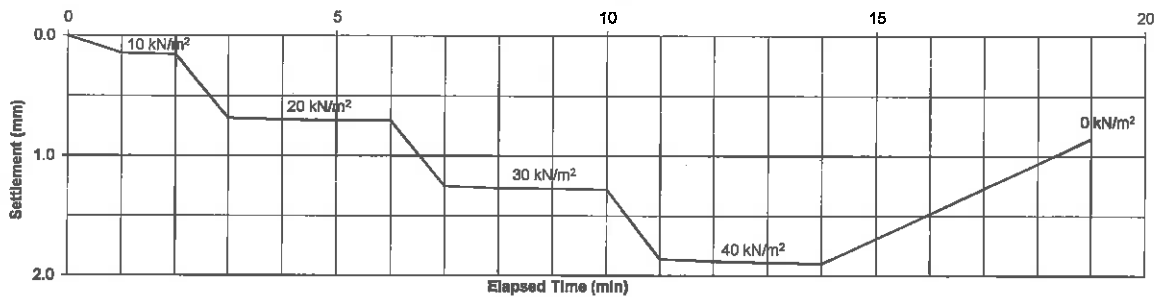
Position: PL5      Sample No: 89      Depth: 0.60m      Date: 08-Apr-15  
 Plate Size: 600mm

**Description:**

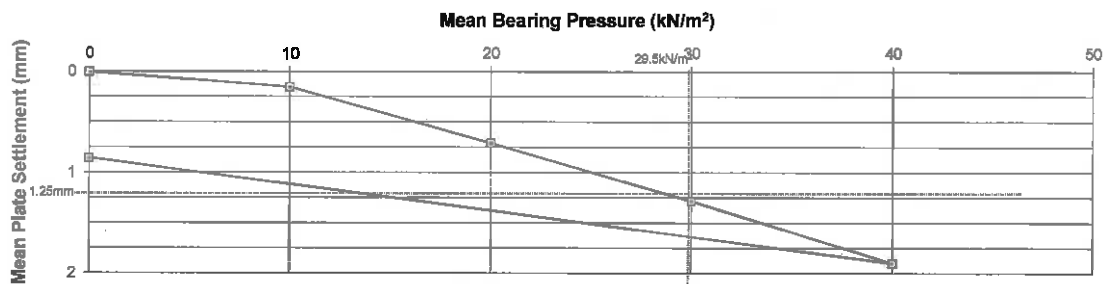
Firm brown and grey mottled slightly gravelly slightly sandy silty CLAY with low siltstone and sandstone cobble content. Gravel is subangular to rounded fine to coarse siltstone, sandstone and quartz.

**Summary of Results:**

**Time Settlement Relationship.**



**Load Settlement Curve**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
10	0.153
20	0.707
30	1.280
40	1.898
0	0.855

Initial Seating Load: 5 kNm<sup>-2</sup>  
 Moisture Content: 26 %  
 Load @ 1.25mm Penetration: 29.5 kNm<sup>-2</sup>  
 Modulus of Subgrade Reaction: 19.4 MN/m<sup>2</sup>/m

Approximate CBR Value = 1.6 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM



**SUB SURFACE LIMITED**  
 SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
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In-Situ Test

Site: LOGISTICS SITE, BAE SAMLESBURY, BLADERSTONE, LANCASHIRE

Job Number:  
6019

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Sheet:  
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Engineer: TRP CONSULTING

**Modulus of Subgrade Reaction Test**

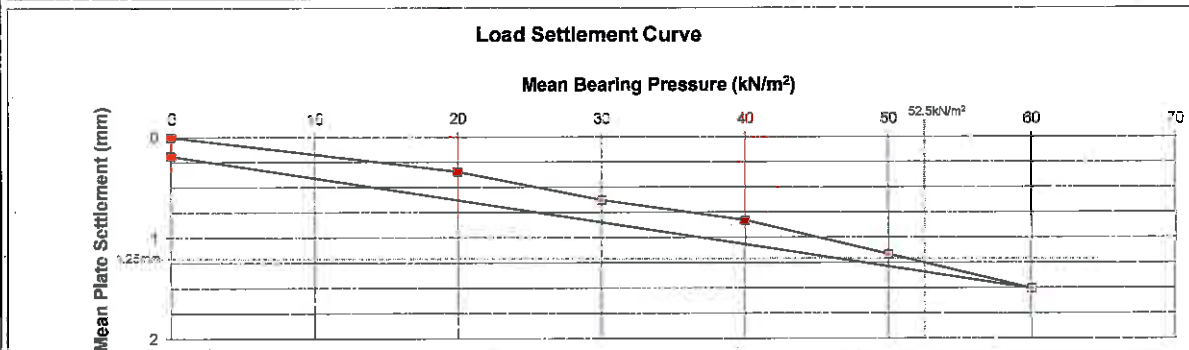
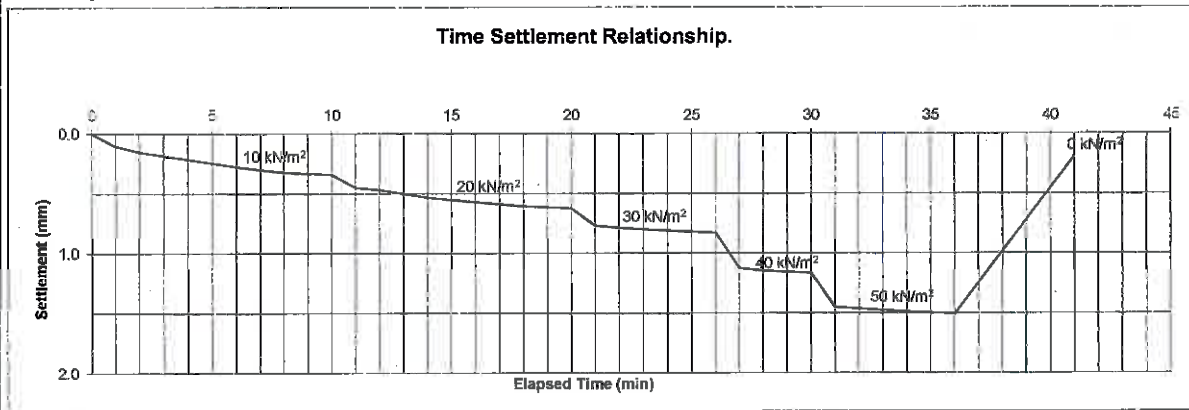
Position: PL6      Sample No: 90      Depth: 0.60m      Date: 07-Apr-15

Plate Size: 600mm

Description:

Firm brown, orangish brown and grey mottled sandy silty CLAY.

**Summary of Results:**



Pressure (kN/m <sup>2</sup> )	Deflection (mm)
0	0.000
20	0.342
30	0.625
40	0.830
50	1.165
60	1.507
0	0.188

Initial Seating Load: 5 kNm<sup>2</sup>  
 Moisture Content: 19 %  
 Load @ 1.25mm Penetration: 52.5 kNm<sup>2</sup>  
 Modulus of Subgrade Reaction: 34.4 MN/m<sup>2</sup>/m

Approximate CBR Value = 4.4 %

Comments:

Operator:  
DM

Checked:  
CAM

Approved:  
CAM

## **LABORATORY TEST RESULTS**

**SUB SURFACE**SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 581185 Fax (01772) 204907**Laboratory Test Results**

Site : LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Job Number

6019

Client : AEW ARCHITECTS &amp; DESIGNERS LTD

Sheet

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Engineer: TRP CONSULTING LTD

**DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT  
AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX**

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %						
BH1	2.00	U	18	89	18	34	15	19	0.16	CL	Brown slightly gravelly sandy silty CLAY. Gravel is fine to medium stone.
BH1	4.00	U	21	82	23	45	19	26	0.15	CI	Dark brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH2	1.20	U	17	99	17	36	17	19	0.00	CI	Dark greyish brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH3	1.20	D	17	97	16	42	20	22	-0.09	CI	Dark brown and occasional grey mottled silty CLAY.
BH3	2.00	U	16	99	16	38	17	21	-0.05	CI	Brown gravelly silty CLAY. Gravel is fine to medium stone.
BH4	1.20	U	18	91	20	40	20	20	0.00	CI	Dark brown and occasional grey slightly gravelly silty CLAY. Gravel is subrounded fine to medium quartz and sandstone.
BH4	3.00	U	19	97	20	44	20	24	0.00	CI	Brown slightly gravelly silty CLAY. Gravel is fine to coarse stone.
BH5	1.20	U	17	97	18	40	18	22	0.00	CI	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH5	3.00	U	18	98	19	40	18	22	0.05	CI	Dark brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
TP5	0.40	B	15	97	15	30	17	13	-0.15	CL	Brown, orange brown, light grey, red brown, greenish brown and yellow brown mottled sandy gravelly silty CLAY. Gravel is subangular fine to coarse quartz, sandstone and siltstone.
TP6	0.70	B	24	92	26	50	23	27	0.11	CI/CH	MADE GROUND: dark brown slightly sandy gravelly clay (subsoil) with some rootlets. Gravel sized fragments are fine to coarse stone.
TP7	1.20	D	25	84	27	55	24	31	0.10	CH	Brown, light brown, light grey and greenish brown slightly sandy slightly gravelly CLAY with occasional rootlets and lenses of silty fine to medium sand. Gravel is subangular to subrounded fine to coarse quartz, sandstone and siltstone.
TP8	3.60	D	22	92	24	43	19	24	0.21	CI	Brown and light grey mottled slightly sandy slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 &amp; 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index

Remarks :

**SUB SURFACE**SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS, Tel. (01772) 561135 Fax (01772) 204907**Laboratory Test Results**

Site : LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Client : AEW ARCHITECTS &amp; DESIGNERS LTD

Engineer: TRP CONSULTING LTD

Job Number

6019

Sheet

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**DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH  
IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE**

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Cell Pressure (kN/m <sup>2</sup> )	Deviator Stress (kN/m <sup>2</sup> )	Apparent Cohesion (kN/m <sup>2</sup> )	Angle of Shearing Resistance (degrees)	Laboratory Description
BH1	2.00	U	18	2.11	1.79	50 100 150	182 0 0	91	0.0	Brown slightly gravelly sandy silty CLAY. Gravel is fine to medium stone.
BH1	4.00	U	21	2.21	1.84	100 150 200	137 138 138	69	0.0	Dark brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH1	6.00	U	31	2.23	1.71	125 175 225	160 161 162	81	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH1	9.00	U	17	2.21	1.88	200 250 300	184 184 186	92	0.0	Brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to medium stone.
BH1	12.00	U	18	2.23	1.89	250 300 350	254 259 264	130	0.0	Dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium quartz and mudstone.
BH2	1.20	U	17	2.09	1.79	25 75 125	219 0 0	110	0.0	Dark greyish brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH2	3.00	U	20	2.13	1.77	75 125 175	259 262 0	130	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH2	8.50	U	16	1.92	1.65	175 225 275	125 0 0	83	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH3	2.00	U	16	2.13	1.83	50 100 150	334 0 0	167	0.0	Brown gravelly silty CLAY. Gravel is fine to medium stone.
BH3	4.00	U	18	2.18	1.84	100 150 200	184 193 198	96	0.0	Brown slightly gravelly silty CLAY. Gravel is fine stone.
BH3	6.00	U	17	2.17	1.86	125 175 225	181 156 160	78	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH3	9.00	U	15	2.22	1.93	200 250 300	218 226 233	113	0.0	Dark brown gravelly silty CLAY. Gravel is fine to medium stone.
BH3	12.00	U	18	2.13	1.81	250 300 350	211 213 217	107	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH3	13.50	U	20	2.18	1.62	275 325 375	245 255 260	127	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH4	1.20	U	18	2.19	1.86	25 75 125	354 355 370	180	0.0	Dark brown and occasional grey slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to medium quartz and sandstone.
BH4	3.00	U	19	2.11	1.78	75 125 175	227 229 228	114	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to coarse stone.
BH4	5.00	U	19	2.17	1.83	100 150 200	188 197 201	98	0.0	Dark brown slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to coarse quartz and sandstone.
BH4	7.50	U	30	1.88	1.44	150 200 250	83 0 0	42	0.0	Dark brown silty CLAY.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

Remarks :



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## Laboratory Test Results

Site : LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Job Number

6019

Client : AEW ARCHITECTS & DESIGNERS LTD

Sheet

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Engineer: TRP CONSULTING LTD

### DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Cell Pressure (kN/m <sup>2</sup> )	Deviator Stress (kN/m <sup>2</sup> )	Apparent Cohesion (kN/m <sup>2</sup> )	Angle of Shearing Resistance (degrees)	Laboratory Description
BH4	10.50	U	18	2.16	1.83	225 275 325	180 185 188	92	0.0	Dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium quartz and sandstone.
BH4	13.50	U	17	2.20	1.88	275 325 375	254 257 283	129	0.0	Brown slightly gravelly silty CLAY. Gravel is fine stone.
BH5	1.20	U	17	2.11	1.81	25 75 125	338 0 0	189	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH5	3.00	U	18	2.07	1.76	75 125 175	288 301 311	150	0.0	Dark brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH5	5.50	U	18	2.20	1.87	125 175 225	138 140 142	70	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to medium stone.
BH5	8.50	U	19	2.11	1.77	175 225 275	190 191 194	96	0.0	Brown slightly gravelly silty CLAY. Gravel is fine to coarse stone.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

Remarks



**SUB SURFACE**

GEOTECHNICAL & GEOENVIRONMENTAL  
 SITE INVESTIGATION SPECIALISTS AND CONSULTANTS  
 3 Peel Street, Preston, Lancashire, PR2 2QS  
 Tel. 01772 561135 Fax. 01772 204907 info@subsurface.co.uk

**Laboratory Test Results****One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	190 (WAC)
<b>Project</b>	Logistics Site, BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH1	<b>Sample</b>	190

**Test Details**

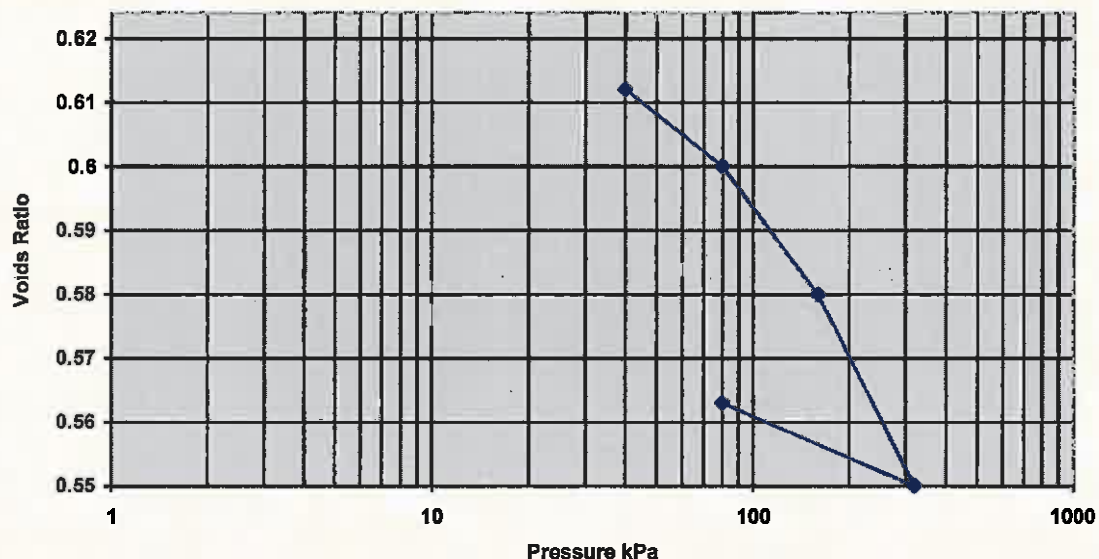
<b>Standard</b>	BS 1377: Part 5 : 1990 : Clause 3	<b>Particle Density</b>	2.65 Mg/m <sup>3</sup>
<b>Sample Type</b>	Undisturbed sample - open drive	<b>Lab Temperature</b>	21.0 deg.C
<b>Sample Depth</b>	2.00 m		
<b>Sample Description</b>	Dark brown and occasional grey mottled slightly gravelly silty CLAY with occasional plant remains. Gravel is subrounded to rounded fine to medium siltstone.		
<b>Variations from Procedure</b>	None		

**Specimen Details**

<b>Specimen Reference</b>	A	<b>Description</b>	As Above
<b>Depth within Sample</b>	0.00mm	<b>Orientation within Sample</b>	None
<b>Specimen Mass</b>	174.03 g	<b>Condition</b>	Natural Moisture
<b>Specimen Height</b>	20.00 mm	<b>Preparation</b>	Natural Undisturbed
<b>Comments</b>			

**Test Apparatus**

<b>Ring Number</b>	1	<b>Ring Diameter</b>	75.00 mm
<b>Ring Height</b>	20.00 mm	<b>Ring Weight</b>	114.82 g
<b>Lever Ratio</b>	9.00 : 1		

**Voids Ratio Vs Applied Pressure**

<b>Height of Solid Particles</b>	12.32 mm	<b>Swelling Pressure</b>	0.0 kPa
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**One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	190 (WAC)
<b>Project</b>	Logistics Site, BAE, Samblesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH1	<b>Sample</b>	190

<b>Initial Moisture Content*</b>	20.7 %	<b>Final Moisture Content</b>	19.7 %
<b>Initial Bulk Density</b>	1.97 Mg/m <sup>3</sup>	<b>Final Bulk Density</b>	2.03 Mg/m <sup>3</sup>
<b>Initial Dry Density</b>	1.63 Mg/m <sup>3</sup>	<b>Final Dry Density</b>	1.69 Mg/m <sup>3</sup>
<b>Initial Void Ratio</b>	0.6239	<b>Final Void Ratio</b>	0.5635
<b>Initial Degree of Saturation</b>	87.90%	<b>Final Degree of Saturation</b>	92.60 %

- Calculated from initial and dry weights of whole specimen

<b>Pressure (Loading Stages)</b>	<b>Coefficient of Volume Compressibility (<math>m_v</math>)</b>	<b>Coefficient of Consolidation (<math>c_v</math>)</b>
0.00		
40.0 kPa	0.18 m <sup>2</sup> /MN	1.97 m <sup>2</sup> /yr
80.0 kPa	0.19 m <sup>2</sup> /MN	1.30 m <sup>2</sup> /yr
160.0 kPa	0.15 m <sup>2</sup> /MN	1.79 m <sup>2</sup> /yr
320.0 kPa	0.12 m <sup>2</sup> /MN	1.11 m <sup>2</sup> /yr
80.0 kPa	0.04 m <sup>2</sup> /MN	-----

<b>Method of Time Fitting Used</b>	Square Root Time
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Tested By and Date:	WAC 07 May 15
Checked By and Date:	
Approved By and Date:	

**SUB SURFACE**

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**Laboratory Test Results****One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	124 (WAC)
<b>Project</b>	Logistics Site, BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH2	<b>Sample</b>	124

**Test Details**

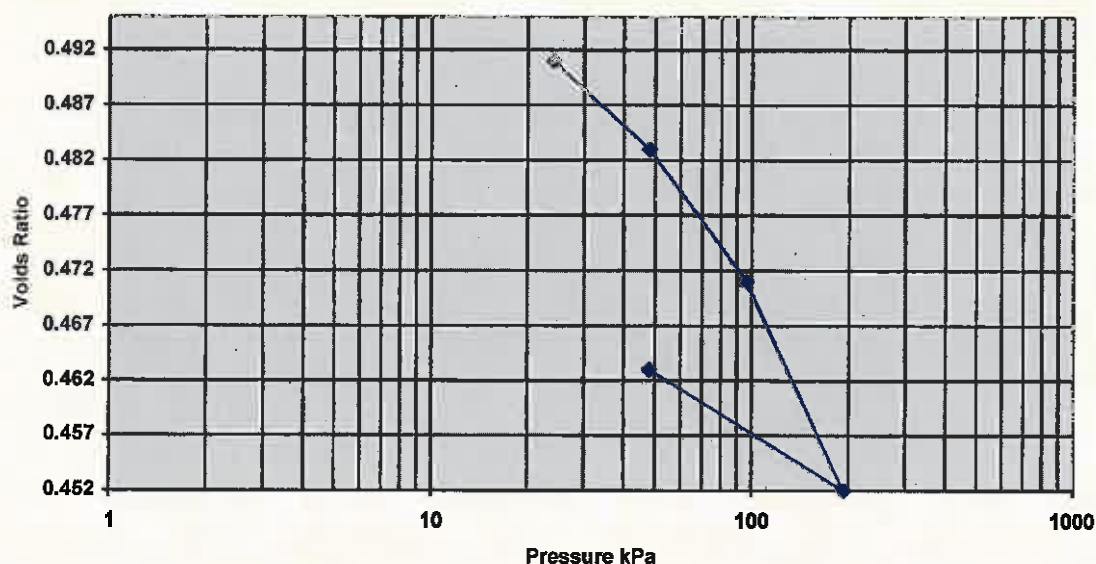
<b>Standard</b>	BS 1377: Part 5 : 1990 : Clause 3	<b>Particle Density</b>	2.65 Mg/m <sup>3</sup>
<b>Sample Type</b>	Undisturbed sample - open drive	<b>Lab Temperature</b>	21.0 deg.C
<b>Sample Depth</b>	1.20 m		
<b>Sample Description</b>	Dark brown and occasional grey mottled silty CLAY with occasional plant remains.		
<b>Variations from Procedure</b>	None		

**Specimen Details**

<b>Specimen Reference</b>	A	<b>Description</b>	As Above
<b>Depth within Sample</b>	0.00mm	<b>Orientation within Sample</b>	None
<b>Specimen Mass</b>	181.69 g	<b>Condition</b>	Natural Moisture
<b>Specimen Height</b>	20.00 mm	<b>Preparation</b>	Natural Undisturbed
<b>Comments</b>			

**Test Apparatus**

<b>Ring Number</b>	2	<b>Ring Diameter</b>	75.00 mm
<b>Ring Height</b>	20.00 mm	<b>Ring Weight</b>	115.01 g
<b>Lever Ratio</b>	9.00 : 1		

**Void Ratio Vs Applied Pressure**

<b>Height of Solid Particles</b>	13.38 mm	<b>Swelling Pressure</b>	0.0 kPa
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**Laboratory Test Results**

**One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	124 (WAC)
<b>Project</b>	Logistics Site, BAE, Sarnesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH2	<b>Sample</b>	124

<b>Initial Moisture Content*</b>	16.0 %	<b>Final Moisture Content</b>	16.5 %
<b>Initial Bulk Density</b>	2.06 Mg/m <sup>3</sup>	<b>Final Bulk Density</b>	2.11 Mg/m <sup>3</sup>
<b>Initial Dry Density</b>	1.77 Mg/m <sup>3</sup>	<b>Final Dry Density</b>	1.81 Mg/m <sup>3</sup>
<b>Initial Void Ratio</b>	0.4951	<b>Final Void Ratio</b>	0.4633
<b>Initial Degree of Saturation</b>	85.72%	<b>Final Degree of Saturation</b>	94.30 %

\* Calculated from initial and dry weights of whole specimen

<b>Pressure (Loading Stages)</b>	<b>Coefficient of Volume Compressibility (m<sub>v</sub>)</b>	<b>Coefficient of Consolidation (c<sub>v</sub>)</b>
0.00		
24.0 kPa	0.13 m <sup>2</sup> /MN	3.27 m <sup>2</sup> /yr
48.0 kPa	0.21 m <sup>2</sup> /MN	2.93 m <sup>2</sup> /yr
96.0 kPa	0.18 m <sup>2</sup> /MN	3.20 m <sup>2</sup> /yr
192.0 kPa	0.13 m <sup>2</sup> /MN	1.19 m <sup>2</sup> /yr
48.0 kPa	0.05 m <sup>2</sup> /MN	-----

**Method of Time Fitting Used**      Square Root Time

<b>Tested By and Date:</b>	WAC      07 May 15
<b>Checked By and Date:</b>	
<b>Approved By and Date:</b>	

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**Laboratory Test Results****One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	217 (WAC)
<b>Project</b>	Logistics Site, BAE, Sarnesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH3	<b>Sample</b>	217

**Test Details**

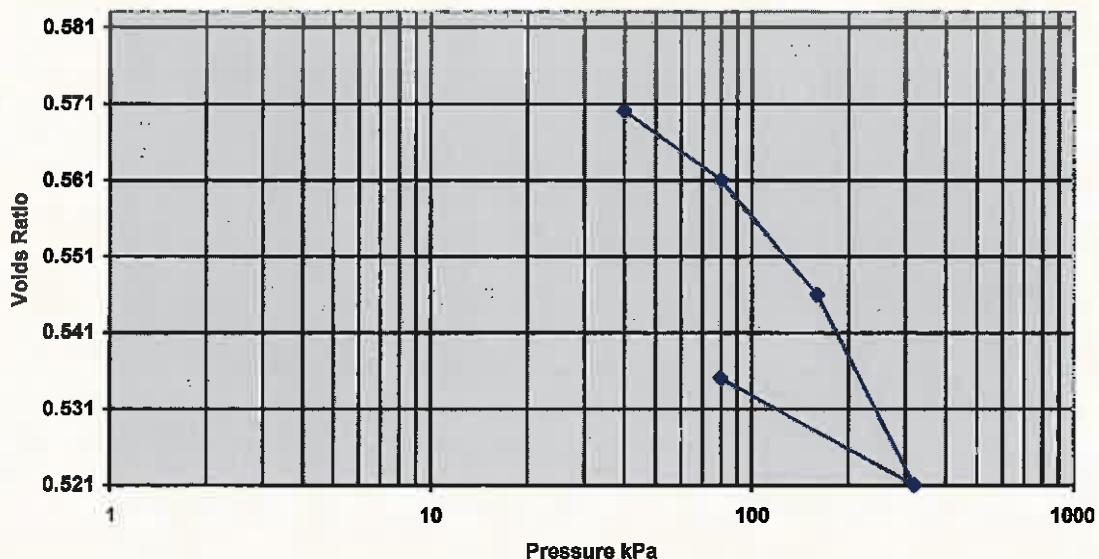
<b>Standard</b>	BS 1377: Part 5 : 1990 : Clause 3	<b>Particle Density</b>	2.65 Mg/m <sup>3</sup>
<b>Sample Type</b>	Undisturbed sample - open drive	<b>Lab Temperature</b>	21.0 deg.C
<b>Sample Depth</b>	2.00 m		
<b>Sample Description</b>	Dark brown and occasional grey mottled slightly gravelly silty CLAY with occasional plant remains. Gravel is subrounded to rounded fine to medium siltstone.		
<b>Variations from Procedure</b>	None		

**Specimen Details**

<b>Specimen Reference</b>	A	<b>Description</b>	As Above
<b>Depth within Sample</b>	0.00mm	<b>Orientation within Sample</b>	None
<b>Specimen Mass</b>	175.08 g	<b>Condition</b>	Natural Moisture
<b>Specimen Height</b>	20.00 mm	<b>Preparation</b>	Natural Undisturbed
<b>Comments</b>			

**Test Apparatus**

<b>Ring Number</b>	3	<b>Ring Diameter</b>	75.00 mm
<b>Ring Height</b>	20.00 mm	<b>Ring Weight</b>	112.42 g
<b>Lever Ratio</b>	9.00 : 1		

**Voids Ratio Vs Applied Pressure**

<b>Height of Solid Particles</b>	12.64 mm	<b>Swelling Pressure</b>	0.0 kPa
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**One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	217 (WAC)
<b>Project</b>	Logistics Site, BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH3	<b>Sample</b>	217

<b>Initial Moisture Content*</b>	18.3 %	<b>Final Moisture Content</b>	18.3 %
<b>Initial Bulk Density</b>	1.98 Mg/m <sup>3</sup>	<b>Final Bulk Density</b>	2.04 Mg/m <sup>3</sup>
<b>Initial Dry Density</b>	1.67 Mg/m <sup>3</sup>	<b>Final Dry Density</b>	1.73 Mg/m <sup>3</sup>
<b>Initial Void Ratio</b>	0.5825	<b>Final Void Ratio</b>	0.5354
<b>Initial Degree of Saturation</b>	83.39%	<b>Final Degree of Saturation</b>	90.52 %

- Calculated from initial and dry weights of whole specimen

<b>Pressure (Loading Stages)</b>	<b>Coefficient of Volume Compressibility (m<sub>v</sub>)</b>	<b>Coefficient of Consolidation (c<sub>v</sub>)</b>
0.00		
40.0 kPa	0.20 m <sup>2</sup> /MN	4.36 m <sup>2</sup> /yr
80.0 kPa	0.14 m <sup>2</sup> /MN	2.38 m <sup>2</sup> /yr
160.0 kPa	0.12 m <sup>2</sup> /MN	1.81 m <sup>2</sup> /yr
320.0 kPa	0.10 m <sup>2</sup> /MN	1.22 m <sup>2</sup> /yr
80.0 kPa	0.04 m <sup>2</sup> /MN	-----

<b>Method of Time Fitting Used</b>	Square Root Time
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<b>Tested By and Date:</b>	WAC 07 May 15
<b>Checked By and Date:</b>	
<b>Approved By and Date:</b>	

**SUB SURFACE**

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**Laboratory Test Results****One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	147 (WAC)
<b>Project</b>	Logistics Site, BAE, Samesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH4	<b>Sample</b>	147

**Test Details**

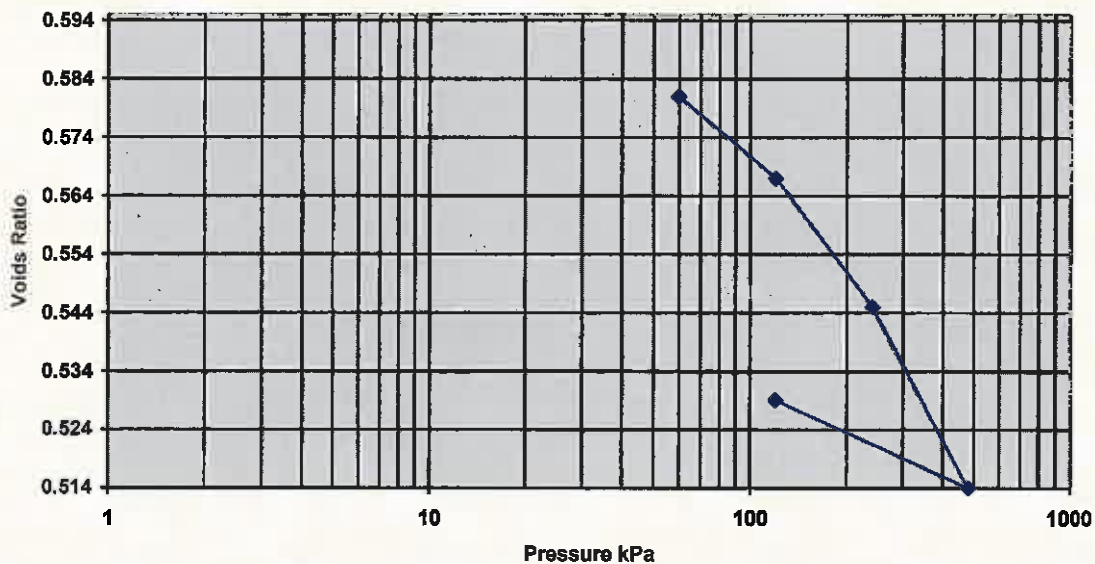
<b>Standard</b>	BS 1377: Part 5 : 1990 : Clause 3	<b>Particle Density</b>	2.65 Mg/m <sup>3</sup>
<b>Sample Type</b>	Undisturbed sample - open drive	<b>Lab Temperature</b>	21.0 deg.C
<b>Sample Depth</b>	3.00 m		
<b>Sample Description</b>	Dark brown and occasional grey mottled silty CLAY with occasional plant remains.		
<b>Variations from Procedure</b>	None		

**Specimen Details**

<b>Specimen Reference</b>	A	<b>Description</b>	As Above
<b>Depth within Sample</b>	0.00mm	<b>Orientation within Sample</b>	None
<b>Specimen Mass</b>	174.95 g	<b>Condition</b>	Natural Moisture
<b>Specimen Height</b>	20.00 mm	<b>Preparation</b>	Natural Undisturbed
<b>Comments</b>			

**Test Apparatus**

<b>Ring Number</b>	4	<b>Ring Diameter</b>	75.00 mm
<b>Ring Height</b>	20.00 mm	<b>Ring Weight</b>	112.73 g
<b>Lever Ratio</b>	9.00 : 1		

**Voids Ratio Vs Applied Pressure**

<b>Height of Solid Particles</b>	12.54 mm	<b>Swelling Pressure</b>	0.0 kPa
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**Laboratory Test Results**

**One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	147 (WAC)
<b>Project</b>	Logistics Site, BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH4	<b>Sample</b>	147

<b>Initial Moisture Content*</b>	19.2 %	<b>Final Moisture Content</b>	18.1 %
<b>Initial Bulk Density</b>	1.98 Mg/m <sup>3</sup>	<b>Final Bulk Density</b>	2.05 Mg/m <sup>3</sup>
<b>Initial Dry Density</b>	1.66 Mg/m <sup>3</sup>	<b>Final Dry Density</b>	1.73 Mg/m <sup>3</sup>
<b>Initial Void Ratio</b>	0.5949	<b>Final Void Ratio</b>	0.5292
<b>Initial Degree of Saturation</b>	85.38%	<b>Final Degree of Saturation</b>	90.70 %

- Calculated from initial and dry weights of whole specimen

<b>Pressure (Loading Stages)</b>	<b>Coefficient of Volume Compressibility (m<sub>v</sub>)</b>	<b>Coefficient of Consolidation (c<sub>v</sub>)</b>
0.00		
60.0 kPa	0.14 m <sup>2</sup> /MN	2.98 m <sup>2</sup> /yr
120.0 kPa	0.15 m <sup>2</sup> /MN	2.22 m <sup>2</sup> /yr
240.0 kPa	0.12 m <sup>2</sup> /MN	1.80 m <sup>2</sup> /yr
480.0 kPa	0.08 m <sup>2</sup> /MN	1.38 m <sup>2</sup> /yr
120.0 kPa	0.03 m <sup>2</sup> /MN	-----

<b>Method of Time Fitting Used</b>	Square Root Time
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<b>Tested By and Date:</b>	WAC 07 May 15
<b>Checked By and Date:</b>	
<b>Approved By and Date:</b>	



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**Laboratory Test Results****One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	170 (WAC)
<b>Project</b>	Logistics Site. BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH5	<b>Sample</b>	170

**Test Details**

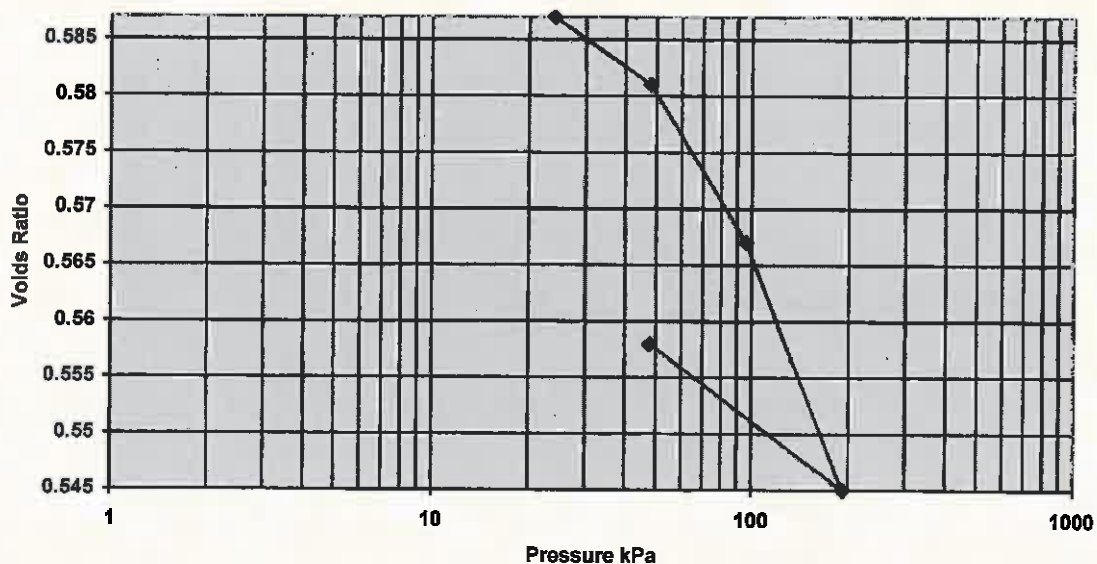
<b>Standard</b>	BS 1377: Part 5 : 1990 : Clause 3	<b>Particle Density</b>	2.65 Mg/m <sup>3</sup>
<b>Sample Type</b>	Undisturbed sample - open drive	<b>Lab Temperature</b>	21.0 deg.C
<b>Sample Depth</b>	1.20 m		
<b>Sample Description</b>	Dark brown and occasional grey mottled slightly gravelly silty CLAY with occasional plant remains. Gravel is subrounded to rounded fine to medium siltstone.		
<b>Variations from Procedure</b>	None		

**Specimen Details**

<b>Specimen Reference</b>	A	<b>Description</b>	As Above
<b>Depth within Sample</b>	0.00mm	<b>Orientation within Sample</b>	None
<b>Specimen Mass</b>	175.72 g	<b>Condition</b>	Natural Moisture
<b>Specimen Height</b>	20.00 mm	<b>Preparation</b>	Natural Undisturbed
<b>Comments</b>			

**Test Apparatus**

<b>Ring Number</b>	5	<b>Ring Diameter</b>	75.00 mm
<b>Ring Height</b>	20.00 mm	<b>Ring Weight</b>	114.79 g
<b>Lever Ratio</b>	9.00 : 1		

**Voids Ratio Vs Applied Pressure**

<b>Height of Solid Particles</b>	12.61 mm	<b>Swelling Pressure</b>	0.0 kPa
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**Laboratory Test Results**

**One Dimensional Consolidation Properties (Oedometer)**

<b>Client</b>	TRP Consulting	<b>Lab Ref</b>	170 (WAC)
<b>Project</b>	Logistics Site, BAE, Samlesbury, Lancashire	<b>Job</b>	6019
<b>Borehole</b>	BH5	<b>Sample</b>	170

<b>Initial Moisture Content*</b>	19.0 %	<b>Final Moisture Content</b>	19.3 %
<b>Initial Bulk Density</b>	1.99 Mg/m3	<b>Final Bulk Density</b>	2.03 Mg/m3
<b>Initial Dry Density</b>	1.67 Mg/m3	<b>Final Dry Density</b>	1.70 Mg/m3
<b>Initial Void Ratio</b>	0.5855	<b>Final Void Ratio</b>	0.5578
<b>Initial Degree of Saturation</b>	85.94%	<b>Final Degree of Saturation</b>	91.62 %

\* Calculated from initial and dry weights of whole specimen

<b>Pressure (Loading Stages)</b>	<b>Coefficient of Volume Compressibility (m<sub>v</sub>)</b>	<b>Coefficient of Consolidation (c<sub>v</sub>)</b>
0.00		
24.0 kPa	-0.05 m2/MN	-----
48.0 kPa	0.16 m2/MN	0.90 m2/yr
96.0 kPa	0.18 m2/MN	1.96 m2/yr
192.0 kPa	0.15 m2/MN	1.42 m2/yr
48.0 kPa	0.06 m2/MN	-----

<b>Method of Time Fitting Used</b>	Square Root Time
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<b>Tested By and Date:</b>	WAC	07 May 15
<b>Checked By and Date:</b>		
<b>Approved By and Date:</b>		

**SUB SURFACE**SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907**Laboratory Test Results**

Site: LOGISTICS SITE, BAE, SAMLESBURY, LANCASHIRE

Job Number  
**6019**

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Sheet:  
**1/4**

Engineer: TRP CONSULTING

**Dry Density/Moisture Content Relationship**

Position: TP5    Sample No: 206    Depth: 0.60 m    Mould: 1 litre    Rammer: 4.5 kg

Description:

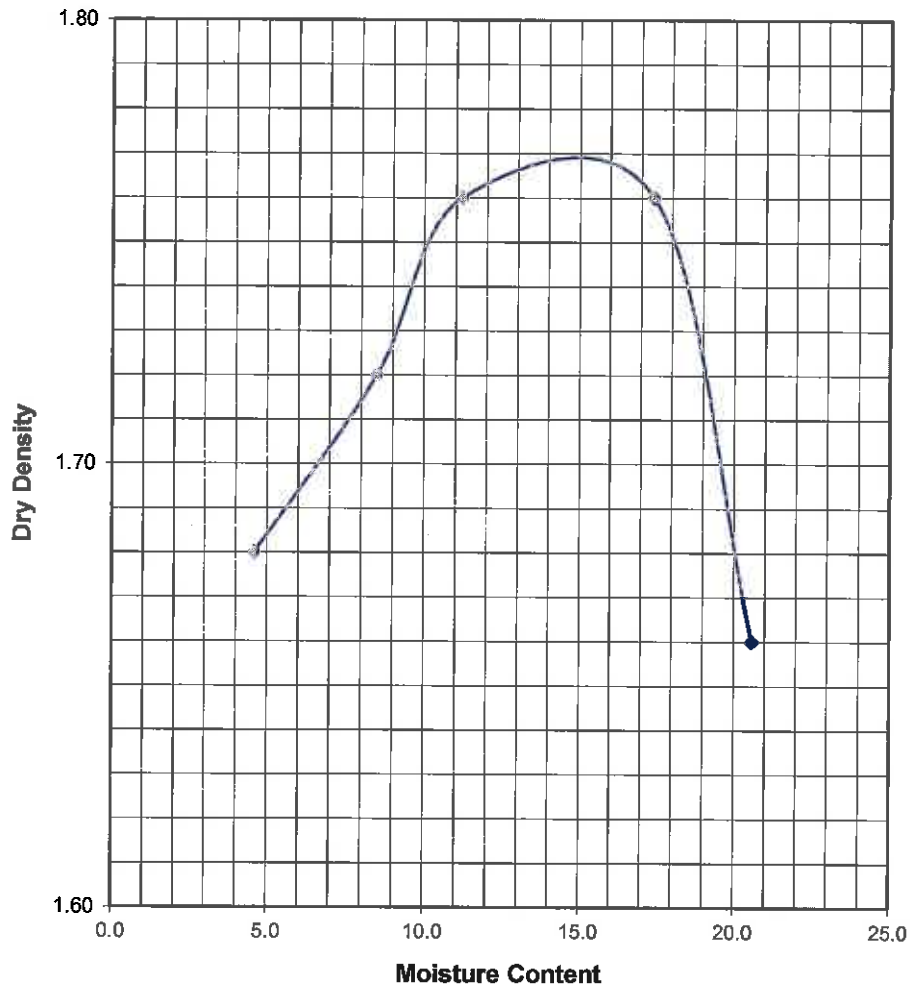
Orangey brown, brown and light grey mottled sandy CLAY with lenses of light grey silty sand.

Increment	Moisture Content (%)	Dry Density (Mg/m <sup>3</sup> )
1	4.6	1.68
2	8.5	1.72
3	11.2	1.76
4	17.4	1.76
5	20.6	1.66

Natural M.C.: 23%

Passing 20mm : 100%

Optimum M.C.: 15%

Max Dry Density: 1.77 Mg/m<sup>3</sup>

Remarks:

Operator

Checked

Approved

WAC



# SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## Laboratory Test Results

Site: LOGISTICS SITE, BAE, SAMLESBURY, LANCASHIRE

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Engineer: TRP CONSULTING

Job Number  
6019

Sheet:  
2/4

### Dry Density/Moisture Content Relationship

Position: TP6    Sample No: 202    Depth: 0.70 m    Mould: 1 litre    Rammer: 4.5 kg

Description:

Orangey brown and greyish brown slightly gravelly silty CLAY. Gravel is fine to medium stone.

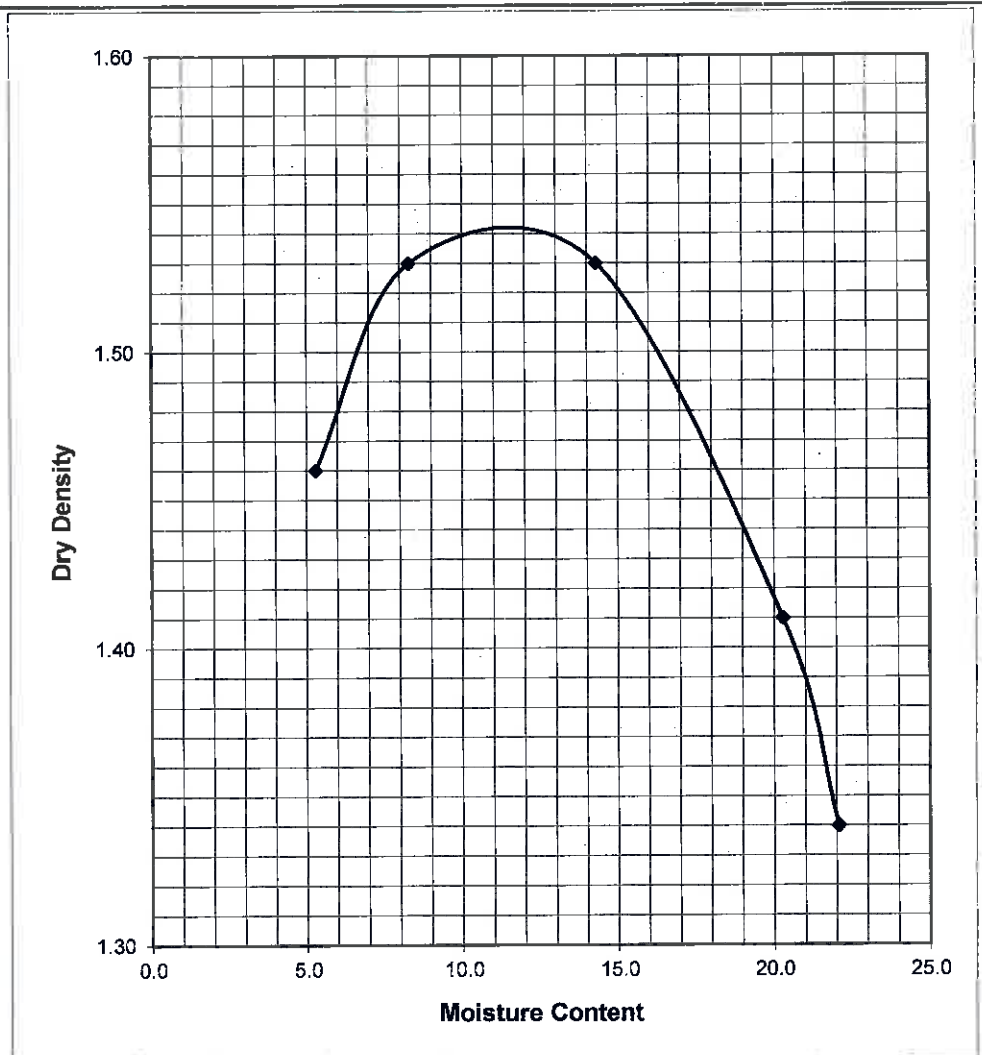
Increment	Moisture Content (%)	Dry Density (Mg/m <sup>3</sup> )
1	5.3	1.46
2	8.3	1.53
3	14.3	1.53
4	20.3	1.41
5	22.1	1.34

Natural M.C.: 29%

Passing 20mm : 98%

Optimum M.C.: 11.5%

Max Dry Density: 1.54 Mg/m<sup>3</sup>



Remarks:

Operator

Checked

Approved

SJG

**SUB SURFACE**SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS Tel. (01772) 561135 Fax (01772) 204907**Laboratory Test Results**

Site: LOGISTICS SITE, BAE, SAMLESBURY, LANCASHIRE

Job Number  
6019

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Sheet:  
3/4

Engineer: TRP CONSULTING

**Dry Density/Moisture Content Relationship**

Position: PL4    Sample No: 258    Depth: 0.40 m    Mould: 1 litre    Rammer: 4.5 kg

## Description:

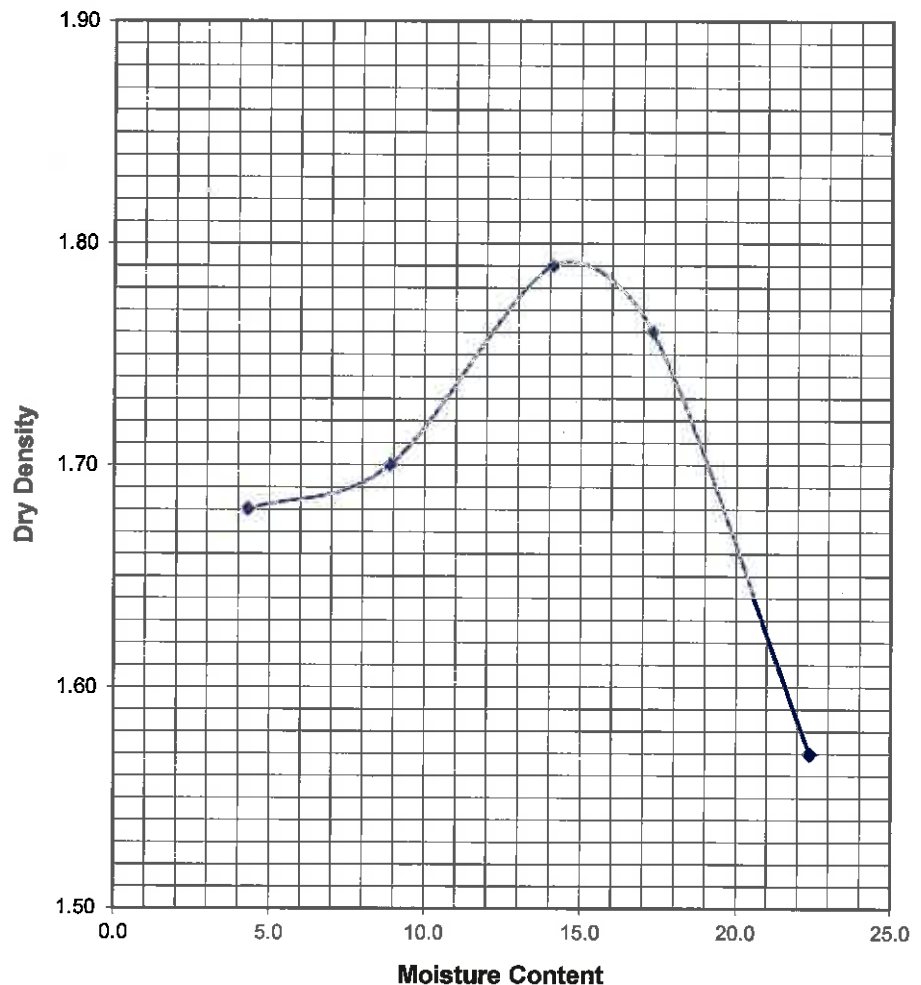
Orangey brown, brown and yellow mottled slightly gravelly sandy CLAY. Gravel is fine to medium stone.

Increment	Moisture Content (%)	Dry Density (Mg/m <sup>3</sup> )
1	4.3	1.68
2	8.9	1.70
3	14.1	1.79
4	17.3	1.76
5	22.4	1.57

Natural M.C.: 18%

Passing 20mm : 96%

Optimum M.C.: 14.4%

Max Dry Density: 1.79 Mg/m<sup>3</sup>

Remarks:

Operator

Checked

Approved

SJG

**SUB SURFACE**SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel (01772) 561135 Fax (01772) 204907**Laboratory Test Results**

Site: LOGISTICS SITE, BAE, SAMLESBURY, LANCASHIRE

Client: AEW ARCHITECTS AND DESIGNERS LIMITED

Engineer: TRP CONSULTING

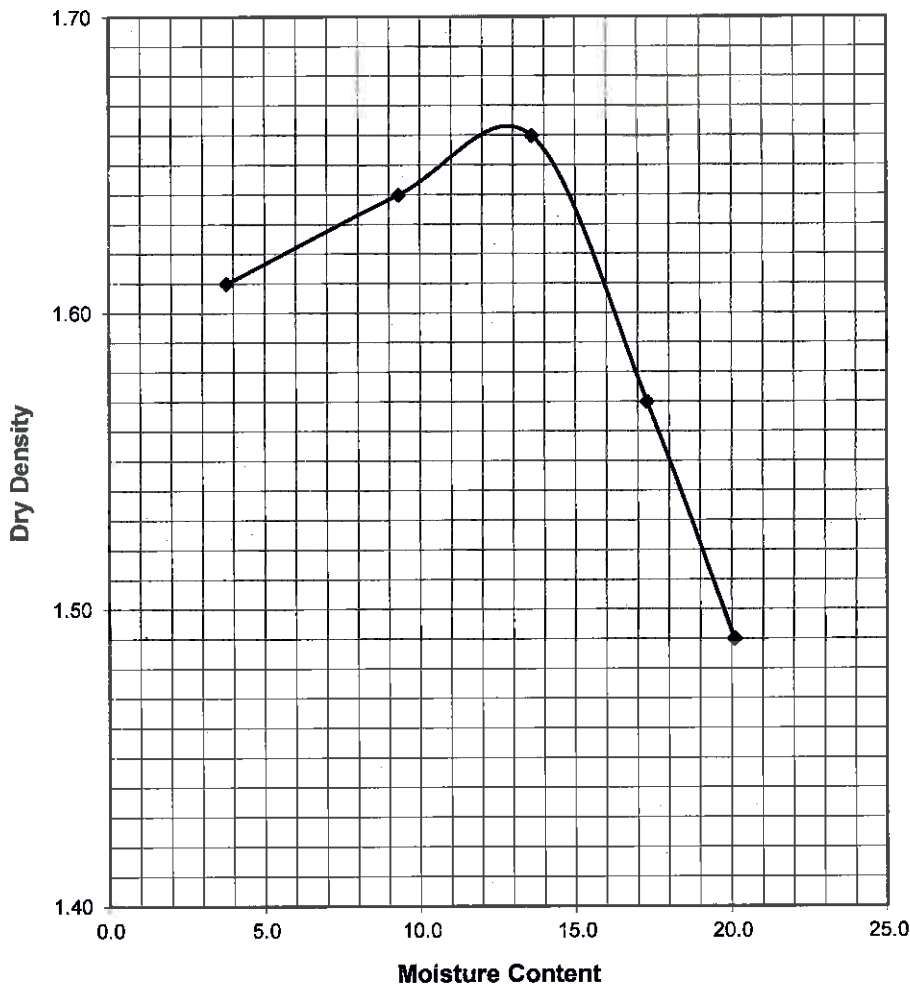
Job Number  
**6019**Sheet:  
**4/4****Dry Density/Moisture Content Relationship**

Position: PL6    Sample No: 259    Depth: 0.30 m    Mould: 1 litre    Rammer: 4.5 kg

Description:

Dark greyish brown and brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium stone.

Increment	Moisture Content (%)	Dry Density (Mg/m <sup>3</sup> )
1	3.8	1.61
2	9.3	1.64
3	13.6	1.66
4	17.3	1.57
5	20.1	1.49



Natural M.C: 17%

Passing 20mm : 98%

Optimum M.C: 12.7%

Max Dry Density: 1.66 Mg/m<sup>3</sup>

Remarks:

Operator

Checked

Approved

SJG

**SUB SURFACE**SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907**Laboratory Test Results**

Site : LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Client : AEW ARCHITECTS &amp; DESIGNERS LTD

Engineer : TRP CONSULTING LTD

Job Number

6019

Sheet

1 / 1

**DETERMINATION OF THE pH VALUE AND THE SULPHATE CONTENT OF SOIL AND GROUNDWATER**

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Soluble Sulphate			Percentage of sample passing 2mm Sieve %	pH	Classification	Laboratory Description
			Total SO <sub>3</sub> %	SO <sub>4</sub> in 2:1 water:soil g/l	Groundwater g/l				
BH1	0.20	W			0.06		7.9	DS-1	GROUNDWATER
BH1	1.20	D		<0.01			8.3	DS-1	Dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium quartz and siltstone.
BH2	0.60	B		<0.01			7.7	DS-1	Brown and occasional grey and orangish slightly gravelly slightly sandy silty CLAY. Gravel is subangular to rounded fine to coarse quartz, siltstone and sandstone.
BH2	0.95	W			0.04		7.7	DS-1	GROUNDWATER
BH3	0.30	D		<0.01			7.6	DS-1	Dark brown and occasional grey and light grey slightly gravelly silty CLAY with occasional lenses of fine to medium sand. Gravel is subangular to rounded fine to medium quartz and siltstone.
BH3	1.20	B		<0.01			8.1	DS-1	Dark brown and occasional grey mottled silty CLAY.
BH4	0.30	D		<0.01			8.0	DS-1	Brown and orange grey and light brown slightly gravelly silty CLAY with occasional lenses of silt. Gravel is subrounded to rounded fine to medium quartz.
BH4	1.70	D		<0.01			8.4	DS-1	Dark brown and occasional slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to coarse quartz.
BH5	0.30	D		0.02			7.6	DS-1	Brown and occasional grey and light brown slightly gravelly silty CLAY with occasional lenses of silt. Gravel is subrounded to rounded fine to medium quartz.
BH5	0.90	D		<0.01			8.2	DS-1	Dark brown and occasional grey slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to medium quartz and siltstone.
BH5	4.35	W			0.07		7.7	DS-1	GROUNDWATER
TP5	0.40	B		<0.01			7.2	DS-1	Brown, orange brown, light grey, red brown, greenish brown and yellow brown mottled sandy gravelly silty CLAY. Gravel is subangular fine to coarse quartz, sandstone and siltstone.
TP6	0.70	B		<0.01			6.9	DS-1	MADE GROUND: dark brown slightly sandy gravelly clay (subsoil) with some rootlets. Gravel sized fragments are fine to coarse stone.
TP7	1.20	D		<0.01			8.2	DS-1	Brown, light brown, light grey and greenish brown slightly sandy slightly gravelly CLAY with occasional rootlets and lenses of silty fine to medium sand. Gravel is subangular to subrounded fine to coarse quartz, sandstone and siltstone.
TP8	1.70	D		1.70			7.5	DS-3	MADE GROUND: brown and grey brown slightly sandy slightly gravelly clay with some plant, root and peat remains. Gravel sized fragments are fine to coarse stone, slag and clinker.

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 &amp; 9.4

Method of Test : Laboratory in-house methods based on BS1377: Part 3 for contents of water soluble sulphate, total sulphate and pH.

Remarks : Classification relates to Design Sulphate Class of BRE Special Digest 1 (2005)



# SUB SURFACE

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BRE Special Digest 1

## AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

Table C1: Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations<sup>a</sup>

Sulfate Design Sulfate Class for Location	2:1 water/soil extract <sup>b</sup>	Groundwater		Groundwater		ACEC Class for location
		Total potential sulfate <sup>c</sup>	Static water	Mobile water		
1	2 (SO <sub>4</sub> mg/l)	3 (SO <sub>4</sub> mg/l)	4 (SO <sub>4</sub> %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	≥2.5	>5.5d 2.5 - 5.5	AC-1s AC-1d AC-2z
DS-2	500 - 1500	400 - 1400	0.24 - 0.6	>3.5 2.5-3.5	>5.5 2.5 - 5.5	AC-1s AC-2z AC-2s AC-3z
DS-3	1600-3000	1500-3000	0.7 - 1.2	>3.5 2.5 - 3.5	>5.5 2.5 - 5.5	AC-2s AC-3 AC-3s AC-4
DS-4	3100 - 6000	3100 - 6000	1.3 - 2.4	>3.5 2.5 - 3.5	>5.5 2.5 - 5.5	AC-3s AC-4 AC-4s AC-5
DS-5	>6000	>6000	>2.4	>3.5 2.5 - 3.5	≥2.5	AC-4s AC-5

### Notes

- a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie not brownfield - Table C2) or clean fill derived from such ground
- b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).
- c Applies only to locations where concrete will be exposed to sulfate ions (SO<sub>4</sub>) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
- d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

### Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.

Table C1: Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations<sup>a</sup>

Sulfate Design Sulfate Class for Location	2:1 water/soil extract <sup>b</sup>	Groundwater		Total potential sulfate <sup>c</sup>	Groundwater		ACEC Class for location	
		Static water	Mobile water					
1	2 (SO <sub>4</sub> mg/l)	3 (Mg mg/l)	4 (SO <sub>4</sub> mg/l)	5 (Mg mg/l)	6 (SO <sub>4</sub> %)	7 (pH) <sup>d</sup>	8 (pH) <sup>d</sup>	9
DS-1	<500	<400	<400	<0.24	≥2.5	>6.5 <sup>d</sup> 5.5 - 6.5 4.5 - 5.5 2.5 - 4.5	AC-1s AC-1 AC-2z AC-3z AC-4z	
DS-2	500 - 1500	<1200	400 - 1400	0.24 - 0.6	>5.5 2.5 - 5.5	>6.5 5.5 - 6.5 4.5 - 5.5 2.5 - 5.5	AC-1s AC-2 AC-2s AC-3z AC-4z AC-5z	
DS-3	1600 - 3000	<1200	1500 - 3000	0.7 - 1.2	>5.5 2.5 - 5.5	>6.5 5.5 - 6.5 2.5 - 5.5	AC-2s AC-3 AC-3s AC-4 AC-5	
DS-4	3100 - 6000	≤1200	3100 - 6000	≤1000	>5.5 2.5 - 5.5	>6.5 2.5 - 5.5	AC-3s AC-4 AC-4s AC-5	
DS-4m	3100 - 6000	>1200 <sup>e</sup>	3100 - 6000	>1000 <sup>e</sup>	1.3 - 2.4	>5.5 2.5 - 5.5	AC-3s AC-4m AC-4ms AC-5m	
DS-5	>6000	≤1200	>6000	≤1000	>2.4	>5.5 2.5 - 5.5	AC-4s AC-5	
DS-5m	>6000	>1200 <sup>e</sup>	>6000	>1000 <sup>e</sup>	>2.4	>5.5 2.5 - 5.5	AC-4ms AC-5m	

### Notes

- a Brownfield sites are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).
- b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).
- c Applies only to locations where concrete will be exposed to sulfate ions (SO<sub>4</sub>) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
- d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfates content (Section C5.1.3).
- e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000mg/l and 17000 mg/l). This allows 'm' to be omitted from the relevant ACEC Classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

### Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.



**CHEMICAL CONTAMINATION ANALYSIS RESULTS**



# Final Report

**Report Number:** 15-08615 Issue-1

**Initial Date of Issue:** 21-Apr-2015

**Client:** Sub Surface

**Client Address:** 3 Peel Street  
Preston  
Lancashire  
PR2 2QS

**Contact(s):** Simon Gabbatt

**Project:** 6019 Logistics Site, Bae Samlesbury

**Quotation No.:** **Date Received:** 16-Apr-2015

**Order No.:** 6019 **Date Instructed:** 15-Apr-2015

**No. of Samples:** 29

**Turnaround: (Wkdays)** 5 **Results Due Date:** 21-Apr-2015

**Date Approved:** 21-Apr-2015

**Approved By:**

**Details:** Keith Jones, Technical Manager

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## Results Summary - Soil

### Project: 6019 Logistics Site, Bae Samlesbury

Client: Sub Surface		Chemtest Job No.:		15-08615		15-08615		15-08615		15-08615		15-08615		15-08615		
Quotation No.:		Chemtest Sample ID.:		128523		128524		128525		128526		128527		128528		
Order No.: 6019		Client Sample Ref.:		185		188		120		123		211		216		
		Client Sample ID.:		BH1		BH1		BH2		BH2		BH3		BH3		
		Sample Type:		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		
		Top Depth (m):		0.0		1.20		0.0		0.60		0.0		1.20		
		Bottom Depth(m):														
		Date Sampled:		09-Apr-15		09-Apr-15		09-Apr-15		09-Apr-15		09-Apr-15		09-Apr-15		
Determinand	Accred.	SOP	Units	LOD												
AC:M Type	U	2192	%	0.001												
Asbestos Identification	U	2192	%	0.02												
Moisture	N	2030	%		15		18		15		15		15		15	
pH	U	2010			7.7		7.2		7.4		8.1		7.1		8.0	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	< 0.40		< 0.40		< 0.40		< 0.40		< 0.40		< 0.40	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.01	< 0.010		< 0.010		< 0.010		< 0.010		< 0.010		< 0.010	
Cyanide (Total)	U	2300	mg/kg	0.5	< 0.50		< 0.50		< 0.50		< 0.50		< 0.50		< 0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.5	6.8		15		2.2		2.2		4.0		4.0	
Sulphate (Total)	U	2430	%	0.01	0.033		0.066		0.018		0.018		0.096		0.096	
Arsenic	U	2450	mg/kg	1	18		14		9.8		9.8		11		11	
Cadmium	U	2450	mg/kg	0.1	0.11		0.17		0.14		0.14		0.36		0.36	
Chromium	U	2450	mg/kg	1	70		55		26		20		26		26	
Copper	U	2450	mg/kg	0.5	25		26		20		20		28		28	
Mercury	U	2450	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Nickel	U	2450	mg/kg	0.5	55		39		42		42		29		29	
Lead	U	2450	mg/kg	0.5	36		87		21		21		78		78	
Selenium	U	2450	mg/kg	0.2	< 0.20		< 0.20		< 0.20		< 0.20		< 0.20		< 0.20	
Zinc	U	2450	mg/kg	0.5	56		61		44		44		100		100	
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50		< 0.50		< 0.50		< 0.50		< 0.50		< 0.50	
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aliphatic TPH >C10-C12	U	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
Aliphatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
Aliphatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
Aliphatic TPH >C21-C35	U	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
Aliphatic TPH >C35-C44	U	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
Total Aliphatic Hydrocarbons	U	2675	mg/kg	5	< 5.0		< 5.0		< 5.0		< 5.0		< 5.0		< 5.0	
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10		< 0.10		< 0.10		< 0.10		< 0.10		< 0.10	
Aromatic TPH >C10-C12	N	2675	mg/kg	1	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	

## Results Summary - Soil

### Project: 6019 Logistics Site, Bae Samlesbury

Determination	Accred.	SOP	Units	LOD	15-08615		15-08615		15-08615		15-08615		15-08615		15-08615	
					128523	185	128524	188	128525	123	211	128527	128528	128529	128530	128531
Client: Sub Surface					09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15
Quotation No.:		Chemtest Job No.:		Chemtest Sample ID.:	128523	185	128524	188	128525	123	211	128527	128528	128529	128530	128531
Order No.: 6019		Client Sample Ref.:		Client Sample ID.:	BH1	BH1	BH1	BH1	BH2	BH3	BH3	BH3	BH3	BH3	BH4	BH4
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.0	1.20	1.20	1.20	0.0	0.60	0.0	0.0	0.30	1.20	0.0	0.30
		Bottom Depth(m):														
		Date Sampled:			09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15
		Accred.			U	U	U	U	U	U	U	U	U	U	U	U
Aromatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	N	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	U	2675	mg/kg	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	U	2675	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.1	8.8	2.1	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Acenaphthylene	U	2700	mg/kg	0.1	0.86	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Acenaphthene	U	2700	mg/kg	0.1	0.91	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Fluorene	U	2700	mg/kg	0.1	1.3	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Phenanthrene	U	2700	mg/kg	0.1	1.9	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Anthracene	U	2700	mg/kg	0.1	0.27	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.1	0.72	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Pyrene	U	2700	mg/kg	0.1	0.70	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Benzo[a]anthracene	U	2700	mg/kg	0.1	< 0.10	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Chrysene	U	2700	mg/kg	0.1	< 0.10	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	< 0.10	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	< 0.10	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2	16	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Benzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

## Results Summary - Soil

### Project: 6019 Logistics Site, Bae Samlesbury

Client: Sub Surface	Chemtest Job No.		Date Sampled:		Bottom Depth(m):	Sample Type:	Top Depth (m):	Bottom Depth(m):	15-08615		15-08615		15-08615		15-08615		15-08615			
	Quotation No.:	Chemtest Sample ID.:	128533	128534					128535	128536	128537	128538	128539	128540	128541	207 208 209				
Order No.: 6019	Client Sample Ref.:	166	188	169	245 246 247	TP1	TP1	TP1	TP2	TP3	TP3	TP3	TP3	TP3	TP3	TP3	TP3	TP3	TP4	
	Client Sample ID.:	BH5	BH5	BH5	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Top Depth (m):	0.0	0.30	0.90	0.90	0.90	0.90	0.90	0.90	1.20	1.20	1.20	1.20	1.20	1.50	1.50	1.50	1.50	0.30	
	Bottom Depth(m):																			
Determinand	Accred.	SOP	Units	LOD	Date Sampled:	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	
ACM Type	U	2192																		
Asbestos Identification	U	2192	%	0.001																
Moisture	N	2030	%	0.02			14	16	18	20	22	23	25							
pH	U	2010				7.8	7.6	8.2	7.9	7.6	7.8	7.6	7.7							
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4		< 0.40			0.50	0.55	0.40	0.40	0.66							
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.01			0.015	< 0.010												
Cyanide (Total)	U	2300	mg/kg	0.5		< 0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50							
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.5		2.0			5.4	7.5	2.1	8.9	2.0							
Sulphate (Total)	U	2430	%	0.01		0.032			0.24	0.13	0.090	0.17	0.16							
Arsenic	U	2450	mg/kg	1		8.6			10	17	16	17	12							
Cadmium	U	2450	mg/kg	0.1		< 0.10			0.16	1.8	0.23	0.26	0.40							
Chromium	U	2450	mg/kg	1		67			46	84	69	65	50							
Copper	U	2450	mg/kg	0.5		14			21	70	29	30	28							
Mercury	U	2450	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	0.51	< 0.10							
Nickel	U	2450	mg/kg	0.5		38			30	47	46	38	31							
Lead	U	2450	mg/kg	0.5		21			45	100	74	120	81							
Selenium	U	2450	mg/kg	0.2		< 0.20			< 0.20	< 0.20	< 0.20	< 0.20	< 0.20							
Zinc	U	2450	mg/kg	0.5		41			45	250	67	66	69							
Chromium (Hexavalent)	N	2490	mg/kg	0.5		< 0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50							
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aliphatic TPH >C10-C12	U	2675	mg/kg	1		< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0							
Aliphatic TPH >C12-C16	U	2675	mg/kg	1		< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0							
Aliphatic TPH >C16-C21	U	2675	mg/kg	1		< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0							
Aliphatic TPH >C21-C35	U	2675	mg/kg	1		< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0							
Aliphatic TPH >C35-C44	U	2675	mg/kg	5		< 5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0							
Total Aliphatic Hydrocarbons	N	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aromatic TPH >C5-C7	U	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aromatic TPH >C7-C8	U	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10							
Aromatic TPH >C10-C12	N	2675	mg/kg	1		< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0							

## Results Summary - Soil

**Project: 6019 Logistics Site, Bae Samlesbury**

Client: Sub Surface	Chemtest Job No.:		15-08615		15-08615		15-08615		15-08615		15-08615		15-08615	
	Quotation No.:	Chemtest Sample ID.:	128533	128534	128535	128536	128537	128538	128539	128540	128541	128542	128543	128544
Order No.:	Client Sample Ref.:	Client Sample ID.:	168	168	169	245 246 247	249 250 251	231 232 233	220 221 222	224 225 226	207 208 209	207 208 209	207 208 209	207 208 209
	Sample Type:	Sample ID.:	BH5	BH5	BH5	TP1	TP1	TP2	TP3	TP3	TP4	TP4	TP4	
	Top Depth (m):		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Bottom Depth (m):		0.0	0.30	0.90	0.60	1.20	0.50	0.50	1.50	0.30	0.30	0.30	
	Date Sampled:		09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	
	Accred.	SOP	Units	LOD										
Aromatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0	< 1.0	4.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.1	
Aromatic TPH >C21-C35	N	2675	mg/kg	1	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C35-C44	N	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aromatic Hydrocarbons	U	2675	mg/kg	5	< 5.0	< 5.0	6.5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Total Petroleum Hydrocarbons	U	2675	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	
Naphthalene	U	2700	mg/kg	0.1	< 0.10	3.1	1.9	< 0.10	2.7	< 0.10	3.0	< 0.10	3.3	
Acenaphthylene	U	2700	mg/kg	0.1	< 0.10	0.28	0.32	< 0.10	0.11	< 0.10	0.28	< 0.10	0.24	
Acenaphthene	U	2700	mg/kg	0.1	< 0.10	0.21	0.65	< 0.10	0.10	< 0.10	0.21	< 0.10	0.19	
Fluorene	U	2700	mg/kg	0.1	< 0.10	0.31	0.67	< 0.10	< 0.10	< 0.10	0.26	< 0.10	0.30	
Phenanthrene	U	2700	mg/kg	0.1	< 0.10	1.4	5.0	< 0.10	0.26	< 0.10	0.68	< 0.10	1.0	
Anthracene	U	2700	mg/kg	0.1	< 0.10	0.29	1.3	< 0.10	< 0.10	< 0.10	0.19	< 0.10	0.23	
Fluoranthene	U	2700	mg/kg	0.1	< 0.10	2.8	5.9	< 0.10	0.46	< 0.10	1.6	< 0.10	2.5	
Pyrene	U	2700	mg/kg	0.1	< 0.10	2.6	5.7	< 0.10	0.45	< 0.10	1.6	< 0.10	2.5	
Benzo[a]anthracene	U	2700	mg/kg	0.1	< 0.10	1.3	2.1	< 0.10	< 0.10	< 0.10	0.91	< 0.10	1.3	
Chrysene	U	2700	mg/kg	0.1	< 0.10	1.3	2.6	< 0.10	< 0.10	< 0.10	1.1	< 0.10	1.8	
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	< 0.10	1.8	2.8	< 0.10	< 0.10	< 0.10	2.3	< 0.10	2.2	
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	< 0.10	0.98	1.4	< 0.10	< 0.10	< 0.10	1.4	< 0.10	1.3	
Benzo[a]pyrene	U	2700	mg/kg	0.1	< 0.10	1.2	2.0	< 0.10	< 0.10	< 0.10	1.7	< 0.10	1.6	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	< 0.10	1.0	1.4	< 0.10	< 0.10	< 0.10	1.4	< 0.10	1.2	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	< 0.10	0.45	0.18	< 0.10	< 0.10	< 0.10	0.60	< 0.10	0.45	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	< 2.0	1.0	1.6	< 0.10	< 0.10	< 0.10	1.3	< 0.10	1.1	
Total Of 16 PAH's	U	2700	µg/kg	2	< 2.0	20	36	< 2.0	4.1	< 2.0	19	< 2.0	21	
Benzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
m & p-Xylene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Phenols	U	2920	mg/kg	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	



## Results Summary - Soil

### Project: 6019 Logistics Site, Bae Samlesbury

Client: Sub Surface	Chemtest Job No.:		15-08615		15-08615		15-08615		15-08615		15-08615		15-08615	
	Quotation No.:	Chemtest Sample ID.:	128542	128543	128544	128545	128546	128547	128548	128549	128550	128551	128552	128553
Order No.:	Client Sample Ref.:	211 212 213	216 217 218	176 177 178	180	198 199 200	202	170 171 172	174	183 184 185	186	194	196	
Client Sample ID.:	Sample Type:	TP4	TP4	TP5	TP5	TP6	TP6	TP7	TP7	TP8	TP8	TP7	TP8	
Top Depth (m):	SOIL	1.20	4.20	0.10	0.40	0.10	0.70	0.30	0.30	0.10	0.10	1.20	0.10	
Bottom Depth(m):	SOIL													
Date Sampled:	LOD	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	
Determinand	Units	Accred.	SOP	Units	LOD	Units	LOD	Units	LOD	Units	LOD	Units	LOD	
ACM Type	2192	U	2192	%	0.001	U	2192	%	0.001	U	2192	%	0.001	
Asbestos Identification		U	2192	%	0.001									
Molsture		N	2030	%	0.02									
pH		U	2010											
Boron (Hot Water Soluble)		U	2010	mg/kg	0.4									
Sulphate (2:1 Water Soluble) as SO4		U	2120	g/l	0.01									
Cyanide (Total)		U	2300	mg/kg	0.5									
Sulphide (Easily Liberatable)		U	2325	mg/kg	0.5									
Sulphate (Total)		U	2430	%	0.01									
Arsenic		U	2450	mg/kg	1									
Cadmium		U	2450	mg/kg	0.1									
Chromium		U	2450	mg/kg	1									
Copper		U	2450	mg/kg	0.5									
Mercury		U	2450	mg/kg	0.1									
Nickel		U	2450	mg/kg	0.5									
Lead		U	2450	mg/kg	0.5									
Selenium		U	2450	mg/kg	0.5									
Zinc		U	2450	mg/kg	0.5									
Chromium (Hexavalent)		N	2490	mg/kg	0.5									
Aliphatic TPH >C5-C6		N	2675	mg/kg	0.1									
Aliphatic TPH >C6-C8		N	2675	mg/kg	0.1									
Aliphatic TPH >C8-C10		U	2675	mg/kg	0.1									
Aliphatic TPH >C10-C12		U	2675	mg/kg	1									
Aliphatic TPH >C12-C16		U	2675	mg/kg	1									
Aliphatic TPH >C16-C21		U	2675	mg/kg	1									
Aliphatic TPH >C21-C35		U	2675	mg/kg	1									
Aliphatic TPH >C35-C44		U	2675	mg/kg	1									
Total Aliphatic Hydrocarbons		U	2675	mg/kg	1									
Aromatic TPH >C5-C7		U	2675	mg/kg	5									
Aromatic TPH >C7-C8		N	2675	mg/kg	0.1									
Aromatic TPH >C8-C10		U	2675	mg/kg	0.1									
Aromatic TPH >C10-C12		N	2675	mg/kg	1									

## Results Summary - Soil

**Project: 6019 Logistics Site, Bae Samlesbury**

Client: Sub Surface	Chemtest Job No.:		15-08615		15-08615		15-08615		15-08615		15-08615		15-08615						
	Chemtest Sample ID.:	Client Sample Ref.:	128542	211 212 213	128543	216 217 218	128544	176 177 178	128545	180	128546	198 199 200	128547	202	128548	170 171 172	128549	174	183 184 185
Order No.: 6019	Client Sample ID.:	Sample Type:	TP4	SOIL	TP4	SOIL	TP5	SOIL	TP5	SOIL	TP6	SOIL	TP6	SOIL	TP7	SOIL	TP7	SOIL	TP8
	Bottom Depth (m):		1.20	4.20	4.20	0.40	0.10	0.40	0.10	0.10	0.70	0.10	0.70	0.30	1.20	0.10	1.20	0.10	
	Date Sampled:		09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15	09-Apr-15
Determinand	Accred.	SOP	Units	LOD															
Aromatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	N	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2675	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	U	2675	mg/kg	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	U	2675	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.1	2.0	1.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Acenaphthylene	U	2700	mg/kg	0.1	0.16	0.29	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Acenaphthene	U	2700	mg/kg	0.1	0.11	0.23	0.29	0.29	0.29	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Fluorene	U	2700	mg/kg	0.1	0.16	0.39	0.30	0.30	0.30	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Phenanthrene	U	2700	mg/kg	0.1	0.74	1.1	1.0	1.0	1.0	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Anthracene	U	2700	mg/kg	0.1	0.15	0.21	0.30	0.30	0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.1	1.6	1.9	2.8	2.8	2.8	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Pyrene	U	2700	mg/kg	0.1	1.5	2.0	2.5	2.5	2.5	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Benzo[a]anthracene	U	2700	mg/kg	0.1	0.61	0.80	0.85	0.85	0.85	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Chrysene	U	2700	mg/kg	0.1	0.90	0.57	0.73	0.73	0.73	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	1.2	0.50	1.4	1.4	1.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	0.81	0.78	0.96	0.96	0.96	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	0.76	1.1	1.1	1.1	1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	0.62	0.78	0.68	0.68	0.68	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	< 0.10	0.49	0.30	0.30	0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	0.72	0.74	0.85	0.85	0.85	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	µg/kg	2	12	13	18	18	18	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Benzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylenes	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30



**Project: 6019 Logistics Site, Bae Samlesbury**

Client: Sub Surface		Chemtest Job No.:	15-08615		
Quotation No.:		Chemtest Sample ID.:	128551		
Order No.: 6019		Client Sample Ref.:	192 193 194		
		Client Sample ID.:	TP8		
		Sample Type:	SOIL		
		Top Depth (m):	1.70		
		Bottom Depth(m):			
		Date Sampled:	09-Apr-15		
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192	%		No Asbestos Detected
Asbestos Identification	U	2192	%	0.001	
Moisture	N	2030	%	0.02	56
pH	U	2010			7.5
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	2.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.01	1.7
Cyanide (Total)	U	2300	mg/kg	0.5	< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.5	9.5
Sulphate (Total)	U	2430	%	0.01	2.8
Arsenic	U	2450	mg/kg	1	10
Cadmium	U	2450	mg/kg	0.1	0.43
Chromium	U	2450	mg/kg	1	50
Copper	U	2450	mg/kg	0.5	44
Mercury	U	2450	mg/kg	0.1	< 0.10
Nickel	U	2450	mg/kg	0.5	38
Lead	U	2450	mg/kg	0.5	110
Selenium	U	2450	mg/kg	0.2	0.24
Zinc	U	2450	mg/kg	0.5	110
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10
Aliphatic TPH >C10-C12	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C12-C16	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C21-C35	U	2675	mg/kg	1	< 1.0
Aliphatic TPH >C35-C44	U	2675	mg/kg	1	< 1.0
Total Aliphatic Hydrocarbons	U	2675	mg/kg	5	< 5.0
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1	< 0.10
Aromatic TPH >C10-C12	N	2675	mg/kg	1	< 1.0

**Project: 6019 Logistics Site, Bae Samlesbury**

Client: Sub Surface	Chemtest Job No.: 15-08615			
Quotation No.:	Chemtest Sample ID.: 128551			
Order No.: 6019	Client Sample Ref.: 192 193 194			
	Client Sample ID.: TP8			
	Sample Type: SOIL			
	Top Depth (m): 1.70			
	Bottom Depth(m):			
	Date Sampled: 09-Apr-15			
Determinand	Accred.	SOP	Units	LOD
Aromatic TPH >C12-C16	U	2675	mg/kg	1
Aromatic TPH >C16-C21	U	2675	mg/kg	1
Aromatic TPH >C21-C35	N	2675	mg/kg	1
Aromatic TPH >C35-C44	N	2675	mg/kg	1
Total Aromatic Hydrocarbons	U	2675	mg/kg	5
Total Petroleum Hydrocarbons	U	2675	mg/kg	10
Naphthalene	U	2700	mg/kg	0.1
Acenaphthylene	U	2700	mg/kg	0.1
Acenaphthene	U	2700	mg/kg	0.1
Fluorene	U	2700	mg/kg	0.1
Phenanthrene	U	2700	mg/kg	0.1
Anthracene	U	2700	mg/kg	0.1
Fluoranthene	U	2700	mg/kg	0.1
Pyrene	U	2700	mg/kg	0.1
Benzo[a]anthracene	U	2700	mg/kg	0.1
Chrysene	U	2700	mg/kg	0.1
Benzo[b]fluoranthene	U	2700	mg/kg	0.1
Benzo[k]fluoranthene	U	2700	mg/kg	0.1
Benzo[a]pyrene	U	2700	mg/kg	0.1
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.1
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1
Total Of 16 PAH's	U	2700	mg/kg	2
Benzene	U	2760	µg/kg	1
Toluene	U	2760	µg/kg	1
Ethylbenzene	U	2760	µg/kg	1
m & p-Xylene	U	2760	µg/kg	1
o-Xylene	U	2760	µg/kg	1
Methyl Tert-Butyl Ether	U	2760	µg/kg	1
Total Phenols	U	2920	mg/kg	0.3

## Report Information

### Key

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- U/S Unsuitable Sample
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- > "greater than"

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Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

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### Sample Deviation Codes

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

### Sample Retention and Disposal

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All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.co.uk](mailto:customerservices@chemtest.co.uk)



## Final Report

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**Report Number:** 15-09695 Issue-1

**Initial Date of Issue:** 07-May-2015

**Client:** Sub Surface

**Client Address:** 3 Peel Street  
Preston  
Lancashire  
PR2 2QS

**Contact(s):** Simon Gabbatt

**Project:** 6019 Logistics Site, BAE Samlesbury

**Quotation No.:**

**Date Received:** 28-Apr-2015

**Order No.:**

**Date Instructed:** 30-Apr-2015

**No. of Samples:** 1

**Turnaround: (Wkdays)** 5

**Results Due Date:** 07-May-2015

**Date Approved:** 07-May-2015

**Approved By:**

**Details:** Robert Monk, Technical Development  
Chemist

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**Project: 6019 Logistics Site, BAE Samlesbury**

Client: Sub Surface	Chemtest Job No.:	16-06585		
Quotation No.:	Chemtest Sample ID.:	133813		
Order No.:	Client Sample Ref.:	TP1		
	Client Sample ID.:	253 254 255		
	Sample Type:	SOIL		
	Top Depth (m):	3.20		
	Bottom Depth(m):			
	Date Sampled:	09-Apr-15		
Determinand	Accred.	SOP	Units	LOD
Moisture	N	2030	%	0.02
pH	U	2010		7.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4
Cyanide (Total)	U	2300	mg/kg	< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.5
Sulphate (Total)	U	2430	%	0.01
Arsenic	U	2450	mg/kg	1
Cadmium	U	2450	mg/kg	0.1
Chromium	U	2450	mg/kg	1
Copper	U	2450	mg/kg	0.5
Mercury	U	2450	mg/kg	0.1
Nickel	U	2450	mg/kg	0.5
Lead	U	2450	mg/kg	0.5
Selenium	U	2450	mg/kg	0.2
Zinc	U	2450	mg/kg	0.5
Chromium (Hexavalent)	N	2490	mg/kg	0.5
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1
Aliphatic TPH >C10-C12	U	2675	mg/kg	1
Aliphatic TPH >C12-C16	U	2675	mg/kg	1
Aliphatic TPH >C16-C21	U	2675	mg/kg	1
Aliphatic TPH >C21-C35	U	2675	mg/kg	1
Aliphatic TPH >C35-C44	U	2675	mg/kg	1
Total Aliphatic Hydrocarbons	U	2675	mg/kg	5
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1
Aromatic TPH >C10-C12	N	2675	mg/kg	1
Aromatic TPH >C12-C16	U	2675	mg/kg	1
Aromatic TPH >C16-C21	U	2675	mg/kg	1
Aromatic TPH >C21-C35	N	2675	mg/kg	1
Aromatic TPH >C35-C44	N	2675	mg/kg	1

**Results Summary - Soil**

**Project: 6019 Logistics Site, BAE Samlesbury**

Client: Sub Surface	Chemtest Job No.:	15-096805		
Quotation No.:	Chemtest Sample ID.:	133913		
Order No.:	Client Sample Ref.:	TP1		
	Client Sample ID.:	253 254 255		
	Sample Type:	SOIL		
	Top Depth (m):	3.20		
	Bottom Depth(m):			
	Date Sampled:	08-Apr-15		
Determinand	Accred.	SOP	Units	LOD
Total Aromatic Hydrocarbons	U	2675	mg/kg	5
Total Petroleum Hydrocarbons	U	2675	mg/kg	10
Naphthalene	U	2700	mg/kg	0.1
Acenaphthylene	U	2700	mg/kg	0.1
Acenaphthene	U	2700	mg/kg	0.1
Fluorene	U	2700	mg/kg	0.1
Phenanthrene	U	2700	mg/kg	0.1
Anthracene	U	2700	mg/kg	0.1
Fluoranthene	U	2700	mg/kg	0.1
Pyrene	U	2700	mg/kg	0.1
Benzo[a]anthracene	U	2700	mg/kg	0.1
Chrysene	U	2700	mg/kg	0.1
Benzo[b]fluoranthene	U	2700	mg/kg	0.1
Benzo[k]fluoranthene	U	2700	mg/kg	0.1
Benzo[a]pyrene	U	2700	mg/kg	0.1
Indeno[1,2,3-c,d]Pyrene	U	2700	mg/kg	0.1
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.1
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1
Total Of 16 PAH's	U	2700	mg/kg	2
Benzene	U	2760	µg/kg	1
Toluene	U	2760	µg/kg	1
Ethylbenzene	U	2760	µg/kg	1
m. & p-Xylene	U	2760	µg/kg	1
o-Xylene	U	2760	µg/kg	1
Methyl Tert-Butyl Ether	U	2760	µg/kg	1
Total Phenols	U	2920	mg/kg	0.3

## Report Information

### Key

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- U UKAS accredited
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- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### Sample Deviation Codes

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

### Sample Retention and Disposal

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All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.co.uk](mailto:customerservices@chemtest.co.uk)



## Final Report

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**Report Number:** 15-11041 Issue-1

**Initial Date of Issue:** 20-May-2015

**Client:** Sub Surface

**Client Address:** 3 Peel Street  
Preston  
Lancashire  
PR2 2QS

**Contact(s):** Simon Gabbatt

**Project:** 6019 Logistics Site, BAE Samlesbury, Bladerston, Lancashire

**Quotation No.:** **Date Received:** 14-May-2015

**Order No.:** **Date Instructed:** 14-May-2015

**No. of Samples:** 3

**Turnaround: (Wkdays)** 5 **Results Due Date:** 20-May-2015

**Date Approved:** 20-May-2015

**Approved By:**

**Details:** Keith Jones, Technical Manager

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**Project: 6019 Logistics Site, BAE Samesbury, Bladeston, Lancashire**

Client: Sub Surface		Chemtest Job No.:	15-11041	15-11041	15-11041
Quotation No.:		Chemtest Sample ID.:	140278	140279	140280
Order No.:		Client Sample Ref.:	203 204 205	206 207 208	209 210 211
		Client Sample ID.:	BH1	BH2	BH5
		Sample Type:	WATER	WATER	WATER
		Top Depth (m):	0.20	0.95	4.35
		Bottom Depth(m):			
		Date Sampled:	12-May-15	12-May-15	12-May-15
Determinand	Ascert.	SOP	Units	LOD	
pH	U	1010			
Sulphate	U	1220	mg/l	1	7.8
Cyanide (Total)	U	1300	mg/l	0.05	< 0.050
Sulphide	U	1325	mg/l	0.05	< 0.050
Arsenic (Dissolved)	U	1450	µg/l	1	2.9
Boron (Dissolved)	U	1450	µg/l	20	180
Cadmium (Dissolved)	U	1450	µg/l	0.08	0.084
Chromium (Dissolved)	U	1450	µg/l	1	< 1.0
Copper (Dissolved)	U	1450	µg/l	1	4.5
Mercury (Dissolved)	U	1450	µg/l	0.5	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1	3.2
Lead (Dissolved)	U	1450	µg/l	1	1.7
Selenium (Dissolved)	U	1450	µg/l	1	1.7
Zinc (Dissolved)	U	1450	µg/l	1	93
Chromium (Hexavalent)	U	1490	µg/l	20	< 20
Total TPH >C6-C40	U	1670	µg/l	10	< 10
Aliphatic TPH >C6-C6	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.1	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.1	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.1	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.1	< 0.10

**Project: 6019 Logistics Site, BAE Samlesbury, Bladderston, Lancashire**

Client: Sub Surface	Chemtest Job No.: 15-11041	15-11041	15-11041		
Quotation No.:	Chemtest Sample ID.: 140278	140279	140280		
Order No.:	Client Sample Ref.: 203 204 205	206 207 208	209 210 211		
	Client Sample ID.: BH1	BH2	BH5		
	Sample Type: WATER	WATER	WATER		
	Top Depth (m): 0.20	0.95	4.35		
	Bottom Depth (m):				
	Date Sampled: 12-May-15	12-May-15	12-May-15		
Determinand	Accred.	SOP	Units	LOD	Result
Total Aromatic Hydrocarbons	N	1675	µg/l	5	< 5.0
Total Petroleum Hydrocarbons	U	1675	µg/l	10	< 10
Naphthalene	U	1700	µg/l	0.1	< 0.10
Acenaphthylene	U	1700	µg/l	0.1	< 0.10
Acenaphthene	U	1700	µg/l	0.1	< 0.10
Fluorene	U	1700	µg/l	0.1	< 0.10
Phenanthrene	U	1700	µg/l	0.1	< 0.10
Anthracene	U	1700	µg/l	0.1	< 0.10
Fluoranthene	U	1700	µg/l	0.1	< 0.10
Pyrene	U	1700	µg/l	0.1	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.1	< 0.10
Chrysene	U	1700	µg/l	0.1	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.1	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.1	< 0.10
Benzo[e]pyrene	U	1700	µg/l	0.1	< 0.10
Indeno[1,2,3-c,d]Pyrene	U	1700	µg/l	0.1	< 0.10
Dibenz[a,h]Anthracene	U	1700	µg/l	0.1	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.1	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2	< 2.0
Benzene	U	1760	µg/l	1	< 1.0
Toluene	U	1760	µg/l	1	< 1.0
Ethylbenzene	U	1760	µg/l	1	< 1.0
m & p-Xylene	U	1760	µg/l	1	< 1.0
o-Xylene	U	1760	µg/l	1	< 1.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1	< 1.0
Total Phenols	U	1900	mg/l	0.03	< 0.030

## Report Information

### Key

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### Sample Deviation Codes

---

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

### Sample Retention and Disposal

---

All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

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## Final Report

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**Report Number:** 15-08619 Issue-1

**Initial Date of Issue:** 24-Apr-2015

**Client:** Sub Surface

**Client Address:**  
3 Peel Street  
Preston  
Lancashire  
PR2 2QS

**Contact(s):** Simon Gabbatt

**Project:** 6019 Logistics Site, Bae Samlesbury

**Quotation No.:**

**Date Received:** 16-Apr-2015

**Order No.:** 6019

**Date Instructed:** 15-Apr-2015

**No. of Samples:** 4

**Turnaround: (Wkdays)** 7

**Results Due Date:** 23-Apr-2015

**Date Approved:** 24-Apr-2015

**Approved By:**

**Details:** Keith Jones, Technical Manager

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**Results Summary - 2 Stage WAC**  
Project: 6019 Logistics Site, Bae Samlesbury

Chemtest Job No: 15-08619  
Chemtest Sample ID: 128567  
Sample Ref: 252  
Sample ID: TP1  
Top Depth(m): 1.20  
Bottom Depth(m):  
Sampling Date: 09-Apr-2015

Determinand	SOP	Accred.	Units	Landfill Waste Acceptance Criteria		
				Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Total Organic Carbon	2625	U	%	3	5	6
Loss on Ignition	2610	U	%	-	-	10
Total BTEX	2760	U	mg/kg	6	-	-
Total PCBs (7 congeners)	2815	U	mg/kg	1	-	-
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	500	-	-
Total (of 17) PAHs	2700	N	mg/kg	100	-	-
pH	2010	U		-	>6	-
Acid Neutralisation Capacity	2015	N	mol/kg	-	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative 10:1 mg/kg
						Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
Arsenic	1450	U	0.002	0.001	< 0.050	< 0.050
Barium	1450	U	0.4	0.067	0.78	1.1
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010
Chromium	1450	U	0.03	0.037	0.058	0.36
Copper	1450	U	< 0.001	< 0.001	< 0.050	< 0.050
Mercury	1450	U	0.0006	< 0.0005	0.001	< 0.005
Molybdenum	1450	U	0.003	< 0.001	< 0.050	< 0.050
Nickel	1450	U	< 0.001	0.001	< 0.050	< 0.050
Lead	1450	U	< 0.001	< 0.001	< 0.010	< 0.010
Antimony	1450	U	0.003	< 0.001	< 0.010	< 0.010
Selenium	1450	U	0.001	< 0.001	< 0.010	< 0.010
Zinc	1450	U	0.003	< 0.001	< 0.50	< 0.50
Chloride	1220	U	2.5	1.8	< 10	19
Fluoride	1220	U	0.35	0.24	< 1.0	2.5
Sulphate	1220	U	2	< 1.0	< 10	< 10
Total Dissolved Solids	1020	N	100	66	200	700
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50
Dissolved Organic Carbon	1610	U	< 2.5	< 2.5	< 50	< 50

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	20

Leachate Test Information	
Leachant volume 1st extract/l	0.306
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.21

## Results Summary - 2 Stage WAC

Project: 6019 Logistics Site, Bae Samlesbury

Chemtest Job No: 15-08619  
 Chemtest Sample ID: 128568  
 Sample Ref: 234  
 Sample ID: TP2  
 Top Depth(m): 0.50  
 Bottom Depth(m):  
 Sampling Date: 09-Apr-2015

Determination	SOP	Accred.	Units	Landfill Waste Acceptance Criteria		
				Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Total Organic Carbon	2625	U	%	1.2	5	6
Loss on Ignition	2610	U	%	4.5	-	10
Total BTEX	2760	U	mg/kg	<0.01	-	-
Total PCBs (7 congeners)	2815	U	mg/kg	<0.10	-	-
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	29	-	-
Total (of 17) PAHs	2700	N	mg/kg	11	-	-
pH	2010	U		8.2	>6	-
Acid Neutralisation Capacity	2015	N	mol/kg	0.21	To evaluate	To evaluate
<b>Eluate Analysis</b>				<b>Cumulative 10:1 mg/kg</b>	<b>Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg</b>	
Arsenic	1450	U	0.009	<0.050	0.5	2
Barium	1450	U	0.046	<0.50	20	100
Cadmium	1450	U	0.0058	<0.010	0.04	1
Chromium	1450	U	0.02	<0.050	0.15	10
Copper	1450	U	0.01	<0.050	0.5	10
Mercury	1450	U	0.0011	<0.005	0.01	0.2
Molybdenum	1450	U	0.008	<0.050	0.5	10
Nickel	1450	U	0.009	<0.001	0.4	10
Lead	1450	U	0.007	0.001	0.5	10
Antimony	1450	U	0.006	<0.001	0.06	0.7
Selenium	1450	U	0.008	0.002	0.1	0.5
Zinc	1450	U	0.012	0.006	4	50
Chloride	1220	U	3.1	<10	800	15000
Fluoride	1220	U	0.31	<1.0	10	150
Sulphate	1220	U	4.7	<10	1000	20000
Total Dissolved Solids	1020	N	110	220	4000	60000
Phenol Index	1920	U	<0.030	<0.30	1	-
Dissolved Organic Carbon	1610	U	3.2	<2.5	500	800

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.312
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.201

Chemtest Job No: 15-08619  
Chemtest Sample ID: 128569  
Sample Ref: 227  
Sample ID: TP3  
Top Depth(m): 1.50  
Bottom Depth(m):  
Sampling Date: 09-Apr-2015

Determinand	SOP	Accred.	Units	Landfill Waste Acceptance Criteria		
				Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Wastes Landfill
Total Organic Carbon	2625	U	%	3	5	6
Loss on Ignition	2610	U	%	6	--	10
Total BTEX	2760	U	mg/kg	1	--	--
Total PCBs (7 congeners)	2815	U	mg/kg	500	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	100	--	--
Total (of 17) PAHs	2700	N	mg/kg	--	--	--
pH	2010	U		--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	--	To evaluate	To evaluate
<b>Eluate Analysis</b>			<b>2:1 mg/l</b>	<b>Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg</b>		
Arsenic	1450	U	0.002	8:1 mg/l	2:1 mg/kg	Cumulative 10:1 mg/kg
Barium	1450	U	0.032	<0.002	<0.050	<0.050
Cadmium	1450	U	<0.00010	<0.023	<0.50	<0.50
Chromium	1450	U	0.013	<0.00010	<0.010	<0.010
Copper	1450	U	0.002	0.012	<0.050	0.12
Mercury	1450	U	<0.0005	0.002	<0.050	<0.050
Molybdenum	1450	U	0.002	<0.0005	<0.001	<0.005
Nickel	1450	U	<0.001	0.002	<0.050	<0.050
Lead	1450	U	<0.001	<0.001	<0.050	<0.050
Antimony	1450	U	<0.001	<0.001	<0.010	<0.010
Selenium	1450	U	0.002	<0.001	<0.010	<0.010
Zinc	1450	U	0.008	0.001	<0.010	0.013
Chloride	1220	U	3	0.007	<0.50	<0.50
Fluoride	1220	U	0.28	1.7	<10	19
Sulphate	1220	U	11	0.2	<1.0	2.1
Total Dissolved Solids	1020	N	98	3.4	22	43
Phenol Index	1920	U	<0.030	62	190	660
Dissolved Organic Carbon	1610	U	2.7	<0.030	<0.30	<0.50

Solid information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.316
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.21

## Results Summary - 2 Stage WAC

Project: 6019 Logistics Site, Bae Samlesbury

Chemtest Job No: 15-08619  
 Chemtest Sample ID: 128570  
 Sample Ref: 219  
 Sample ID: TP4  
 Top Depth(m): 4.20  
 Bottom Depth(m):  
 Sampling Date: 09-Apr-2015

Determindand	SOP	Accred.	Units	Landfill Waste Acceptance Criteria Limits		
				Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Total Organic Carbon	2625	U	%	4	5	6
Loss on Ignition	2610	U	%	8.2	-	10
Total BTEX	2760	U	mg/kg	<0.01	-	-
Total PCBs (7 congeners)	2815	U	mg/kg	<0.10	-	-
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	20	500	-
Total (of 17) PAHs	2700	N	mg/kg	8.9	100	-
pH	2010	U		7.7	-	-
Acid Neutralisation Capacity	2015	N	mol/kg	0.031	>6	-
<b>Eluate Analysis</b>				<b>Cumulative 10:1 mg/kg</b>	<b>Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg</b>	
Arsenic	1450	U	2:1 mg/l	<0.050	<0.050	25
Barium	1450	U	0.031	<0.50	<0.50	300
Cadmium	1450	U	<0.00010	<0.010	0.04	5
Chromium	1450	U	0.012	<0.050	0.11	70
Copper	1450	U	0.002	<0.050	2	100
Mercury	1450	U	<0.0005	<0.001	0.01	2
Molybdenum	1450	U	0.002	<0.050	0.5	30
Nickel	1450	U	<0.001	<0.050	0.4	40
Lead	1450	U	<0.001	<0.010	0.5	50
Antimony	1450	U	<0.001	<0.010	0.06	5
Selenium	1450	U	0.001	<0.010	0.1	7
Zinc	1450	U	0.005	<0.50	4	200
Chloride	1220	U	3.7	<10	800	25000
Fluoride	1220	U	0.28	<1.0	10	500
Sulphate	1220	U	4	<10	1000	50000
Total Dissolved Solids	1020	N	90	180	4000	100000
Phenol Index	1920	U	<0.030	<0.30	1	-
Dissolved Organic Carbon	1610	U	<2.5	<50	500	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	20

Leachate Test Information	
Leachant volume 1st extract/l	0.306
Leachant volume 2nd extract/l	1.4
Eluant recovered from 1st extract/l	0.222



## Report Information

### Key

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- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### Sample Deviation Codes

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

### Sample Retention and Disposal

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All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.co.uk](mailto:customerservices@chemtest.co.uk)

**BOREHOLE RECORD SHEETS**



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Borehole  
Number  
**BH1**

Boring Method LIGHT CABLE PERCUSSIVE	Casing Diameter 150mm to 12.00m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 08/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00 0.10 0.20	B D D					(0.20) 0.20	MADE GROUND: grass over dark brown slightly gravelly silty clay with occasional rootlets. Gravel sized fragments are angular to subangular fine to medium stone and coal (topsoil).  Firm low strength becoming high strength brown and occasional grey mottled slightly gravelly silty CLAY with occasional rootlets. Gravel is subangular to subrounded fine to medium siltstone, mudstone and quartz.			
1.20-1.65 1.20-1.65 1.20-1.65	SPT N=8 B D			1,1/2,2,2,2		(2.30)				
2.00-2.45	U c=91kPa						.... below 2.00m : high strength			
2.50	D					2.50				
3.00-3.45 3.00-3.45 3.00-3.45	SPT N=9 B D			2,2/2,2,2,3						
4.00-4.45	U c=69kPa						.... below 4.00m : medum strength			
4.50	D									
5.00-5.45 5.00-5.45 5.00-5.45	SPT N=13 B D			2,2/3,3,3,4						
6.00-6.45	U c=81kPa						.... at 6.00m : high strength			
6.50	D									
7.50-7.95 7.50-7.95 7.50-7.95	SPT N=14 B D			2,2/3,3,4,4						
8.50	D									
9.00-9.45	U c=92kPa					(12.95)	.... at 9.00m : high strength			
9.50	D									

**Remarks**

Hand dug inspection pit from GL to 1.20m to check for services - 1hr  
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 6.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

Scale (approx)

1:50

Logged By

NM/SJ

Figure No.

6019.BH1



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel: (01772) 581135 Fax (01772) 204807

### Site

LOGISTICS SITE, BAE SAMLESBURY LANCASHIRE

### Borehole Number

**BH1**

### Boring Method

LIGHT CABLE PERCUSSIVE

### Casing Diameter

150mm to 12.00m

### Ground Level (mOD)

### Client

AEW ARCHITECTS & DESIGNERS LTD

### Job Number

6019

### Location

AS PLAN

### Dates

08/04/2015

### Engineer

TRP CONSULTING LTD

### Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.50-10.95 10.50-10.95	SPT N=15 B			2,2/3,4,4,4			Firm medium to high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse mudstone, siltstone, sandstone and quartz.			
12.00-12.45	U <sub>c</sub> =130kPa						... at 12.00m : high strength			
12.50	D									
13.50-13.95 13.50-13.95 13.50-13.95	SPT N=18 B D			2,3/4,4,5,5						
15.00-15.45 15.00-15.40	SPT N=23 D			3,4/5,5,6,7			... at 15.00m : high strength			
				08/04/2015:15.00m		15.45	Complete at 15.45m			

### Remarks

Scale (approx)

1:50

Logged By

NM/SJ

Figure No.

6019.BH1



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Borehole  
Number  
**BH2**

Boring Method  
LIGHT CABLE PERCUSSIVE

Casing Diameter  
150mm to 10.45m

Ground Level (mOD)

Client  
AEW ARCHITECTS & DESIGNERS LTD

Job  
Number  
6019

Location  
AS PLAN

Dates  
02/04/2015

Engineer  
TRP CONSULTING LTD

Sheet  
1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.60	B						MADE GROUND: grass over dark brown, grey and brown mottled slightly gravelly silty clay with many rootlets. Gravel sized fragments are angular to subangular fine to medium stone.			
0.20	D					(0.60)				
0.60	D					0.60				
0.60-1.20	B			Seepage(1) at 0.80m.		(1.10)	Firm high strength brown and occasional grey and orangish brown mottled slightly gravelly slightly sandy silty CLAY. Gravel is subrounded to rounded fine to coarse quartz, siltstone and sandstone.		∇1	
1.20-1.65	U c=110kPa					1.70				
1.70	D						Stiff medium to high strength dark brown and occasional grey mottled slightly gravelly silty CLAY with occasional plant remains. Gravel is subangular to rounded fine to medium quartz, siltstone and sandstone.			
2.00-2.45	SPT N=15			2,2/3,3,4,5		(1.80)				
2.00-2.45	B									
2.00-2.45	D									
3.00-3.45	U c=130kPa					3.50	.... at 3.00m : high strength			
3.50	D						Stiff medium strength dark brown slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to coarse quartz.			
4.00-4.45	SPT N=14			2,2/3,3,4,4						
4.00-4.45	B									
4.00-4.45	D									
5.50-5.95	U NR						.... at 5.50m : low cobble content			
6.00	D					(5.50)				
7.00-7.45	SPT N=12			2,2/3,3,3,3						
7.00-7.45	B									
7.00-7.45	D									
8.50-8.95	U c=63kPa									
9.00	D					9.00	Firm poorly laminated dark brown silty CLAY with occasional dustings of silt.			
						(1.00)				
10.00-10.45	SPT N=22			2,3/5,5,6,6						

### Remarks

Hand dug inspection pit from GL to 1.20m to check for services - 1hr  
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 6.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.  
NR = No Recovery

Scale (approx)

1:50

Logged By

NM/SJ

Figure No.

6019.BH2



**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel: (01772) 551135 Fax: (01772) 204907

Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Borehole  
 Number  
**BH2**

Boring Method  
 LIGHT CABLE PERCUSSIVE

Casing Diameter  
 150mm to 10.45m

Ground Level (mOD)

Client  
 AEW ARCHITECTS & DESIGNERS LTD

Job  
 Number  
 6019

Location  
 AS PLAN

Dates  
 02/04/2015

Engineer  
 TRP CONSULTING LTD

Sheet  
 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00-10.45	D			02/04/2015: DRY		10.00 (0.45) 10.45	Stiff high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse sandstone and siltstone.  Complete at 10.45m			

Remarks

Scale (approx)  
 1:50  
 Logged By  
 NM/SJ  
 Figure No.  
 6C18.BH2

**SUB SURFACE**SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIREBorehole  
Number  
**BH3**

Boring Method LIGHT CABLE PERCUSSIVE	Casing Diameter 150mm to 10.50m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 08/04/2015- 09/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00 0.10 0.30	B D D					(0.30) 0.30	MADE GROUND: grass over dark brown silty clay with occasional rootlets.		
0.80	D					(0.50) 0.80	Firm brown and occasional grey and light brown mottled slightly gravelly silty CLAY with occasional lenses of fine to medium sand. Gravel is subrounded to rounded fine to medium quartz and siltstone.		
1.20-1.65 1.20-1.65 1.20-1.65	SPT N=14 B D			2,2/3,3,4,4			Stiff medium strength locally very high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.		
2.00-2.45	U c=167kPa					(2.70)	.... at 2.00m : very high strength		
2.50	D								
3.00-3.45 3.00-3.45 3.00-3.45	SPT N=13 B D			2,2/3,3,3,4		3.50	Stiff high strength locally medium strength dark brown silty CLAY.		
4.00-4.45	U c=96kPa								
4.50	D								
5.00-5.45 5.00-5.45 5.00-5.45	SPT N=12 B D			2,2/3,3,3,3		(3.00)			
6.00-6.45	U c=78kPa			08/04/2015:5.50m 09/04/2015:DRY					
6.50	D					6.50	Firm medium strength dark brown silty CLAY.		
7.50-7.95 7.50-7.95 7.50-7.95	SPT N=15 B D			3,3/3,4,4,4		(2.50)			
9.00-9.45	U c=113kPa					9.00	Stiff high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.		
9.50	D								

Remarks Hand dug inspection pit from GL to 1.20m to check for services - 1hr Backfilled on completion.	Scale (approx)	Logged By
	1:50	NM/SJ
	Figure No. 6019.BH3	



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston PR2 2GS, Tel. (01772) 521135 Fax (01772) 204207

## Site

LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

## Borehole Number

BH3

### Boring Method

LIGHT CABLE PERCUSSIVE

### Casing Diameter

150mm to 10.50m

### Ground Level (mOD)

### Client

AEW ARCHITECTS & DESIGNERS LTD

### Job Number

6019

### Location

AS PLAN

### Dates

08/04/2015-  
09/04/2015

### Engineer

TRP CONSULTING LTD

### Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50-10.95 10.50-10.95 10.50-10.95	SPT N=18 B D			3,4/4,4,5,5			Stiff high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.		
12.00-12.45	Uc=107kPa				(6.45)				
12.50	D								
13.50-13.95	Uc=127kPa								
14.00	D								
15.00-15.45 15.00-15.45	SPT N=28 D			4,5/6,7,7,8		15.45	Complete at 15.45m		
				09/04/2015:15.00m					

### Remarks

Scale (approx)

1:50

Logged By

NM/SJ

Figure No.

6C19.BH3





# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Borehole  
Number  
**BH4**

Boring Method LIGHT CABLE PERCUSSIVE	Casing Diameter 150mm to 4.50m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 07/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00 0.10 0.30	B D D					(0.30) 0.30	MADE GROUND: dark brown slightly gravelly silty clay with occasional rootlets. Gravel sized fragments are angular to subangular fine to medium brick and stone.		
1.20-1.65	U c=180kPa					(1.40)	Firm becoming stiff very high strength brown and occasional grey and light brown mottled slightly gravelly silty CLAY with occasional lenses of silt. Gravel is subrounded to rounded fine to medium quartz.  ... at 1.20m : very high strength		
1.70	D					1.70	Stiff medium becoming high strength strength dark brown and occasional grey mottled slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz and sandstone.		
2.00-2.45 2.00-2.45 2.00-2.45	SPT N=14 B D			3,3/3,3,4,4		(1.80)			
3.00-3.45	U c=114kPa					3.50	Stiff high strength dark brown slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to coarse siltstone and quartz.		
3.50	D					3.50			
4.00-4.45 4.00-4.45 4.00-4.45	SPT N=18 B D			2,3/4,4,5,5		(2.00)			
5.00-5.45	U c=98kPa					5.50	Firm medium strength dark brown silty CLAY.		
5.50	D					5.50			
6.00-6.45 6.00-6.45 6.00-6.45	SPT N=12 B D			2,2/3,3,3,3		(2.50)			
7.50-7.95	U c=42kPa					8.00	Stiff medium to high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.		
8.00	D					8.00			
9.00-9.45 9.00-9.45 9.00-9.45	SPT N=16 B D			3,3/4,4,4,4					

Remarks Hand dug inspection pit from GL to 1.20m to check for services - 1hr Backfilled on completion.	Scale (approx)	Logged By
	1:50	NM/SJ
	Figure No. 6019.BH4	



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

## Site

LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

## Borehole Number

BH4

### Boring Method

LIGHT CABLE PERCUSSIVE

### Casing Diameter

150mm to 4.50m

### Ground Level (mOD)

### Client

A&W ARCHITECTS & DESIGNERS LTD

### Job Number

6019

### Location

AS PLAN

### Dates

07/04/2015

### Engineer

TRP CONSULTING LTD

### Sheet

2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description:	Legend	Water
10.50-10.95	U c=82kPa						Stiff medium to high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.  .... below 12.00m : high strength		
11.00	D				(7.45)				
12.00-12.45 12.00-12.45 12.00-12.45	SPT N=23 B D			3,4/5,6,6,6					
13.50-13.95	U c=125kPa								
14.00	D								
15.00-15.45 15.00-15.45	SPT N=26 D			4,5/6,6,7,7					
				07/04/2015:15.45m		15.45	Complete at: 15.45m		

### Remarks

Scale (approx)

1:50

Logged By

NM/SJ

Figure No.

6019.BH4



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE


Borehole  
Number  
**BH5**

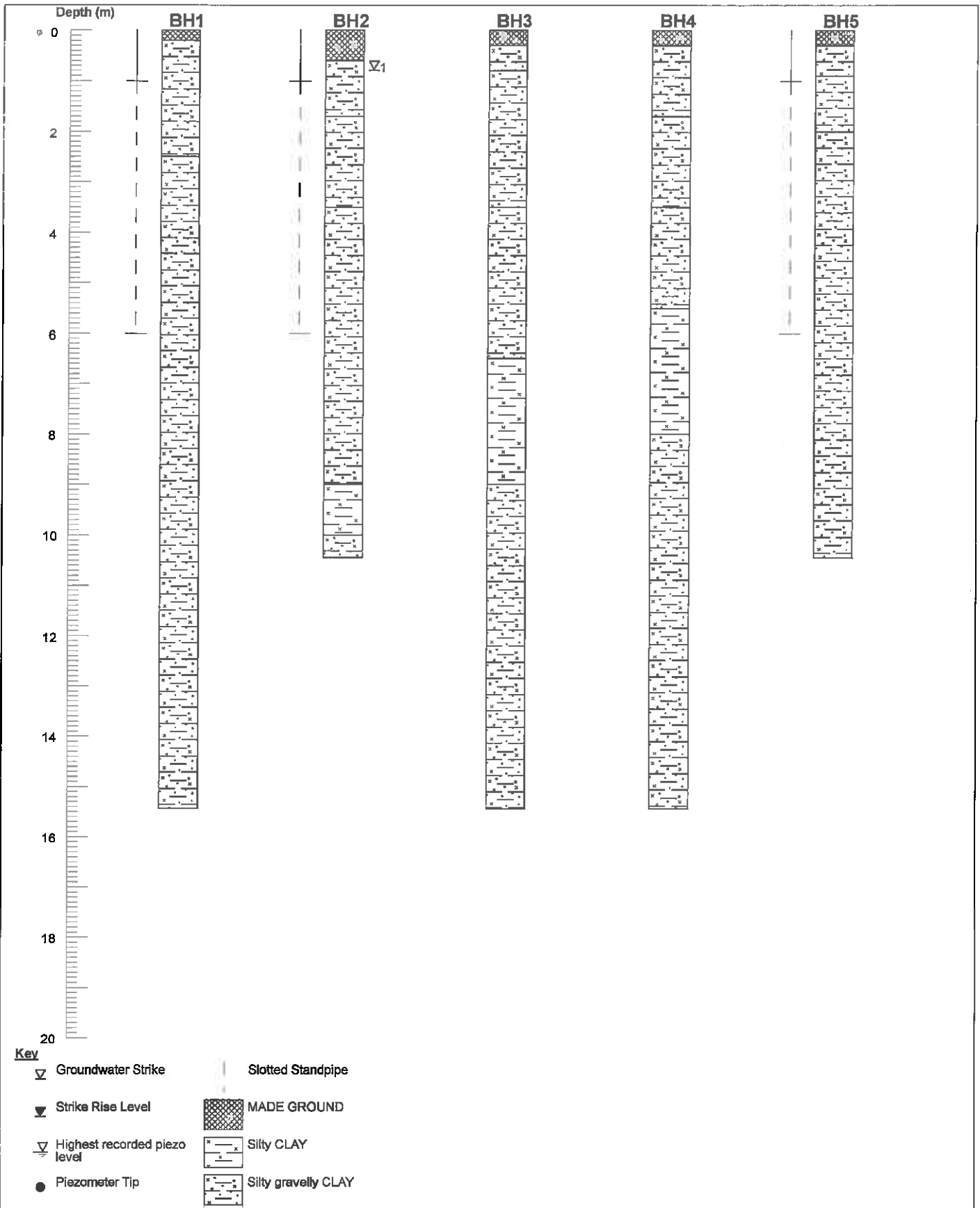
<b>Boring Method</b> LIGHT CABLE PERCUSSIVE		<b>Casing Diameter</b> 150mm to 3.00m		<b>Ground Level (mOD)</b>		<b>Client</b> AEW ARCHITECTS & DESIGNERS LTD		<b>Job Number</b> 6019	
		<b>Location</b> AS PLAN		<b>Dates</b> 07/04/2015		<b>Engineer</b> TRP CONSULTING LTD		<b>Sheet</b> 1/2	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00 0.10 0.30	B D D					(0.30) 0.30	MADE GROUND: dark brown slightly gravelly silty clay with many rootlets. Gravel sized fragments are angular to subrounded fine to coarse stone and brick.			
0.90	D					(0.60) 0.90	Firm brown and occasional grey and light brown mottled slightly gravelly CLAY with occasional lenses of silt. Gravel is subrounded fine to medium quartz.			
1.20-1.65	U c=169kPa					(1.10) 1.70	Stiff very high strength dark brown and occasional grey mottled slightly gravelly silty CLAY with occasional plant remains. Gravel is subrounded to rounded fine to medium siltstone and quartz.			
2.00-2.45 2.00-2.45 2.00-2.45	SPT N=13 B D			2,3/3,3,3,4		2.00	Stiff medium to high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse quartz, siltstone and sandstone.			
3.00-3.45	U c=150kPa						.... at 3.00m : high strength			
3.50	D									
4.00-4.45 4.00-4.45 4.00-4.45	SPT N=11 B D			1,2/2,3,3,3						
5.50-5.95	U c=70kPa									
6.00	D					(8.45) 6.00				
7.00-7.45 7.00-7.40 7.00-7.45	SPT N=18 B D			2,3/4,4,5,5						
8.50-8.95	U c=98kPa						.... below 8.50m : high strength			
9.00	D									
10.00-10.45	SPT N=19			3,4/4,5,5,5						

**Remarks**  
Hand dug inspection pit from GL to 1.20m to check for services - 1hr  
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 6.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

<b>Scale (approx)</b> 1:50	<b>Logged By</b> NM/SJ
<b>Figure No.</b> 8019.BH5	

 <b>SUB SURFACE</b> SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel: (01772) 581135 Fax: (01772) 204837							<b>Site</b> LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE			<b>Borehole Number</b> <b>BH5</b>	
<b>Boring Method</b> LIGHT CABLE PERCUSSIVE		<b>Casing Diameter</b> 150mm to 3.00m		<b>Ground Level (mOD)</b>		<b>Client</b> AEW ARCHITECTS & DESIGNERS LTD		<b>Job Number</b> 6019			
		<b>Location</b> AS PLAN		<b>Dates</b> 07/04/2015		<b>Engineer</b> TRP CONSULTING LTD		<b>Sheet</b> 2/2			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
10.00-10.45	D			07/04/2015:10.45m		10.45	Stiff medium to high strength dark brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse quartz, siltstone and sandstone.  Complete at 10.45m				
<b>Remarks</b>								<b>Scale (approx)</b> 1:50	<b>Logged By</b> NM/SJ	<b>Figure No.</b> 6019.BH5	



**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204807

**Site**  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

**Client**  
 AEW ARCHITECTS & DESIGNERS LTD

<b>Nominal Section</b>			
<b>Date Drawn</b> 03/06/2015	<b>Date Checked</b>	<b>Sheet</b> 1/1	<b>Job Number</b> 6019
<b>Drawn By</b>	<b>Checked By</b>	<b>Scale</b> 1:100[V]	<b>Figure No.</b> 6019.1

**TRIAL PIT RECORD SHEETS**



# SUB SURFACE

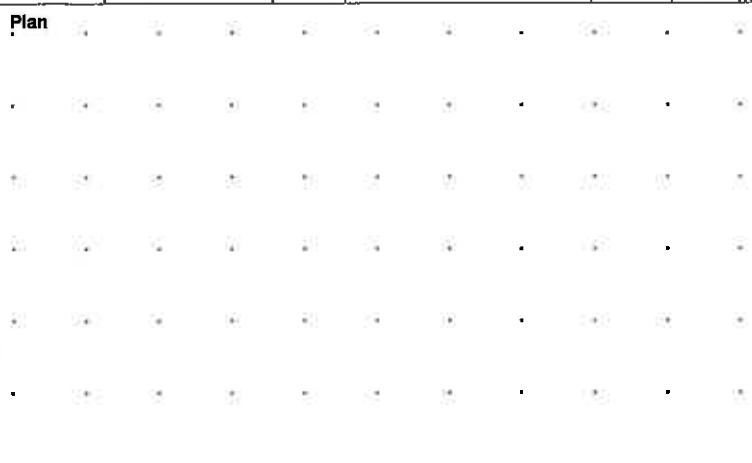
SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 581135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit  
Number  
**TP1**

Excavation Method MECHANICAL EXCAVATOR	Dimensions 0.70m x 3.80m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 09/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.01-0.30 0.01-0.30 0.01-0.30	A D V				(0.60)	MADE GROUND: grass over dark grey brown slightly sandy gravelly clay with some roots and rootlets (topsoil). Gravel sized fragments are fine to coarse stone.		
0.60-0.80 0.60-0.80 0.60-0.80 0.60-0.80	A B D V				0.60 (0.50)	MADE GROUND: brown and dark grey brown slightly sandy gravelly clay (subsoil) with some roots and rootlets and with low cobble content of brick and stone. Gravel sized fragments are fine to coarse stone, clay pipe, brick, slate and occasional slag and ceramics.		
1.20-1.40 1.20-1.40 1.20-1.40 1.20-1.40	A B D V				1.10	MADE GROUND: brown, dark grey and dark grey brown slightly sandy slightly gravelly clay with some roots and low cobble and boulder sized fragments of brick and stone. Gravel sized fragments are fine to coarse stone, brick and slag.		
			Seepage(1) at 2.00m.		(2.10)	..... below 2.00m : with occasional cobble and gravel sized fragments bituminous macadam		▽1
3.20-3.40 3.20-3.40 3.20-3.40 3.20-3.40	A B D V				3.20 (0.30) 3.50	MADE GROUND: dark grey and dark grey brown slightly ash slightly sandy gravelly clay with occasional rootlets and medium cobble content of brick and stone. Gravel sized fragments are fine to coarse stone, brick, slag, ash, burnt timber and wood.		
					(0.50)	MADE GROUND: brown, dark grey and dark grey brown slightly sandy slightly gravelly clay with some roots and low cobble and boulder sized fragments of brick and stone. Gravel sized fragments are fine to coarse stone, brick and slag.		
4.00	D				4.00			



**Remarks**

Pit sides remained stable and vertical.  
Seepage at 2.00m  
Measurements taken from high side of mound,  
A = Amber glass jar sample  
V = Vial sample  
On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP1



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS, Tel: (01772) 581133 Fax (01772) 204907

Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit  
 Number  
**TP1**

Excavation Method  
 MECHANICAL EXCAVATOR

Dimensions  
 0.70m x 3.60m

Ground Level (mOD)

Client  
 AEW ARCHITECTS & DESIGNERS LTD

Job  
 Number  
 6019

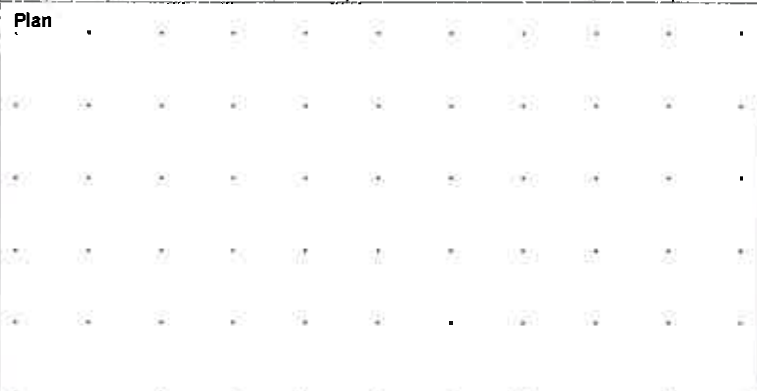
Location  
 AS PLAN

Dates  
 09/04/2015

Engineer  
 TRP CONSULTING LTD

Sheet  
 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			09/04/2015:		(0.10) 4.10	Stiff brown and occasional light grey mottled slightly sandy slightly gravelly slightly fissured CLAY with occasional rootlets and pockets of greenish medium to coarse sand. Gravel is subangular to rounded fine to coarse quartz, siltstone, sandstone and mudstone.  Complete at 4.10m		



Remarks

Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP1





# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 581135 Fax (01772) 204907

Site  
LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE  
Trial Pit Number  
**TP2**

Excavation Method MECHANICAL EXCAVATOR	Dimensions 0.70m x 3.40m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 09/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-0.70 0.50-0.70 0.50-0.70 0.50-0.70	A B D V				(0.30) 0.30	MADE GROUND: grass over dark grey brown slightly sandy gravelly clay (topsoil) with some roots and rootlets. Gravel sized fragments are fine to coarse stone and occasional brick.		
2.00-2.20	B		Seepage(1) at 1.80m.	(2.70)	MADE GROUND: brown, grey brown and grey slightly sandy gravelly clay with occasional roots and rootlets with low cobble content of stone. Gravel sized fragments are fine to coarse stone and occasional brick and glass.  .... at 2.20m : concrete block			
3.10-3.30 3.10-3.30 3.10-3.30 3.10-3.30	A B D V			3.00 (0.50)	MADE GROUND: dark brown clayey fine to coarse sand and gravel with low cobble content of stone. Gravel sized fragments are fine to coarse stone.			
3.90	D			3.50 (0.60)	Stiff brown and occasional light grey mottled slightly sandy slightly gravelly slightly fissured CLAY with occasional rootlets and pockets of greenish medium to coarse sand. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.			



Remarks

Pit sides remained stable and vertical.  
Seepage below 1.80m  
Measurements taken from high side of mound.  
A = Amber glass jar sample  
V = Vial sample  
On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP2



**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS, Tel: (01772) 561135 Fax: (01772) 204937

Site  
 LOGISTICS SITE, SAE SAMLESBURY, LANCASHIRE

Trial Pit  
 Number  
**TP2**

Excavation Method  
 MECHANICAL EXCAVATOR

Dimensions  
 3.70m x 3.42m

Ground Level (mOD)

Client  
 AEW ARCHITECTS & DESIGNERS LTD

Job  
 Number  
 6019

Location  
 AS PLAN

Dates  
 09/04/2015

Engineer  
 TRP CONSULTING LTD

Sheet  
 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			09/04/2015:		4.10	Stiff brown and occasional light grey mottled slightly sandy slightly gravelly slightly fissured CLAY with occasional rootlets and pockets of greenish medium to coarse sand. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.  Complete at 4.10m		

<b>Plan</b>								

<b>Remarks</b>		
Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP2



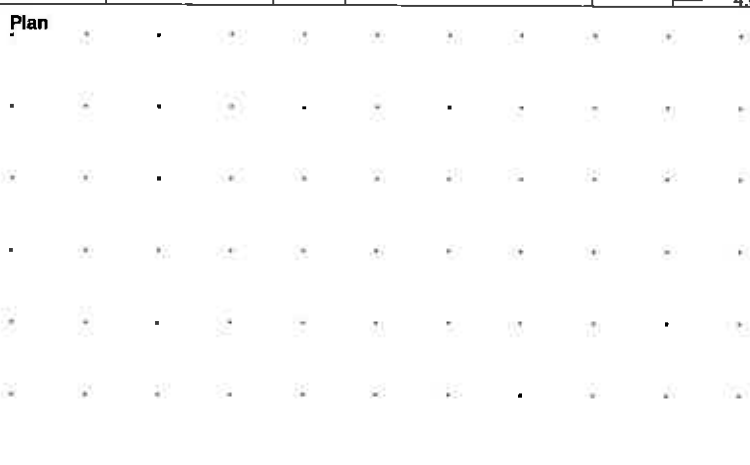
**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
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Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit  
 Number  
**TP3**

Excavation Method MECHANICAL EXCAVATOR	Dimensions 0.70m x 4.00m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 09/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-0.70 0.50-0.70 0.50-0.70 0.50-0.70	A B D V				(0.30) 0.30	MADE GROUND: grass over dark grey brown slightly sandy slightly gravelly clay (topsoil) with many roots and rootlets. Gravel sized fragments are fine to coarse stone and occasional brick.		
					(1.10)	MADE GROUND: brown and grey brown slightly sandy gravelly clay with occasional rootlets. Gravel sized fragments are fine to coarse stone and occasional brick, slag and an old piece of land drain.		
1.50-1.70 1.50-1.70 1.50-1.70 1.50-1.70	A B D V		Seepage(1) at 1.80m.		1.40 (0.80)	MADE GROUND: brown, grey brown, dark grey brown and whiteish grey slightly sandy gravelly clay with medium cobble content of bituminous macadam and with some roots and rootlets. Gravel sized fragments are fine to coarse stone, brick, bituminous macadam, concrete and slag.		
			Slow inflow(2) at 2.30m.		2.20 (0.80)	MADE GROUND: brown and grey brown and occasional yellow and red brown mottled slightly sandy gravelly CLAY with occasional rootlets. Gravel sized fragments are fine to coarse stone and occasional brick, slag and ceramics.		
2.50-2.70	B				3.00 (0.60)	MADE GROUND: brown, grey and yellow brown sandy gravelly clay with lenses of fine to medium sand and low cobble content of stone. Gravel sized fragments are fine to coarse stone and occasional brick.		V2
3.00-3.20	B				3.60 (0.40)	Firm to stiff brown and occasional grey mottled slightly sandy slightly gravelly CLAY with occasional rootlets, roots and plant remains. Gravel is subangular to rounded fine to coarse quartz, siltstone and mudstone.		
3.90	D		09/04/2015:		4.00			



**Remarks**

Pit sides remained stable and vertical.  
 Slight seepage below 1.80m  
 Measurements taken from high side of mound.  
 A = Amber glass jar sample  
 V = Vial sample  
 On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP3



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

### Site

LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit  
Number  
**TP4**

### Excavation Method

MECHANICAL EXCAVATOR

### Dimensions

0.70m x 3.40m

### Ground Level (mOD)

### Client

AEW ARCHITECTS & DESIGNERS LTD

Job  
Number  
6019

### Location

AS PLAN

### Dates

09/04/2015

### Engineer

TRP CONSULTING LTD

Sheet  
1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.50 0.30-0.50 0.30-0.50 0.30-0.50	A B D V				(1.00)	MADE GROUND: grass over dark grey brown slightly sandy slightly gravelly clay with some roots and rootlets and with low cobble content of stone. Gravel sized fragments are fine to coarse stone and occasional brick and slag (old topsoil and subsoil).		
1.20-1.50 1.20-1.50 1.20-1.50 1.20-1.50	A B D V				1.00 (1.60)	MADE GROUND: brown, dark brown and dark grey brown slightly sandy gravelly clay with occasional rootlets and low cobble content of brick, bituminous macadam and concrete. Gravel sized fragments are fine to coarse stone and occasional brick, slag, bituminous macadam and concrete.		
2.60-2.80	B		Seepage(1) at 2.60m.		2.80 (1.60)	MADE GROUND: brown and occasional dark grey brown slightly sandy very gravelly clay with low cobble content of stone and with occasional rootlets. Gravel sized fragments are fine to coarse stone and occasional brick and slag.  ..... below 3.00m : occasional glass and low cobble content of brick and material rag		Σ1

### Plan



### Remarks

Pit sides remained stable and vertical.  
Seepage below 2.60m  
Measurements taken from high side of mound.  
A = Amber glass jar sample  
V = Vial sample  
On completion backfilled with arisings.

### Scale (approx)

1:25

### Logged By

ALM/SJ

### Figure No.

6019.TP4



**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit Number  
**TP4**

Excavation Method  
 MECHANICAL EXCAVATOR

Dimensions  
 0.70m x 3.40m

Ground Level (mOD)

Client  
 AEW ARCHITECTS & DESIGNERS LTD

Job Number  
 6019

Location  
 AS PLAN

Dates  
 09/04/2015

Engineer  
 TRP CONSULTING LTD

Sheet  
 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
4.20-4.40 4.20-4.40 4.20-4.40 4.20-4.40	A B D V		09/04/2015:		4.20 (0.30) 4.50	MADE GROUND: dark grey and dark grey brown slightly sandy very gravelly clay with medium cobble content of sandstone, slate and stone and with occasional rootlets.. Gravel sized fragments are fine to coarse stone, sandstone, slate, glass, ceramics and brick.  Complete at 4.50m		

Plan

Remarks

Scale (approx) 1:25

Logged By ALM/SJ

Figure No. 6019.TP4



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 681155 Fax (01772) 204897

## Site

LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit  
 Number  
**TP5**

**Excavation Method**  
 MECHANICAL EXCAVATOR

**Dimensions**  
 0.47m x 1.50m

**Ground Level (mOD)**

**Client**  
 AEW ARCHITECTS & DESIGNERS LTD

**Job Number**  
 8019

**Location**  
 AS PLAN

**Dates**  
 07/04/2015

**Engineer**  
 TRP CONSULTING LTD

**Sheet**  
 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10-0.30	A				(0.40)	<b>MADE GROUND: long grasses over dark grey and dark brown and brown mottled slightly sandy slightly gravelly clay (topsoil) with many roots and rootlets. Gravel sized fragments are fine to coarse stone and occasional brick.</b>  Stiff high strength brown, orange brown, light grey, red brown, greenish brown and yellow brown mottled sandy gravelly CLAY with low cobble content of quartz and with some rootlets and lenses of silty fine to medium sand. Gravel is subangular fine to coarse quartz, sandstone and siltstone.  Stiff high strength brown and light grey mottled slightly sandy slightly gravelly CLAY with some root remains and lenses of fine to coarse sand and fine gravel. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.  .... below 1.60m : with some plant remains			
0.10-0.30	B			0.40					
0.10-0.30	D								
0.10-0.30	V								
0.40-0.60	B								
0.60-0.80	B		HV@0.60m, c=97kPa		(0.50)				
0.90	D		HV@0.90m, c=102kPa		0.90				
			HV@1.20m, c=100kPa		(0.90)				
			HV@1.50m, c=130+kPa						
1.80	D		07/04/2015 DRY		1.80	Complete at 1.80m			

## Plan



## Remarks

Pit sides remained stable and vertical.  
 No groundwater encountered.  
 A = Amber glass jar sample  
 V = Vial sample  
 HV = Hand Shear Vane test  
 On completion a soakaway test was carried out before being backfilled with arisings.

**Scale (approx)**

1:25

**Logged By**

ALM/SJ

**Figure No.**

6019.TP5



**SUB SURFACE**  
 SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 581135 Fax (01772) 204907

Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE

Trial Pit Number  
**TP6**

Excavation Method  
 MECHANICAL EXCAVATOR

Dimensions  
 0.70m x 2.00m

Location  
 AS PLAN

Ground Level (mOD)

Dates  
 09/04/2015

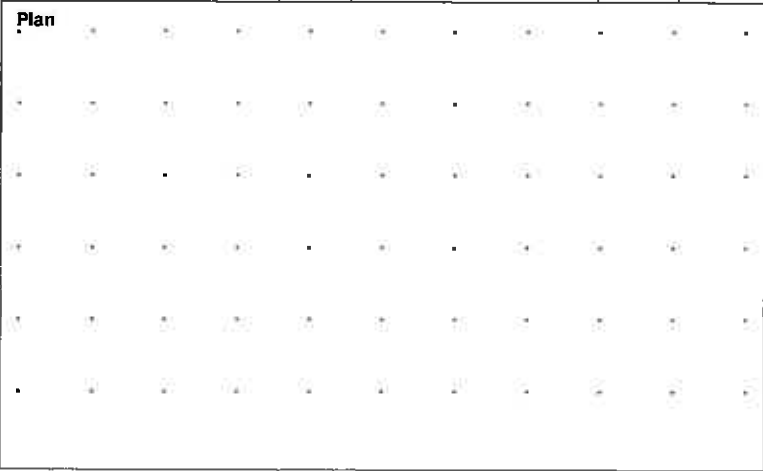
Client  
 AEW ARCHITECTS & DESIGNERS LTD

Engineer  
 TRP CONSULTING LTD

Job Number  
 6019

Sheet  
 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.30 0.10-0.30 0.10-0.30 0.10-0.30	A B D V				(0.30) 0.30 (0.30)	MADE GROUND: dark brown slightly sandy slightly gravelly clay (topsoil) with some roots and rootlets and low cobble content of brick. Gravel sized fragments are fine to coarse stone and occasional brick.		
0.70-0.90	B		HV@0.70m, c=88kPa		0.60 (0.40)	Firm, high strength brown, orange brown, grey and grey brown mottled slightly sandy gravelly CLAY with occasional lenses of silty fine sand and with some rootlets. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.		
1.20	D		HV@1.20m, c=122kPa		1.00	Stiff high strength brown and grey mottled slightly sandy gravelly CLAY with some rootlets. Gravel is subangular to rounded fine to coarse quartz, sandstone, mudstone and siltstone.		
2.00	D		HV@1.80m, c=130+kPa  HV@2.00m, c=130+kPa		(1.50)	.... below 1.80m : low cobble content of quartz slightly fissured and with occasional peat/plant remains and occasional lenses of greenish fine to coarse sand		
2.50	D		HV@2.50m, c=130+kPa 09/04/2015:DRY		2.50	Complete at 2.50m		



**Remarks**

Pit sides remained stable and vertical.  
 No groundwater encountered  
 A = Amber glass jar sample  
 V = Vial sample  
 HV = Hand Shear Vane test  
 On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	ALM/SJ	6019.TP6



Excavation Method MECHANICAL EXCAVATOR	Dimensions 0.97m x 1.20m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 07/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05-0.15	A				(0.15)	MADE GROUND: grass over dark grey brown slightly sandy slightly gravelly clay (topsoil) with many rootlets. Gravel sized fragments are fine to coarse stone and occasional brick.		
0.05-0.15	D				0.15			
0.05-0.15	V							
0.30-0.50	A				(0.55)	MADE GROUND: dark grey, dark grey brown and brown slightly sandy slightly gravelly clay with some plant and root remains and some rootlets. Gravel sized fragments are fine to coarse stone and occasional brick.		
0.30-0.50	D							
0.50-0.50	V							
0.80	D		HV@0.70m, c=93kPa		0.70	Stiff high strength brown, light brown, light grey and greenish brown slightly sandy slightly gravelly CLAY with occasional rootlets and lenses of silty fine to medium sand. Gravel is subangular to subrounded fine to coarse quartz, sandstone and siltstone.		
					(0.40)			
1.20	D		HV@1.20m, c=91kPa		1.10	Stiff high strength brown and grey mottled slightly sandy slightly gravelly CLAY with occasional rootlets, plant and root remains. Gravel is subangular to rounded fine to coarse quartz.		
					(0.70)			
1.80	D		HV@1.60m, c=125kPa		1.80	Complete at 1.80m		
			07/04/2015: DRY					

Plan	Remarks							
	Pit sides remained stable and vertical. Slight seepage at base. A = Amber glass jar sample V = Vial sample HV = Hand Shear Vane test On completion a soakaway test was carried out before being backfilled with arisings.							
	Scale (approx)	1:25	Logged By	ALM/SJ	Figure No.	6019.TP7		





# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 581135 Fax (01772) 204907

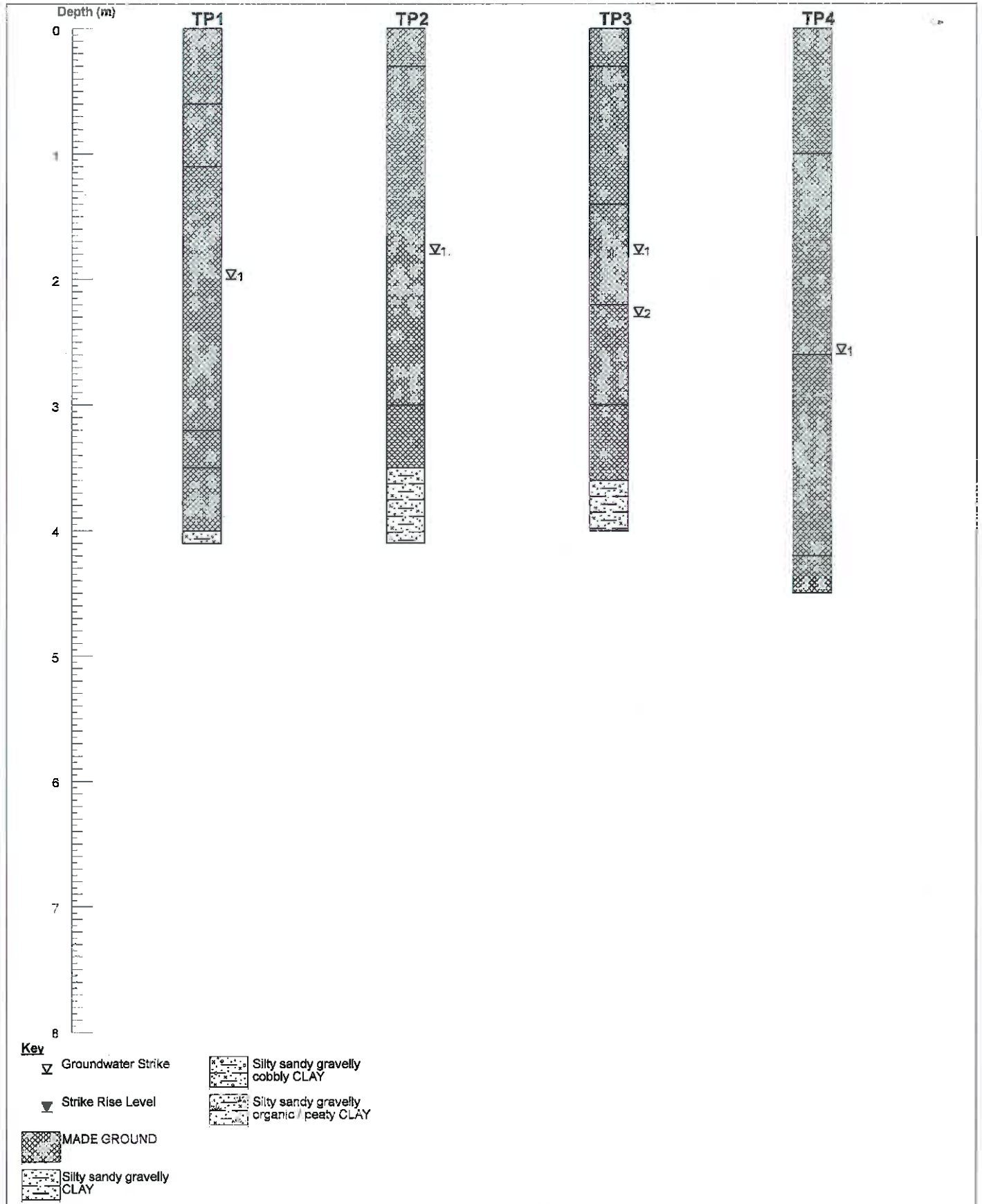
Site  
 LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE


Trial Pit  
 Number  
**TP8**

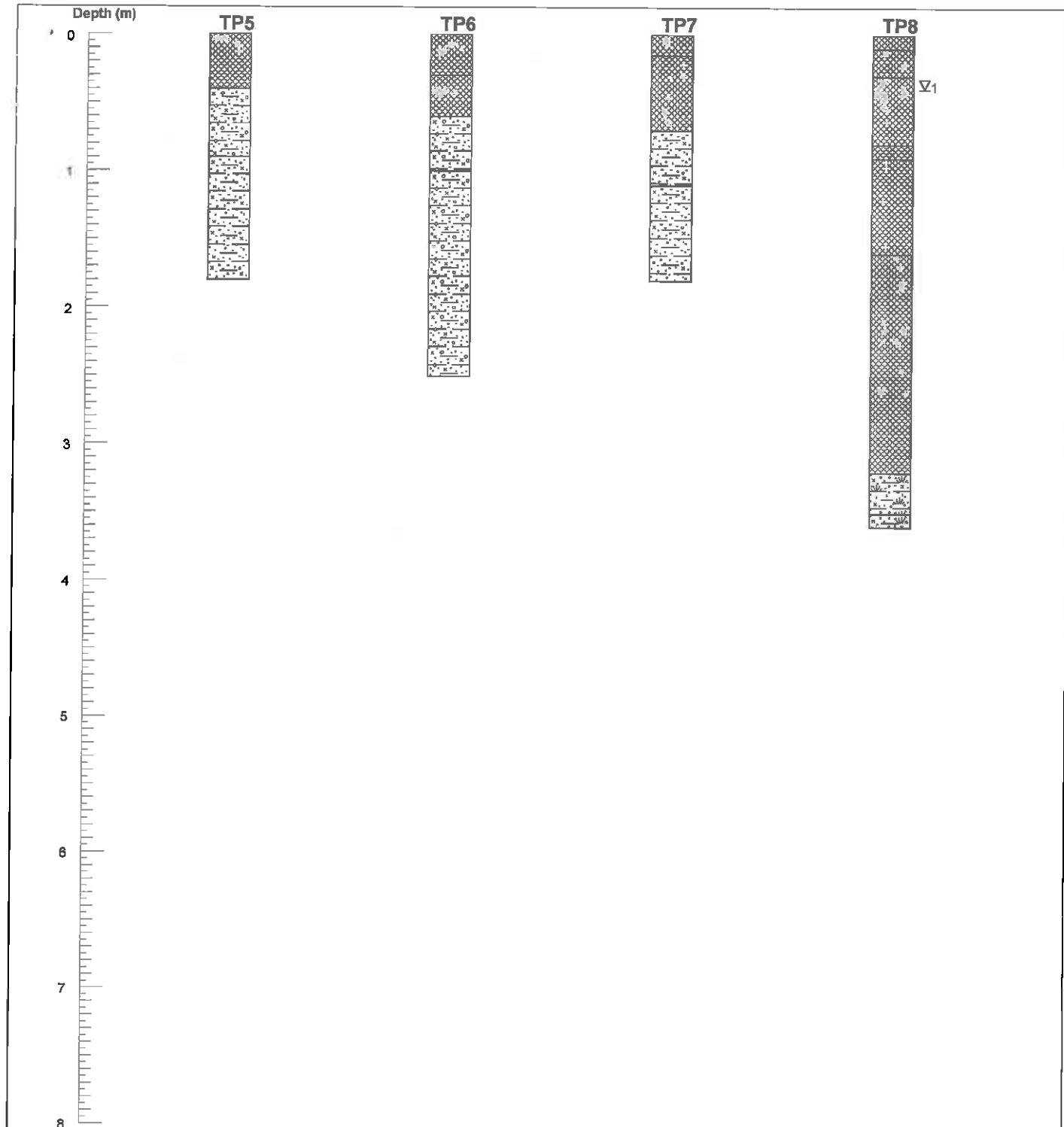
Excavation Method MECHANICAL EXCAVATOR	Dimensions 0.70m x 2.50m	Ground Level (mOD)	Client AEW ARCHITECTS & DESIGNERS LTD	Job Number 6019
	Location AS PLAN	Dates 09/04/2015	Engineer TRP CONSULTING LTD	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.30 0.10-0.30 0.10-0.30 0.10-0.30 0.30-0.50	A B D V B		Seepage(1) at 0.40m. HV@0.40m, c=76kPa		(0.10) 0.10 (0.20) 0.30	MADE GROUND: grass over dark grey brown slightly sandy slightly gravelly clay (topsoil) with some roots and rootlets. Gravel sized fragments are fine to coarse stone.  MADE GROUND: dark grey slightly clayey slightly sandy ashy fine to coarse gravel sized fragments of slag with occasional stone, clinker and brick.		Σ1
0.80 0.80 0.80	A D V				(0.80) (0.10) 0.90	MADE GROUND: stiff high strength brown, light grey, grey brown and dark grey mottled slightly sandy slightly gravelly clay with some rootlets. Gravel sized fragments are fine to coarse stone.		
1.10-1.30	B				(0.70)	MADE GROUND: soft to firm brown and grey brown slightly sandy slightly gravelly clay with some plant, root and peat remains and low cobble content of stone. Gravel sized fragments are fine to coarse stone, slag and timber (slight organic odour).		
1.70-1.90 1.70-1.90 1.70-1.90 1.70-1.90	A B D V				1.80	MADE GROUND: dark grey and dark grey brown silty organic peaty clay with some visible plant remains. Gravel sized fragments are fine to coarse brick and ceramics (slight organic odour).		
					(1.60)	.... below 2.20m : dark grey and dark brown (organic odour)		
3.20-3.40	B				3.20 (0.30)	Very soft brown and grey slightly gravelly silty CLAY with bands and pockets of yellow brown peat (organic odour). Gravel is subangular to rounded fine to coarse stone.		
3.80	D		HV@3.60m, c=88kPa 09/04/2015:DRY		3.50 (0.10) 3.60	Stiff high strength brown and light grey mottled slightly sandy slightly gravelly CLAY with occasional small pockets of peat/plant remains. Gravel is subangular to rounded fine to coarse quartz, sandstone and siltstone.  Complete at 3.60m		


Plan		Remarks						
		<p>Pit sides remained stable and vertical.          Seepage at 0.40m within the peat strata          A = Amber glass jar sample          V = Vial sample          HV = Hand Shear Vane test          On completion backfilled with arisings.</p>						
		<table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Figure No.</td> </tr> <tr> <td>1:25</td> <td>ALM/SJ</td> <td>6019.TP8</td> </tr> </table>	Scale (approx)	Logged By	Figure No.	1:25	ALM/SJ	6019.TP8
Scale (approx)	Logged By	Figure No.						
1:25	ALM/SJ	6019.TP8						



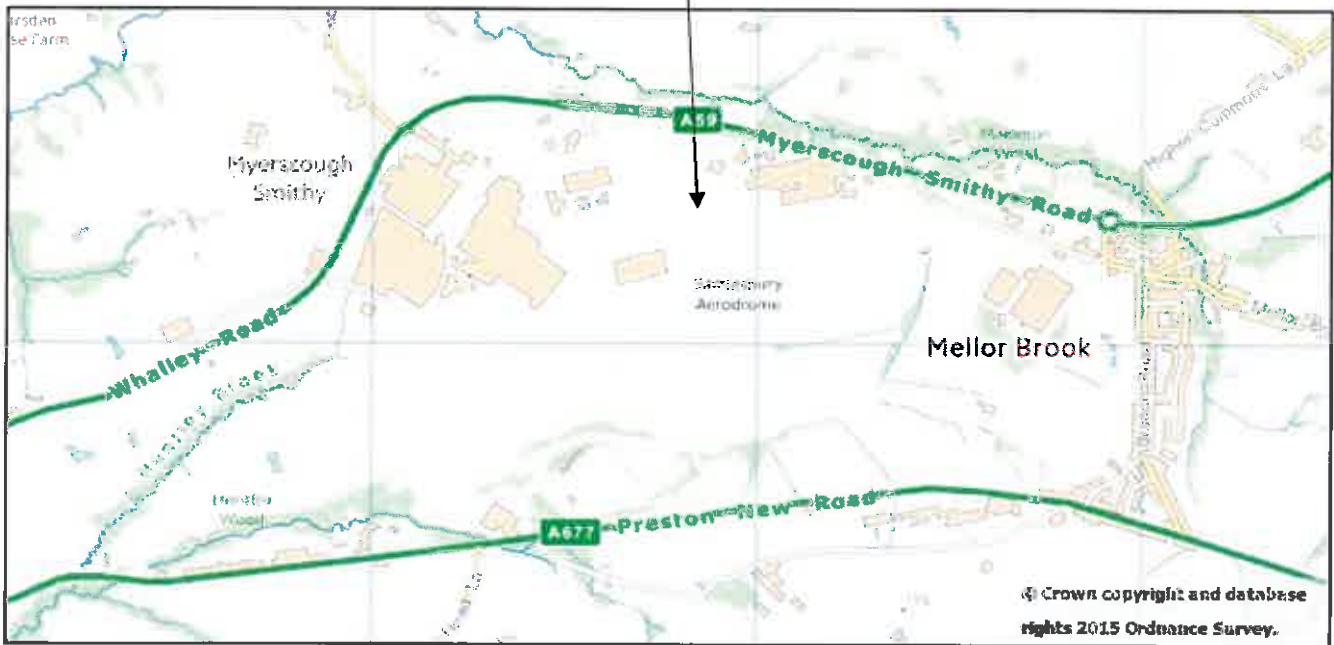
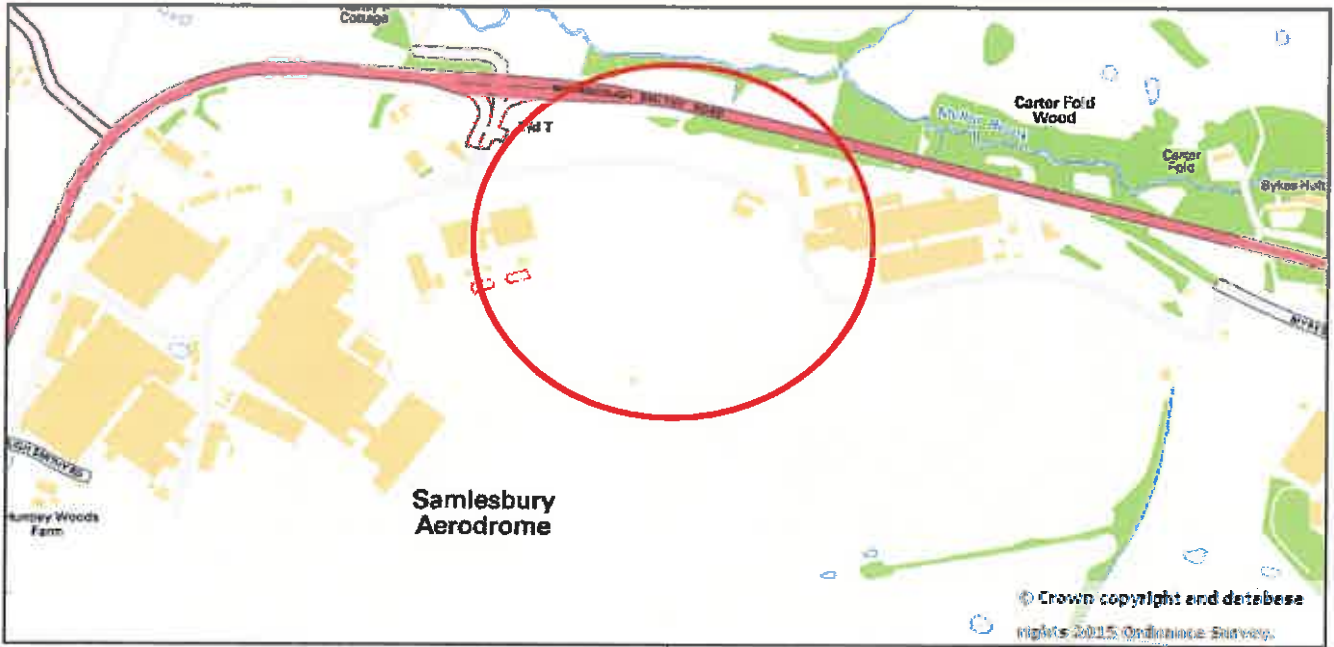
 <b>SUB SURFACE</b> SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	<b>Nominal Section</b>			
	<b>Site</b> LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE	<b>Date Drawn</b> 03/06/2015	<b>Date Checked</b>	<b>Sheet</b> 1/2
<b>Client</b> AEW ARCHITECTS & DESIGNERS LTD	<b>Drawn By</b>	<b>Checked By</b>	<b>Scale</b> 1:40 [1]	<b>Figure No.</b> 6019.1



- Key**
- ▽ Groundwater Strike
  - ▽ Strike Rise Level
  - MADE GROUND
  - Silty sandy gravelly CLAY
  - Silty sandy gravelly cobbly CLAY
  - Silty sandy gravelly organic / peaty CLAY

 <b>SUB SURFACE</b> SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	<b>Nominal Section</b>			
	<b>Date Drawn</b> 03/06/2015	<b>Date Checked</b>	<b>Sheet</b> 2/2	<b>Job Number</b> 6019
<b>Site</b> LOGISTICS SITE, BAE SAMLESBURY, LANCASHIRE	<b>Drawn By</b>	<b>Checked By</b>	<b>Scale</b> 1:40[V]	<b>Figure No.</b> 6019.1
<b>Client</b> AEW ARCHITECTS & DESIGNERS LTD				

## FIGURES




Base Plan Supplied by TRP Consulting

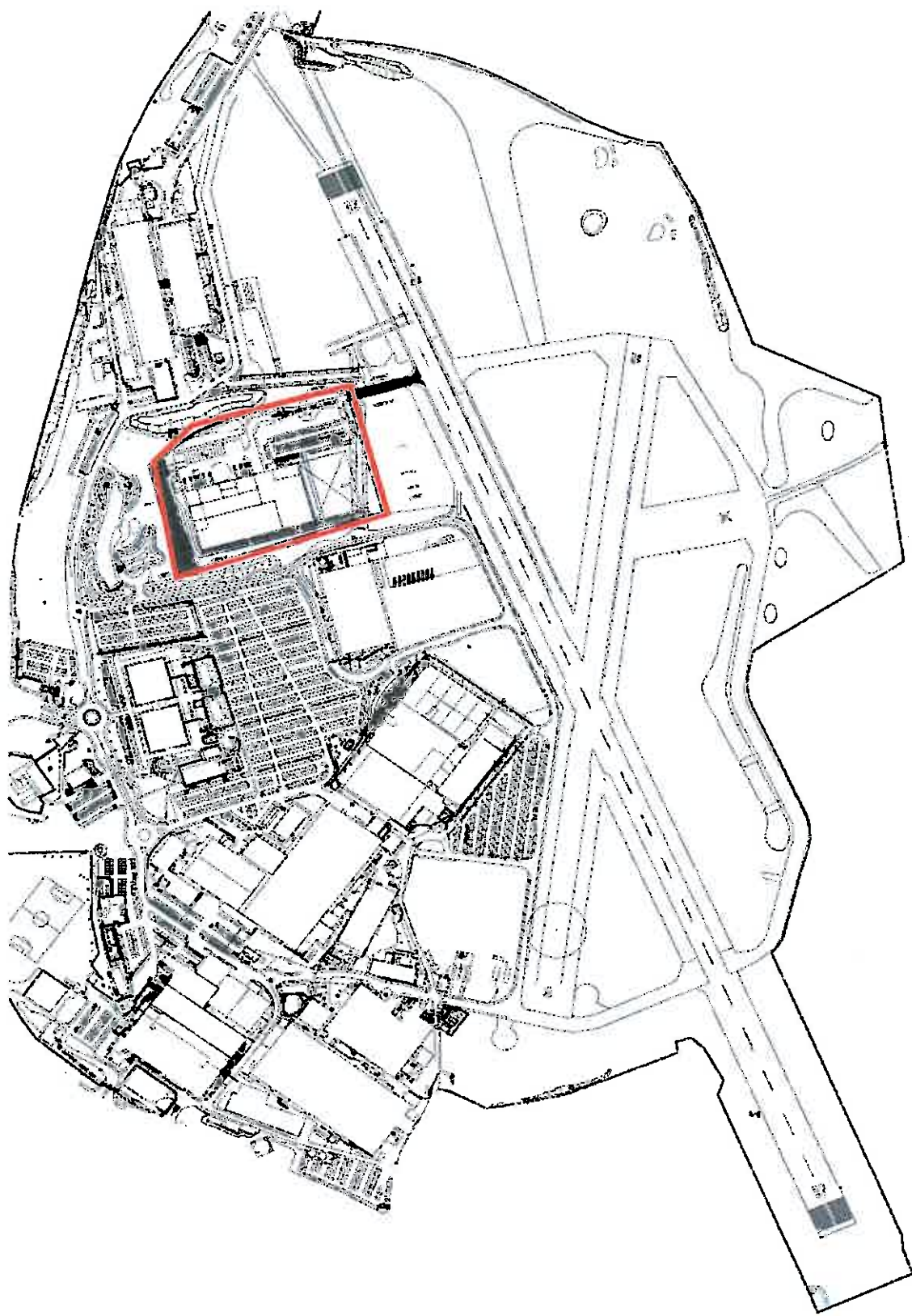


### SUB SURFACE



SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

### General Site Location

Site	Date Drawn	Date Checked	Orientation	Job No.
LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE	01/06/2015			6019
Client	Drawn By	Checked By	Scale	Figure No.
AEW ARCHITECTS AND DESIGNERS LIMITED	DJ		-	1



Base Plan Supplied by TRP Consulting

 <b>SUB SURFACE</b> SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561935 Fax (01772) 204907	<b>Site Location</b>			
	Date Drawn <b>01/06/2015</b>	Date Checked	Orientation 	Job No. <b>6019</b>
Site <b>LOGISTICS SITE, BAE SAMLESBURY, BALDERSTONE, LANCASHIRE</b>	Drawn By <b>DJ</b>	Checked By	Scale -	Figure No. <b>2</b>
Client <b>AEW ARCHITECTS AND DESIGNERS LIMITED</b>				

**Noise**

1. This study is to be used by the contractor to determine the noise abatement measures to be implemented.
2. The contractor shall report any noise abatement measures to the contractor.
3. Do not take any noise abatement measures until the contractor has been notified by the contractor.
4. Work shall be done in accordance with the contractor's noise abatement plan.
5. All work shall be done in accordance with the contractor's noise abatement plan.
6. The contractor shall be responsible for obtaining all necessary permits and approvals.

BOREHOLE S.O.P.s	
PROBID	PROBID Y
BO101	421291.029
BO102	421291.029
BO103	421291.029
BO104	421291.029
BO105	421291.029

TRIAL PIT S.O.P.s	
PROBID	PROBID Y
TP101	421291.029
TP102	421291.029
TP103	421291.029
TP104	421291.029
TP105	421291.029
TP106	421291.029
TP107	421291.029
TP108	421291.029

CBR S.O.P.s	
PROBID	PROBID Y
CBR101	421291.029
CBR102	421291.029
CBR103	421291.029
CBR104	421291.029
CBR105	421291.029
CBR106	421291.029
CBR107	421291.029
CBR108	421291.029

PILE TEST S.O.P.s	
PROBID	PROBID Y
PL101	421291.029
PL102	421291.029
PL103	421291.029
PL104	421291.029
PL105	421291.029
PL106	421291.029
PL107	421291.029
PL108	421291.029

GENERAL NOTES:  
 B - Information based on field observations, contractor's monitoring program, etc.  
 C - Information based on Construction  
 Note: \* Only 2 specimens to be used for CBR testing.

DATE: 21.03.16  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 PROJECT: BAE SYSTEMS PROJECT LASER

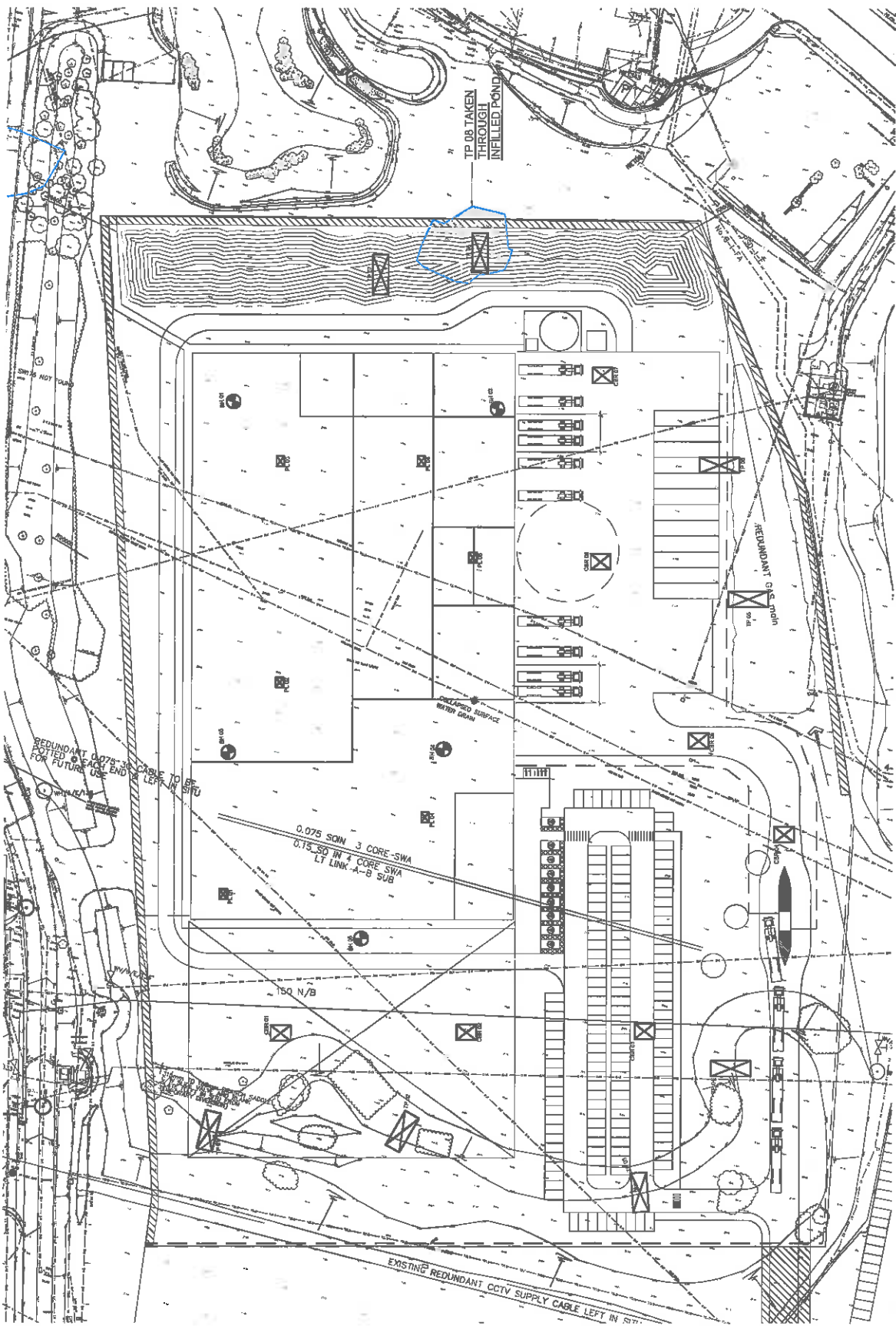
PROJECT: BAE SYSTEMS PROJECT LASER

CLIENT: BAE SYSTEMS

PROPOSED BOREHOLE TRIAL PIT AND CBR TEST LOCATIONS

TRIP CONSULTING  
 21 LINDA STREET, SUITE 101  
 MELBOURNE, VIC 3122  
 TEL: 03 9588 8899  
 FAX: 03 9588 8898  
 EMAIL: melbourne@tripconsulting.com.au

DATE: MARCH 16  
 SCALE: 1:500  
 PROJECT: BAE SYSTEMS PROJECT LASER



EXISTING SERVICE DIVERSION PLAN  
 SCALE 1:500

**KEY**

- TP: TRIAL PIT
- CBR: CBR TEST
- PL: PILE TEST
- SW: SWELL AND ALIEN BOREHOLE

**BOREHOLE DEPTHS**

- BO101 - 3.0m
- BO102 - 3.0m
- BO103 - 3.0m
- BO104 - 3.0m
- BO105 - 3.0m

- Notes**
- The Engineer is to be held responsible only for design of the structure, and not for the construction or maintenance of the same.
  - The Engineer is not responsible for the design of the foundation or other structures to be constructed on the proposed site.
  - The Engineer is not responsible for the design of any structures to be constructed on the proposed site, which are not shown on the plans or which are not indicated by notes.
  - The Engineer is not responsible for the design of any structures to be constructed on the proposed site, which are not shown on the plans or which are not indicated by notes.
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  - The Engineer is not responsible for the design of any structures to be constructed on the proposed site, which are not shown on the plans or which are not indicated by notes.

**SECTION A-A**  
SCALE: H 1/3200 V 1/250

Proposed Structure

Proposed Building

Proposed Parking

Proposed Road

Proposed Utility

Proposed Elevation

Proposed Structure

Proposed Building

Proposed Parking

Proposed Road

Proposed Utility

Proposed Elevation

**SECTION B-B**  
SCALE: H 1/3200 V 1/250

Proposed Structure

Proposed Building

Proposed Parking

Proposed Road

Proposed Utility

Proposed Elevation

Proposed Structure

Proposed Building

Proposed Parking

Proposed Road

Proposed Utility

Proposed Elevation

**Cut/Fill Summary**

Base  
Cut and Fill Analysis - Basic site footprint  
Totals

Station	Cut	Fill	Net
0+00	1,390	0.950	2705.423sq.m
0+50	1,390	0.950	2705.423sq.m
1+00	1,390	0.950	2705.423sq.m
1+50	1,390	0.950	2705.423sq.m
2+00	1,390	0.950	2705.423sq.m
2+50	1,390	0.950	2705.423sq.m
3+00	1,390	0.950	2705.423sq.m
3+50	1,390	0.950	2705.423sq.m
4+00	1,390	0.950	2705.423sq.m
4+50	1,390	0.950	2705.423sq.m
5+00	1,390	0.950	2705.423sq.m
5+50	1,390	0.950	2705.423sq.m
6+00	1,390	0.950	2705.423sq.m
6+50	1,390	0.950	2705.423sq.m
7+00	1,390	0.950	2705.423sq.m
7+50	1,390	0.950	2705.423sq.m
8+00	1,390	0.950	2705.423sq.m
8+50	1,390	0.950	2705.423sq.m
9+00	1,390	0.950	2705.423sq.m
9+50	1,390	0.950	2705.423sq.m
10+00	1,390	0.950	2705.423sq.m
10+50	1,390	0.950	2705.423sq.m
11+00	1,390	0.950	2705.423sq.m
11+50	1,390	0.950	2705.423sq.m
12+00	1,390	0.950	2705.423sq.m
12+50	1,390	0.950	2705.423sq.m
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13+50	1,390	0.950	2705.423sq.m
14+00	1,390	0.950	2705.423sq.m
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28+00	1,390	0.950	2705.423sq.m
28+50	1,390	0.950	2705.423sq.m
29+00	1,390	0.950	2705.423sq.m
29+50	1,390	0.950	2705.423sq.m
30+00	1,390	0.950	2705.423sq.m

**PROPOSED CUT AND FILL TO ROAD, CARPARK AND LOGISTICS BUILDING SUS GRADE**

BAE SAMLESSBURY PROJECT LAYER

BAE SYSTEMS

170 Connolly  
11 Macaulay Street  
Melbourne  
VIC 3000  
Australia  
Tel: 61 3 9600 6113  
Fax: 61 3 9600 6114  
Email: bae@bae.com.au

Client: BAE SYSTEMS  
Date: 1/1/2010

Project: BAE SYSTEMS PROJECT LAYER

**SURFACE LEVEL DATA**

NUMBER	UNFINISHED LEVEL	FINISHED LEVEL	COLOUR	AREA	VOLUME
1	1.50	1.50	Red	86.00sq.m	0.00cu.m
2	1.50	1.50	Red	86.00sq.m	0.00cu.m
3	1.50	1.50	Red	86.00sq.m	0.00cu.m
4	1.50	1.50	Red	86.00sq.m	0.00cu.m
5	1.50	1.50	Red	86.00sq.m	0.00cu.m
6	1.50	1.50	Red	86.00sq.m	0.00cu.m
7	1.50	1.50	Red	86.00sq.m	0.00cu.m
8	1.50	1.50	Red	86.00sq.m	0.00cu.m
9	1.50	1.50	Red	86.00sq.m	0.00cu.m
10	1.50	1.50	Red	86.00sq.m	0.00cu.m
11	1.50	1.50	Red	86.00sq.m	0.00cu.m
12	1.50	1.50	Red	86.00sq.m	0.00cu.m
13	1.50	1.50	Red	86.00sq.m	0.00cu.m
14	1.50	1.50	Red	86.00sq.m	0.00cu.m



**CUT AND FILL ANALYSIS**  
SCALE: H 1/3200 V 1/250

Client: BAE SYSTEMS  
Date: 1/1/2010

Project: BAE SYSTEMS PROJECT LAYER

BAE SYSTEMS

170 Connolly  
11 Macaulay Street  
Melbourne  
VIC 3000  
Australia  
Tel: 61 3 9600 6113  
Fax: 61 3 9600 6114  
Email: bae@bae.com.au

Client: BAE SYSTEMS  
Date: 1/1/2010

Project: BAE SYSTEMS PROJECT LAYER

BAE SYSTEMS

170 Connolly  
11 Macaulay Street  
Melbourne  
VIC 3000  
Australia  
Tel: 61 3 9600 6113  
Fax: 61 3 9600 6114  
Email: bae@bae.com.au