PROPOSED MIXED USE REGENERATION SCHEME,

ST GEORGE'S WORKS, TROWBRIDGE

Phase 2 Geo-Environmental Site Assessment Report & Proposed Remediation Strategy

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APPENDICES

1. Introduction

1.1 Terms of Reference

Ground Investigation (South West) Limited has been instructed by T.C. Sports Limited and Trowbridge Town Council, hereafter referred to as the Client, to carry out a Phase 2 Geo-Environmental Site Assessment in connection with a proposed new mixed use regeneration scheme at St George's Works, Trowbridge in Wiltshire.

This report presents the findings of the intrusive ground investigation works undertaken, including a geotechnical interpretation, together with generic quantitative assessments of risks to human health, and risks arising from potentially hazardous ground gas. A brief qualitative assessment of pollution risks to controlled waters is also presented.

A Ground Conditions Desk Study Report (Ref. 1) has previously been undertaken at the site by WYG in January 2016, the findings of which should be considered in the context of this Phase 2 assessment.

1.2 Site Location

The subject of this report concerns two separate, albeit adjacent, development plots located within Trowbridge town centre. The main area comprises a number of disused commercial buildings and car parks at the site of the former St George's Works premises, and the smaller area is a council service yard on the northern fringe of Trowbridge Town Park, immediately to the south-east of St George's Works.

The postal address is St George's Works, Silver Street, Trowbridge, Wiltshire, BA14 8DA. The approximate National Grid Reference of the site is 385800, 157940.

Detailed information concerning the site interior and its boundaries is provided within the earlier desk study (Ref. 1). This has been updated within Section 2 of this report, based on observations made during a supplementary walkover survey conducted prior to commencement of the intrusive works.

The existing site layout is presented as the base to Figure 1.

1.3 Proposed Development

The development proposals are understood to be divided into three main elements as summarised below.

(i) The demolition of the former club building at St George's Works and its replacement with a four-storey block of 24 residential apartments with associated parking, subordinate soft landscaping and some small private garden areas.

(ii) The conversion of a former warehouse building to provide 6 residential apartments.

(iii) The construction of a new secure storage building for Trowbridge Town Council with associated parking and landscaping within the area of the council service yard and park.

The proposed site layout is presented as the base to Figure 2.

1.4 Objectives

The primary objectives of this assessment are summarised as follows.

(i) Examine the physical ground and groundwater conditions at the site.

(ii) Identify and investigate potentially significant geotechnical and geo-environmental hazards.

(iii) Consider ground contamination in relation to threats posed to human health and controlled waters.

(iv) Advise on the need for remedial actions, or further investigation, to address potentially unacceptable human health or environmental risks associated with identified ground contamination hazards.

(v) Advise on geotechnical conditions, identify foundation options, and provide preliminary advice relating to ground engineering matters in the context of the proposed development.

1.5 Scope of Work

In order to achieve the objectives summarised in Section 1.4 above, the following general scope of work has been carried out.

(i) The review of a Phase 1 Assessment of Land Quality completed by WYG in January 2016 (Ref. 1), in the context of a walkover completed prior to commencement of the fieldworks.

(ii) Fieldworks involving the drilling of ten dynamic percussive window sampler boreholes, together with the installation of five monitoring wells for subsequent gas/groundwater monitoring purposes.

(iii) The excavation of three trial pits in order to undertake in-situ testing for pavement and soakaway design.

(iv) Laboratory chemical analysis and geotechnical testing of soil samples recovered from the exploratory holes.

(v) Preparation of this Phase 2 Geo-Environmental Site Assessment Report addressing ground contamination and ground engineering issues relating to the proposed development. A Proposed Remediation Strategy is also presented.

1.6 Report Structure

This report is presented in six sections, the contents of which are summarised below.

- **Section 1** provides an introduction to the report. It identifies the site location, summarises the proposed development, and outlines the objectives of the study and the general scope of work.

- **Section 2** presents a summary of the findings of the desk-based research, together with a description of the site, based on information gathered during the walkover survey.

- **Section 3** describes the fieldworks and laboratory testing that have been carried out.

- **Section 4** provides a description of the physical ground and groundwater conditions revealed by the investigation.

- **Section 5** considers ground contamination hazards at the site in respect of chronic human health risks, risks to controlled waters and risks arising from potentially hazardous ground gas, and discusses the potential aggressive environment for concrete used below ground level.

- **Section 6** considers the ground conditions at the site in relation to ground engineering and geotechnical matters of likely significance in the context of the proposed development. Preliminary advice is given for the design of foundations and ground floor slabs.

2. Desk Study & Walkover Survey

2.1 General

The earlier desk study (Ref. 1) examined information relating to the historical and present-day land uses in the vicinity of the site, together with geological, hydrogeological and environmental conditions from a variety of sources. This section of the report provides a brief summary of the findings.

A supplementary walkover survey was carried out prior to commencement of the intrusive fieldworks and key observations made are presented.

The information furnished by the desk study is referred to in subsequent sections where it is significant, or has relevance, to consideration of the various issues addressed by this report.

2.2 Walkover Survey

The earlier desk study information has been supplemented by a site walkover conducted prior to commencement of the fieldworks on 9th January 2018. Significant observations made during the walkover are noted below.

For the purposes of description, the site can be divided into two main areas, comprising the St George's Works and the Trowbridge Town Council Service Yard, both of which are located within the Town Centre of Trowbridge, between Silver Street to the north and Trowbridge Town Park to the south. Further details are provided below.

St George's Works

St Georges Works is signposted and accessed via a narrow lane leading between two shop fronts directly off Silver Street in the Town Centre of Trowbridge. Immediately behind the frontage of Silver Street, a small car parking area is located to the east of the brick paved access lane, which leads into a larger car parking area via a barrier. These external car parking areas occupy the north-eastern majority of the site, and are surfaced mainly with concrete. At the time of the walkover, scars from archaeological investigation trenches, together with their associated spoil heaps were observed on the concrete surfacing, whilst manhole covers and service/drainage trench scars were also noted.

A row of traditional, two-storey terraced shop units, housing small retail businesses (such as a fitness studio, beauty salon and model shop) divides the north-eastern car parking area and the brick paved narrow access driveway off Silver Street. These commercial units occupy former engineering works buildings which have already been converted for contemporary usage. There is a further concrete surfaced car parking area within the western part of the site, which is accessed from the end of the brick paved access lane.

Within the southern area of St George's Works, beyond the row of terraced commercial premises, which we understand are to be retained, and beyond the external concrete surfaced car parking areas, are four adjoining former industrial buildings.

For ease of reference, we have labelled these buildings 1-4 on Figure 1, and their descriptions are presented below. It should be noted that Buildings 1-3 are to be demolished to make way for the proposed development, whilst Building 4 will be retained, and converted into apartments.

Building 1

This single storey former industrial workshop covers the largest footprint of the buildings on site. The building has brickwork and corrugated metal clad elevations and a concrete floor with steel stanchions and beams supporting saw-toothed roofing.

At the time of the walkover, demolition had commenced, with the insides being stripped, but the concrete floors and brickwork walls remaining. Although the steel columns and timber and steel roof beams were present, most of the roofing (understood to have been asbestos cement sheeting) had been removed.

We understand that this building, notwithstanding its industrial past, formed part of the more recent night club and latterly a children's soft play area. As such there was no evidence remaining of its former industrial past, such as staining of the flooring etc.

As discussed in the subsequent site history section, this building sits over the footprint of an earlier historic woollen mill.

Building 2

This former industrial building is two storeys in height, with a first floor galleried walkway along its south-western side. It has brickwork elevations, a concrete floor and a pitched roof supported on steel trusses. As with Building 1, demolition had commenced and the building had been stripped, with much of the roofing removed.

The ground floor is slightly lower than the floor of the adjacent Building 1, which was reflected by ponding of surface water over the south-eastern area of the floor slab. Again, this building had formed part of the night club, so there was no significant internal evidence of its industrial past.

There is an external metal staircase (fire escape) leading to the building's first floor.

Building 3

Building 3 also extends to two storeys in height, and has brickwork elevations, partially glazed at second floor level. Significant demolition of this structure had not yet commenced.

Again, the building had been used as a night club so little remaining evidence of its historical legacy of industrial use was present, however, the ceiling was still fitted with steel rails and cables relating to an historic overhead crane.

Building 4

Building 4, a two storey essentially flat roofed former industrial building with partially glazed brickwork elevations, is understood to have most recently been used for warehouse storage purposes. In this regard, the building had recently been vacated, however, some office furniture and paper remained, together with a parked vehicle.

This building has cast iron windows at ground and first floor level, overlooking the park at the rear.

There are scars on the building frontage indicating the former location of two adjoining pitched roofed sheds which would have historically extended over the area of the car park.

The building is presently accessed via a centrally located roller shutter, with further access via a steel staircase to a pedestrian doorway at first floor level.

Council Service Yard

A relatively narrow strip of land located between Trowbridge Town Park to the south, and St George's Works to the north at its western side, and the neighbouring Royal Mail premises to the north on the eastern side, is earmarked for some redevelopment. In the main part this comprises a yard operated by Trowbridge Town Council, although the proposed development plot extends marginally into the area of the park to the east and west.

The plot is irregular in shape as it extends around the rear of the south-facing bandstand and toilet block, which are located on the northern margins of the park. The interior of the council yard is accessed via two sets of metal gates on either side of the bandstand, leading off a tarmac surfaced driveway which follows the northern perimeter of the park. There is presently a small square shaped garage storage unit behind the bandstand which contains horticultural equipment and lawnmowers etc.

Further dilapidated and in the main part disused buildings back on to St George's works in the north, constructed from brickwork, blockwork and timber, with slate and concrete roofing. There are also two metal storage containers on the eastern side of the easternmost entrance.

The eastern part of the council yard has been raised by some 0.5 - 1.0 m above the general site level by filling, and has a gravelled surface. The western part of the yard is partially overgrown with brambles and scrub. The external areas are used for general storage purposes including fencing, planters, plastic ducting and road signs etc. The yard is surrounded by palisade fencing, with a hedgerow to the south and the aforementioned St George's Works and Royal Mail premises to the north.

Beyond the secure area of the yard, the plot extends into the grassed landscaped area of the park, which is interspersed with mature trees including horse chestnut and substantial conifers. A row of mature trees also follows the edge of the tarmac surfaced footpath which marks the southern boundary of the proposed development area.

In general, Silver Street and the commercial properties fronting the street delineate the north-western boundary of the site. The Royal Mail depot premises are present immediately to the east of the site, whilst further residential and commercial properties bound the western margins of the site. As discussed above, the council owned strip of land is located immediately south of the St George's Works property, which is generally open to the surrounding landscaping of Trowbridge Town Park.

2.3 Site History

The history of the site, based on information presented in the previous desk study report (Ref. 1), is briefly summarised below.

- The earliest published Ordnance Survey (OS) mapping dating from the 1887-1888 shows that the northern part of the site is occupied by an engineering works in the western half, with a woollen mill in the eastern half. The southern part of the site forms part of the wider parkland area.

- The 1901 edition of the maps shows no significant change to the site, although a small building is shown in the southern area of parkland.

- No significant changes are shown until the 1936 edition of the maps, which by now label the small building in the southern area as a bandstand.

- By the late 1960s, although the woollen mill is no longer shown at the site, the engineering works is still present, however, with a new layout.

- The 1979 edition of the maps shows some further smaller buildings present just to the south of the main works building.

- No significant subsequent changes to the site are shown up to the latest edition of the maps dated 2015.

Further to the information included on the historical mapping, following closure of the engineering works at the site, we understand that a number of the buildings were converted for retail use, namely the shops which are present today, whilst the majority of the premises were used as a night club. In recent years, the largest of the buildings is understood to have been operated as a children's soft play area. By the time of the recent walkover, however, these buildings were disused and had been stripped out pending demolition or conversion.

2.4 Geology, Hydrogeology, and Environmental Setting

Information pertaining to the geology, hydrogeology and environmental setting, included within the earlier desk study (Ref. 1) is briefly summarised below.

- The published British Geological Survey mapping suggests that a fault runs west to east through the centre of the site separating the interbedded mudstones and limestones of the Forest Marble Formation in the northern area of the site from limestone of the Cornbrash Formation to the south. It should be noted that the recent exploratory hole findings have not substantiated this, having encountered relatively consistent clay subsoils at depth.

- Historical borehole records available in the public domain indicate Made Ground (1.5-3.7 m), over firm to stiff, blueish clay, with thin layers of limestone rock from around 6 m depth. This borehole was located a distant 250 m south-west, however.

- According to the Envirocheck report, the site lies within the lowest probability radon area as less than 1 % of homes are above the action level, and therefore no radon protection measures are necessary in the construction of new dwellings and extensions. Consideration of other potentially hazardous ground gases is provided within this report.

- The site has a bedrock aquifer designation of Secondary 'A' Aquifer, relating to both the Forest Marble and Cornbrash Formations. The site does not, however, lie within a 1 km radius of any groundwater Source Protection Zone (SPZ), and no other abstractions are located within at least a 250 m radius of the site.

- The nearest main surface water feature is approximately 250 m to the south, and the River Biss.

- There are no historical or registered landfill sites within at least a 250 m radius of the site.

3. Fieldworks & Laboratory Testing

3.1 General

A scope of works for the intrusive fieldworks and laboratory testing was developed on the basis of the findings of the earlier desk study (Ref. 1) and is summarised below, with further more detailed information provided in subsequent sections.

- The intrusive investigatory works comprised the drilling of ten dynamic percussive window sampler boreholes, extending to depths of between approximately 2.6 m and 4.6 m below the existing ground level, together with the excavation of three trial pits, terminating at depths of between 1.1 m and 1.2 m below ground level.

- In-situ standard penetration tests (SPTs) were completed at regular intervals within the boreholes.

- In-situ CBR test were undertaken using a Mexecone penetrometer within each of the trial pits, together with infiltration tests.

- Gas/groundwater monitoring wells were installed within five of the boreholes to provide the facility for subsequent gas and groundwater level monitoring/sampling. In this regard, three monitoring visits have been completed to date.

- Disturbed samples of the strata revealed within the exploratory holes were extracted at regular intervals.

- General observations were recorded concerning the incidence and behaviour of groundwater seepages, together with any obvious visual or olfactory evidence of ground or groundwater contamination.

- Laboratory chemical analysis and geotechnical testing was carried out on selected soil samples recovered from the exploratory holes.

This section of the report describes the fieldworks which have been completed and provides details of the subsequent laboratory testing.

3.2 Intrusive Investigatory Works

The dynamic sampling and trial pitting/soakage works were undertaken on the 9th to 10th January, and 1st February 2018, respectively, under the supervision of Ground Investigation (South West) Limited.

Figure 1 superimposes the exploratory hole positions on the existing site layout whilst Figure 2 presents their positions in relation to the proposed layout of the development. The fieldworks are described in detail below.

The exploratory hole positions were determined the basis of the proposed architectural layout, taking into consideration the findings of the desk-based research and observations made during the site walkover.

3.2.1 Lined Dynamic Sampling Boreholes

A rubber tracked heavy duty Archway Competitor Dart rig was used to form the dynamic sampling boreholes. Rotary core drilling techniques were initially used to penetrate the hard surfacing within the building footprints. Externally, any hard surfacing was broken out using a hydraulic breaker, prior to careful hand excavation being undertaken to avoid damage to underground services. Lined steel core barrels of 1 m length, and progressively reducing diameter, were then percussively driven into the ground, enabling the extraction of virtually continuous disturbed 'core' samples of the subsoil within polythene liners. Sub-samples were collected from the liners, sealed in polythene tubs and amber glass jars, as appropriate, and returned to the laboratory for analysis.

Boring commenced initially at approximately 102 mm diameter, reducing progressively with depth to some 50 mm. Standard penetration tests (SPTs) were carried out at 1 m intervals, the results of which are included on the individual borehole records.

As the drilling progressed, details of the strata succession were recorded, together with observations concerning the incidence and behaviour of groundwater ingress and any obvious visual or olfactory evidence of soil or groundwater contamination.

Gas/groundwater monitoring standpipes were installed within five of the boreholes, being constructed from 50 mm nominal diameter uPVC slotted screen, connected to the surface by a section of plain pipe, with a bentonite seal, gas valve and secure steel cover at ground level. The installation details are presented on the individual borehole records.

The engineering records of the dynamic sampling boreholes are presented in Appendix A.

3.2.2 Trial Pits

A 3-tonne tracked excavator was employed for the trial pits. As the excavation progressed at each position, details of the strata succession were recorded, together with observations concerning the incidence and behaviour of any groundwater seepages, the stability of the trial pit sides, and any obvious visual or olfactory evidence of contamination.

Disturbed samples of the soils encountered were collected and sealed in polythene bags, tubs or amber glass jars, as appropriate. Where practicable, California Bearing Ratio (CBR) tests were performed using a hand held Mexecone penetrometer.

Upon completion, the trial pits were carefully backfilled with the excavated spoil. The engineering records of the trial pits are presented in Appendix B.

3.2.3 Soil Infiltration Tests

Soil infiltration tests were carried out in the trial pits, broadly in accordance with BRE Digest 365 (Ref. 4) methodology, insofar as this was practical within the allotted time frame.

The trial pits were excavated to depths of between 1.1 and 1.2 m, measuring 0.3 m wide, and between 1.2 and 1.5 m in length. The percolation strata comprised the Forest Marble Formation in each of the soakaway pits.

Each pit was filled rapidly with water to an assumed invert level and the subsequent fall in water level monitored with time.

Following termination of the infiltration tests, the soakaway trial pits were backfilled with the excavated spoil and were made safe at the surface.

The results of the in-situ soil infiltration tests are presented graphically in Appendix C.

3.2.4 Field Monitoring

Following completion of the intrusive investigatory works, three return visits have been undertaken to date for gas and groundwater monitoring purposes. During each of these visits, concentrations of methane, carbon dioxide and oxygen, together with gas flow rates, were measured within the monitoring wells using a Geotechnical Instruments GA2000 or GA5000 infrared gas analyser. This instrument was also used to record the prevailing atmospheric pressure conditions.

A cable reel interface dipmeter was used to determine standing water levels within the installations.

The results of the field monitoring are presented in Appendix D.

3.3 Laboratory Testing

Geotechnical classification tests have been completed on selected soil samples, together with chemical tests appropriate for the consideration of potentially harmful effects on human health and the aggressive effects towards buried concrete. The types of tests undertaken on the selected samples are summarised under the following headings.

3.3.1 Chemical Tests

Chemical analysis has been undertaken as follows, based on the contaminants of concern identified within Section 5.2.3 of this report:

(i) inorganics suite comprising: metals/semi-metals, cyanides, total and water soluble sulphate, pH and asbestos screening; and

(ii) organics suite comprising: speciated polycyclic aromatic hydrocarbons (PAHs), speciated total petroleum hydrocarbons (TPHs) including BTEX compounds, volatile organic compounds (VOCs) including MTBE, phenols and soil organic matter (SOM).

The chemical laboratory test certificates are presented in Appendix E.

Further samples were also tested for the waste acceptance criteria (WAC) suite of determinands in order to provide information for the consideration of potential disposal options of excess soil. The results of the WAC testing are also presented in Appendix E.

3.3.2 Geotechnical Classification Tests

The following types of geotechnical classification tests have been undertaken:

(i) Moisture content determinations;
(ii) Atterburg limit determinations;
(iii) BRE SD1 sulphate and pH suite.

The geotechnical classification test results are presented in Appendix F.

4. Physical Ground & Groundwater Conditions

4.1 General

The exploratory holes have established that within the depth of investigation the site is underlain by the following general sequence of strata (from ground level down).

(i) Made Ground; and
(ii) Forest Marble Formation.

The general characteristics of the strata, as inferred from field observations, in-situ SPT results, and laboratory test results are discussed below.

4.2 Strata Descriptions

4.2.1 Made Ground

Made Ground generally extended to depths of between 0.25 and 2.20 m below ground level at the selected positions of investigation. However, anomalous ground conditions were encountered at the location of WS02, where 1.2 m of brickwork was found to overlie a void of unknown description, the base of which was proven to 2.7 m depth using a tape measure. The brickwork and void beneath are likely to represent some form of buried structure or substructure.

Boreholes WS01 to WS06 were located within the footprint of the derelict buildings such that a concrete floor slab was encountered to depths ranging between 150 and 260 mm. In places, the concrete was reinforced with 6 mm diameter steel. A dominantly granular sub-base was typically found beneath the floor slab, and comprised materials such as limestone, concrete, brick, slate and clinker. As discussed above, the brickwork structure that extended to 1.2 m depth, was found immediately beneath the concrete floor slab. At the location of WS04, a limestone boulder was encountered to 0.8 m depth, possibly representing a relict floor slab feature.

The Made Ground thereafter, varied considerably between granular material comprising limestone, brick, concrete, ash, clinker and slag, and predominantly cohesive deposits comprising mainly clay soils, with inclusions of similar coarser material.

At the location of WS06, a strong hydrocarbon odour was noted in the Made Ground at 1.2 m depth, coincident with the onset of groundwater.

WS07, located within the car parking area, encountered a 220 mm thick mass concrete slab at the surface, overlying limestone sub-base to 0.3 m depth. Thereafter, the Made Ground extended to 0.7 m depth and comprised cohesive material, with inclusions of limestone, clinker and charcoal, with similar material found at the location of SA01, although this had been disturbed by earlier archaeological investigations.

Boreholes WS08 to WS10, together with SA02 and SA03, were located within the narrow strip of council land to the south, where the Made Ground was generally shallower. At WS08 and SA03 this comprised Topsoil overlying cohesive Made Ground with inclusions of limestone, brick and carbonaceous material to 0.5 - 0.6 m depth. At WS09, brown silty clay with inclusions of limestone, brick and carbonaceous material extended from the surface to 0.25 m depth. Within the artificially raised area of the yard, limestone gravel and cobbles were found at the surface of WS10 to 0.35 m depth,

followed by Topsoil material, with inclusions of limestone and brick to 0.8 m depth. Within SA02, some 0.2 m of Topsoil was found over reworked natural soils comprising yellowish brown, sandy, silty clay.

The SPT N-values recorded in the Made Ground reflected the marked diversity in consistency and strength of these deposits, ranging between 0 and 17.

It should be appreciated that some deeper Made Ground and/or disturbance is likely to be encountered between the selected positions of investigation, associated for example with pre-existing underground services, and existing buried structures and infrastructure, such as the unknown feature found at WS02. In this regard however, a further borehole, WS02A, was positioned only around 2 m distant from WS02, which it should be noted did not encounter any underground brickwork or voids, although the Made Ground extended to a relatively significant depth of 2.2 m.

4.2.2 Forest Marble Formation

Beneath the Made Ground, fundamentally, the Forest Marble Formation was encountered as a sequence of silty clay deposits, becoming stiffer with depth, with some horizons of limestone 'rock'.

The cohesive material of the Forest Marble Formation typically initially comprised soft to firm grey/brown/orange, mottled silty clay, with varying fractions of sand and gravel of limestone, together with some root traces and shell material. With increasing depth, the silty clay became a darker blueish grey in colour and tended stiff or very stiff.

In the above regard, SPT N-values recorded in the upper horizons ranged between around 6 and 12, whilst at depth, ranged between say 30 and 50, confirming the observed increasing consistency with depth.

Where limestone horizons were encountered, the boreholes terminated at effective "refusal" for the type of plant employed, and the SPT N-values were greater than 50.

Estimations of apparent cohesion undertaken within the trial pits using a calibrated Pilcon hand-vane, returned values at around 1.0-1.2 m depth of between 52 and 114 kPa, confirming the generally firm to stiff consistencies at this level.

The results of the geotechnical classification tests indicate that the cohesive materials range between low and very high plasticity (Refs. 5 & 6), with corresponding low, medium and high volume change potential, as defined by NHBC (Ref. 7).

4.3 Groundwater

Groundwater was only encountered within boreholes WS05 and WS06, during the course of the lined dynamic sampling works. This groundwater was associated with the Made Ground soils and is suspected to be perched. However, slight seepages were also recorded in the Forest Marble Formation encountered within the subsequent trial pits at depths of around 1.05 to 1.15 m.

Subsequent monitoring of the standpipes installed in selected boreholes recorded groundwater standing at variable depths, ranging between around 1.17 and 2.65 m below ground level.

It should be noted in the above context, that subsequent variations in groundwater and hydrological conditions could occur in response to future seasonal or climatic changes. Relatively shallow perched groundwater may also be present due to the variable thicknesses Made Ground confined by low permeability clay subsoils, coupled with buried substructures.

5. Ground and Groundwater Contamination

5.1 Introduction

The chemical test results have been considered within a risk assessment framework, whereby a conceptual model of possible pollutant linkage has been developed for the site and is described in the context of the proposed development. This considers the relationship between potential contamination sources, pathways and receptors in the light of the available information concerning the site history, geology, hydrology, and environmental setting, together with details of the proposed development, as set out in the preceding sections of this report.

This section of the report considers the level of risk posed by potential contaminants to human health and controlled waters in the context of the proposed development.

The initial desk study (Ref. 1) presented a Preliminary Conceptual Site Model based on the findings of the desk-based research and site walkover completed. This has been reviewed and extended below, on the basis of the findings of the subsequent intrusive investigatory works.

5.2 Revised Conceptual Site Model

5.2.1 Ground and Groundwater Conditions

It is possible to summarise the general ground and groundwater conditions as follows, on the basis of the information contained within the preceding sections of this report and presented in the initial desk study (Ref. 1):

- The revealed succession comprises hard surface construction and/or Made Ground, followed by the Forest Marble Formation. The majority of the hard surfacing relates to the construction footprint of the St George's Works area in the north, whilst the council yard is only locally hard surfaced.

- The encountered deposits of Made Ground extended to depths ranging generally between 0.25 and 2.20 m at the selected positions of investigation. However, localised deeper deposits of Made Ground should be anticipated due to the presence of buried structures/sub-structures (as recorded at WS02). The Made Ground included materials such as limestone, ash, concrete, clinker and brick. Deposits of Made Ground were typically shallower in the area of the council yard and park.

- At the location of WS06, olfactory evidence of hydrocarbon contamination was observed within the Made Ground upon the onset of groundwater seepages.

- Variable groundwater levels have been observed and recorded, with water strikes ranging between around 1.0 and 1.8 m depth, and standing water in the monitoring wells at between around 1.17 and 2.65 m.

5.2.2 Possible Sources of Contamination

It is possible to make the following comments in relation to possible sources of contamination at the site in the light of the findings of the desk-based research, site inspection, and intrusive investigatory works referred to herein.

- Based on our examination of historical mapping, the site has a significant legacy of industrial land use from the woollen mill and engineering works. These land uses are considered the significant risk driver in the consideration of potential risks from ground contamination at the site.

- With regards to the land uses identified, potential contamination could occur in the form of metals, semi-metals, fuels, oils, polycyclic aromatic hydrocarbons, volatile organics and acids/alkalis, resulting from the historic engineering processes, together with spills/leaks from tanks and storage areas, and vehicle movements etc.

- Cutting oils and degreasing agents are typical contaminants found on former engineering works sites.

- Considering the earlier historic use of the eastern part of site as a woollen mill, this would likely have been a steam powered mill, in the absence of a nearby watercourse to derive power. Significant deposits of ash and clinker would not therefore be unexpected, being a waste product from the coal which would have been used as the fuel for the boilers.

- Any significant deposits of Made Ground are technically considered to represent a possible source of gas generation potential. Furthermore, hydrocarbon spills and leaks could be considered a potential vapour source. In this regard, one of the exploratory holes exhibited olfactory evidence of hydrocarbon contamination. However, the potential for such gases or vapours to move through the soil profile would be mitigated to a significant extent by the dominantly fine-grained nature of the encountered subsoils.

5.2.3 Contaminants of Concern

Based on the summary presented in Section 5.2.2 above, the following broad range of potential contaminants has been considered in quantifiable terms by this assessment:

- Metals and semi-metals: arsenic, boron, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium and zinc.

- Organic compounds: total petroleum hydrocarbons including BTEX compounds, volatile organic compounds including MTBE, phenols and polycyclic aromatic hydrocarbons.

- Inorganic compounds: cyanides, sulphates and asbestos.

- Acids and alkalis.

- Methane and carbon dioxide.

Careful vigilance was also exercised throughout the intrusive investigatory works for visual or olfactory evidence of hydrocarbon contamination and/or likely asbestos containing materials.

5.2.4 Receptors and Pathways

5.2.4.1 Chronic Human Health Risks

In respect of chronic human health risks arising from the presence of potentially contaminated soils at the site following completion of the proposed development, the eventual occupiers of the proposed residential dwellings are considered the most vulnerable receptors. The future users of the council yard would be considered to represent the critical receptors within the parcel of land earmarked for the new

development immediately south of St George's Works, although it should be acknowledged this is a far less sensitive end use.

The most significant pathways for the purposes of assessing the risk posed to the identified receptors, from the aforementioned list of contaminants, would be considered to be ingestion and dermal contact with soil and fugitive soil dust within soft landscaped areas, together with the indoor inhalation of soil vapours/gasses, arising from volatile organic contaminants and or other ground gas.

In the context of this assessment, the standard residential land use is considered to be most appropriate for the majority of the site at the former works, whilst the commercial land use is considered to be most appropriate for the proposed new council yard and building.

5.2.4.2 Acute Human Health Risks

During construction, site workers, employees, occupiers of adjacent properties and members of the public using the adjacent park, roads or footpaths could potentially be exposed to contaminants present in the ground via a number of pathways, including dermal contact with contaminated soils, or ingestion of airborne particulate matter during bulk earthmoving operations. Such risks will need to be addressed in the context of the pre-construction health and safety plan prepared by the building/groundworks contractor.

The normal precautions anticipated on a site of this nature would be expected to include the provision of appropriate personal protective equipment and hygiene facilities, together with effective measures to suppress airborne particulate matter during earthmoving activities.

5.2.4.3 Controlled Waters

The Envirocheck report ascribes a bedrock aquifer designation of Secondary 'A' Aquifer to the underlying Forest Marble Formation. The site does not, however, lie within a groundwater Source Protection Zone (SPZ), and there are no abstractions in the vicinity. Moreover, there are no nearby surface water features. In this regard, controlled water receptors are considered as very low sensitivity.

Furthermore, and critically, a thick sequence of cohesive, low permeability soils has been proven to underlie the site which would act as a barrier against groundwater contamination migration. In this regard, the in-situ soil infiltration tests have proven this to be the case.

It should be appreciated that the proposed residential development, being associated with the removal of all former commercial and industrial usage will provide appreciable environmental betterment compared with the former land uses. Moreover, the development will also be associated with the provision of a newly engineered drainage system thus mitigating the risk from mobilisation of leachable or liquid contaminants through surface water infiltration.

Taking into consideration the aforementioned factors, subject of the approval of the regulatory authorities and warranty providers, controlled waters receptors are considered to be of relatively low sensitivity in the context of the proposed development.

5.3 Assessment of Chronic Human Health Risks

5.3.1 Methodology

Chronic human health risks associated with possible land contamination at the site have been assessed using the generic quantitative risk assessment (GQRA) methods published by DEFRA and the Environment Agency in CLR 11 (Ref. 8).

At the time of writing, Generic Assessment Criteria (GAC) have been issued from several different sources for the use in generic quantitative risk assessments for contaminated land, currently including the following:

(i) Category 4 Screening Levels (C4SLs) issued by Defra in 2013 for 6 contaminants (Ref. 9);

(ii) Soil Guideline Values (SGVs) issued by the Environment Agency in 2009 for some 11 contaminants (Ref. 10); and

(iii) Suitable 4 Use Levels (S4ULs) issued by the Chartered Institute of Environmental Health (CIEH)/Land Quality Management in 2014 for some 80+ contaminants (Ref. 11).

As an initial first stage risk assessment process, due to the fact that almost all potential contaminants of concern are covered, together with the fact that the methodology is the most contemporary, the S4ULs have been used in this GQRA. However, in the case of lead (Pb), only one GAC is presently published, which is the DEFRA C4SL, such that this value has been used in the GQRA.

The GQRA presented herein is based on the generic residential land use as described in the Environment Agency publication SR3 (Ref. 12) for the St Georges Works area of the site, whilst the generic commercial land use has been used for the proposed council yard and building to the south.

5.3.2 Sampling and Laboratory testing

For the purposes of gauging chronic human health risks, attention has focussed on examining contamination levels in soil samples recovered from the near surface soils, namely the Made Ground, together with a deeper sample exhibiting evidence of hydrocarbon contamination.

A total of fourteen soil samples have been analysed for suites of potential contaminants of concern based on those identified in Section 5.2.3, with ten from the proposed residential area, and four from the proposed council yard area.

The results of the laboratory chemical analyses conducted on the selected soil samples are presented in Appendix E.

5.3.3 Risk Assessment – Proposed Residential Development (Former St George's Works)

Table 1 summarises the laboratory test data and compares measured contaminant concentrations in the selected soil samples with their respective GAC.

An initial screening of the results shows that the majority of the detected contaminant concentrations are below the published GAC for the most sensitive residential land use.

However, within four samples of the Made Ground, a number of potential contaminants of concern, namely, lead, polycyclic aromatic hydrocarbons (PAHs) and/or total petroleum hydrocarbon (TPH) fractions are present at concentrations above their GAC such that further consideration is warranted. Furthermore, eight of the ten sample recorded concentrations of VOC compounds, specifically trichloroethene and dichloroethene above their GAC.

The elevated concentrations of lead and PAHs are likely to be associated with the presence of carbonaceous deposits such as ash and clinker, whilst the presence of olfactory evidence of hydrocarbons at one location would be the source of elevated TPH and some PAH. The significant legacy of the former Engineering Works at the site would almost certainly be the source of the elevated

VOC compounds, which were dominated by trichloroethene. One of the main uses for trichloroethene, apart from the manufacture of other chemicals, is to remove grease from metal parts i.e. a degreaser, which may have been used in significant quantities at an engineering works.

The critical exposure pathways from lead, and the elevated heavier-end PAH and TPH compounds would be ingestion and dermal contact with soils and soil dust, whilst the critical exposure pathway from lighter-end PAH and TPH, together with VOCs such as trichloroethene in the near surface soils would also include the indoor inhalation of vapours, owing to their volatile nature. On this basis, considering the results of the laboratory analyses, it is concluded that, for the type of residential development proposed, the Made Ground at the site could possibly present a risk of harm to the health of future residents.

It should also be appreciated, that due to the physical composition of the encountered Made Ground, which contained fractions of ash and clinker etc, that these materials would unlikely to be suitable as surface cover in garden areas or other areas of soft landscaping.

We consider therefore, that suitable remedial actions will be required to mitigate possible chronic human health risks at the site. Fundamentally, such remedial actions could either involve the removal of the source/s of contamination or the removal of the critical exposure pathways discussed above.

Further consideration of the most appropriate methods for remedial actions in respect of human health risks at the site is provided below.

5.3.4 Proposed Remediation Strategy

5.3.4.1 VOCs (e.g. trichloroethene), and lighter-end TPH and PAH compounds

It should be appreciated that hydrocarbon odours were evident during the investigatory works in one of the exploratory holes, two samples contained either elevated concentrations of petroleum hydrocarbons or polycyclic aromatic hydrocarbons, whilst eight samples recorded elevated VOCs, mainly trichloroethene. As discussed above, owing to the volatile nature of some of these potential contaminants (i.e. the lighter-end fractions), the most significant pathway to potential end-users of the site is via the inhalation of indoor air.

As a precautionary measure, it is proposed that gas protection measures are afforded to the ground floor construction of the apartment blocks at the site, as recommended in Section 6.4, with the gas-proof membrane upgraded to a vapour barrier that will afford protection to the ingress of TPH/VOC vapours.

Notwithstanding the above, it should be appreciated that the main primary sources of hydrocarbon/VOC contamination (relating to the former engineering works and associated activities) will be removed from site to realise the proposed development.

5.3.4.2 Lead and heavier-end TPH and PAH compounds

Due to the elevated concentrations of lead, and heavier-end TPH and PAHs, as detailed above, acknowledging the fact that the Made Ground contained inclusions of physically unacceptable materials, we advise that provision should be made for the use of a clean cover system in residential gardens and other soft landscaped areas. Subject to the agreement of the regulators and warranty providers, 600 mm thickness of suitable, certified clean imported soil should be placed in the private garden areas of residential properties, for example the ground floor apartments, and 300-450 mm thickness in areas of communal soft landscaping. The clean soils should be placed over a geotextile membrane to separate the imported materials from the underlying in-situ soils. This membrane will also act as a "no dig barrier" and marker for post-construction verification purposes.

Notwithstanding the above, within the permanently hard surfaced areas of the site, such as the access roads and car parking areas, and beneath the footprint of the housing, the soils will be effectively encapsulated, therefore mitigating the risks to the eventual occupiers.

All imported topsoil and subsoil used in the remedial works should be derived from a suitably certified clean source and precautions should be undertaken to ensure that the imported clean soil is not intermixed with site won materials. The importation of topsoil, subsoil and other fill materials provides the opportunity for new contamination hazards to be introduced onto a site. Soils must not be contaminated with significant quantities of concrete, brick, plastics, metal, asbestos, glass, tarmac or organic matter such as wood/timber. All imported soil must comply with relevant Generic Assessment Criteria (GAC) for residential gardens.

The recommended remedial works should be undertaken by an experienced contractor and fully validated on completion.

Considering the variable nature of the Made Ground established during this investigation and acknowledging the past land use, it will be important to ensure that careful vigilance is exercised during the groundworks phase of construction and associated remedial works for other evidence of contamination.

The proposed remedial measures should be agreed with the regulatory authorities and any warranty providers prior to the works commencing.

5.3.4.4 Water Supply Services

Given the former usage at the site, and the detection of some evidence of hydrocarbon/VOC contamination, non-permeable 'Protecta-line' barrier pipe or similar should be specified for the construction of water services connecting the properties. Furthermore, we recommend that all services are installed within 'clean corridors' surrounded by inert materials, in order to prevent future maintenance workers from exposure to possible contaminated materials.

5.3.5 Risk Assessment – Proposed Council Storage Building

Table 2 summarises the laboratory test data and compares measured contaminant concentrations in the selected soil samples with their respective GAC.

An initial screening of the results shows that concentrations of the contaminants included in the analytical suite are either below the laboratory detection limits (e.g. BTEX) or below their respective GAC.

Subject, therefore, to the approval of the regulatory authorities, taking into consideration the full findings of the investigation and accompanying desk-based research, it is concluded that potential chronic human health risks are very low in this area and are not significant in the context of the type of development proposed (i.e. the council yard, new building and minor landscaping work).

As with any site and intrusive investigation, it cannot be entirely discounted that hitherto undetected pockets of potential contamination may be discovered during the construction works, such that it is recommended careful vigilance is exercised throughout the groundworks phase of construction.

5.4 Waste Acceptance Criteria

Waste Acceptance Criteria (WAC) testing was undertaken on combination samples of Made Ground that were encountered, including the general Made Ground and carbonaceous Made Ground, together

with a sample of naturally deposited Forest Marble Formation, the results of which are presented in Appendix E.

All of the determinands from the sample of the naturally deposited Forest Marble Formation, as would be expected, were below the Inert Waste Landfill criteria limits.

The combination sample of the general Made Ground recorded an elevated concentration of sulphate and total dissolved solids which exceeds the Inert Waste Landfill criteria limit, although these values pass the stable non-reactive hazardous waste in non-hazardous landfill criteria.

The combination sample of the Made Ground containing carbonaceous material such as ash and clinker, recorded an elevated concentration of Total Organic Carbon (TOC), of 3.4 %, exceeding the Inert Waste Landfill criteria limit of 3.0 %. The guidance suggests that it is possible a higher limit value of TOC maybe accepted if the dissolved organic carbon (DOC) value is less than the 500 mg/kg criteria, which in this case it is, at 174 mg/kg, however, this would need to be agreed with the landfill operator. Notwithstanding the above, the concentration of total PAH of 345 mg/kg significantly exceeds the inert limit of 100 mg/kg, such that these materials would not classify as inert waste. Moreover, the concentrations of sulphate and total dissolved solids also exceed the Inert Waste Landfill criteria.

The full results of the laboratory analyses should be presented to prospective landfill recipients of excavation spoil derived from the site, for consideration in the context of their specific license conditions.

Based on the results obtained, it is recommended that any excavated materials which are to be taken to landfill, are carefully separated into individual stockpiles divided into, for example, demolition rubble, general Made Ground, carbonaceous/hydrocarbon impacted Made Ground, and natural soils. Further analysis of these as-dug materials could possibly be considered and may be beneficial in terms of minimising the amount of material which needs to be disposed of as either stable non-reactive or hazardous waste.

5.5 Gas Risk Assessment

5.5.1 Methodology

Risks arising from the possible presence of methane and carbon dioxide gas have been assessed using the methodology described in CIRIA C665 (Ref. 13).

5.5.2 Possible Gas Sources

The deposits of Made Ground and the possible presence of degrading organic contaminants, together with the elevated concentrations of lighter-end TPH, PAH and VOCs, are considered to be sources of potential gas generation potential and vapour ingress.

5.5.3 Gas Monitoring

In order to examine the soil gas regime at the site, five monitoring wells were constructed within the boreholes. These observation wells have been monitored for gas concentrations and gas flow rates on three occasions to date between 17th January and 14th February 2018, at atmospheric pressures ranging between 995 and 1002 mB. The gas monitoring data are presented in Appendix D.

Methane was detected at one position (WS09) at a maximum concentration of only 0.3 %, whilst carbon dioxide was present at a maximum concentration of 11.2 %. No gas flow was detected on any occasion from any of the monitoring wells, however.

5.5.4 Gas Screening Value and Characterisation

The gas screening value (GSV) for the site has been calculated as follows.

GSV = (0.3 L/hr) × (11.2 % vol. CO_2) = 0.034 L/hr

In the absence of any measurable gas flows, the borehole flow rate has, for the purpose of calculating a safe GSV, been taken as 0.1 L/hr which is the limit of detection for the field measuring device. The gas concentration of 11.2 % volume used to calculate the GSV relates to the maximum recorded concentration of carbon dioxide.

Based solely on this GSV, the site's gas classification would be Characteristic Situation 1 (CS1) as defined in CIRIA C665, and no special precautions would be warranted. However, as the typical maximum concentration of carbon dioxide exceeds 5 %, the guidance indicates that basic protective measures should be provided. Such measures would be expected to comply with NHBC Amber 1 requirements in the residential development area and CS2 for the commercial development. It should also be acknowledged in this context, as discussed previously, that some protection from VOCs and volatile hydrocarbons is considered to be necessary within the footprint of the proposed residential development.

We recommend in the above regard that a proprietary VOC/hydrocarbon resistant gas membrane is installed throughout the residential development area, with all joints and service penetrations being sealed. Engineering advice should be sought regarding the design of these protective measures, particularly in the converted building which will need the vapour protection to be retrofitted. A lower specification of membrane could be utilised for the council storage building (resistant to carbon dioxide) on the basis that contaminant concentrations within soils in this area did not exceed published GAC for the lower sensitivity commercial use.

The specifications for the gas protective measures will need to be agreed with the Local Authority and any warranty providers.

The published guidance suggests, that for a high sensitivity development (i.e. residential) and a low generation potential source, ideally, nine gas readings should be undertaken during a six-month period. The guidance indicates, however, that there is a balance to be considered between the cost of additional monitoring and the increase in technical confidence which will result. In this regard, it should be noted that two of the three monitoring visits targeted low and falling atmospheric pressure, considered to represent worst case gassing conditions. Furthermore, as precautionary measures have been already been recommended on the basis of the monitoring undertaken to date, further monitoring is considered unlikely to affect our recommendations.

5.6 Aggressive Chemical Environment for Concrete

The aggressive chemical environment for concrete (ACEC) for the site has been estimated using the methodology described in BRE Special Digest 1 (see Ref. 14).

Concentrations of water soluble sulphate, total sulphate and total potential sulphate, together with pH values have been measured in a total of twenty four samples recovered from the encountered strata. Comparison between the total potential sulphate and acid soluble sulphate concentrations indicates that the presence of pyrite is unlikely to be widely present as only one of the samples recorded oxidisable sulphate above 0.3 %.

Acknowledging the aforementioned considerations, using a characteristic value based on the mean of the highest five (highest 20 %) water soluble sulphate concentrations, and assuming mobile

groundwater, concrete conforming to ACEC Class AC-2, with a design class of DS-2 should be specified for concrete used below ground level.

6 Ground Engineering

6.1 Context

This section of the report considers the ground conditions in the context of the engineering design and construction of the proposed development. Preliminary advice is given in relation to the design of foundations, ground floor slabs and pavements, together with infiltration rates for consideration of drainage options.

It is appropriate to subdivide the recommendations for the proposed residential area and the proposed council yard area based on the variations in the encountered ground conditions, acknowledging the presence of mature trees, together with the impact of the existing buildings and substructures, and the different nature of the proposed developments.

6.2 Site Preparation

Prior to commencing the earthworks or ground works, all live services on, and in the vicinity of, the proposed development should be accurately located and, if necessary, diverted or protected. The ends of existing drains and sewers no longer required because of alterations to the drainage layout should be effectively sealed so as to prevent any residual or persisting seepages from adversely affecting the integrity and/or stability of the formations and/or foundations.

Any old foundations and sub-structures should be cleared. Sub-structure walls should be grubbed up to well below any proposed shallow foundations. In this regard, it is important that the brickwork substructure and apparent void encountered within the centre of the main building (WS02) is investigated further during the demolition works. It is possible depending on the nature and characteristics of this feature, some form of remedial works could be required specific to this structure.

Basements or service conduits, and surface voids resulting from the site preparation work, should be filled with well compacted, acceptable granular material (e.g. DoT Type 1, or similar approved).

6.3 Foundations

6.3.1 Proposed Residential Development (Former St Georges Works)

6.3.1.2 Spread Foundations

Subject to the ability to control groundwater inflows and extend excavations beyond the superficial Made Ground and/or disturbance due to subsurface construction, the new apartment block and/or other proposed structures could be supported by relatively traditional spread foundations constructed within the undisturbed deposits of the Forest Marble Formation. Given the presence of existing structures, the likelihood of areas of buried substructures, and the revealed significant thicknesses of Made Ground, it is envisaged that a series of relatively deep pad foundations could be the most practical solution, although specialist foundations such as mini-piles/piles could be worthy of consideration acknowledging possible limitations imposed by the existing structures, sub-structures and disturbance.

The depth of the foundations will need to reflect the presence of Made Ground or disturbed subsoils, coupled with any variations in the underlying geology. In this regard, to reiterate the point above, it is important that the brickwork substructure and apparent void encountered within the centre of the main building (WS02) is investigated further during the demolition works.

The determination of appropriate foundation depths will need to take into consideration the soil plasticity, as indicated by the results of the classification tests presented in Appendix F, in the context of the potential influence of any existing trees or proposed planting on the soil moisture regime. It is recommended minimum formation levels are determined on the basis of NHBC guidelines (Ref. 9), affording consideration to the worst case high volume change potential of the natural subsoils.

For spread foundations constructed within the undisturbed Forest Marble Formation soils of at least firm consistency, below any Made Ground/disturbance, based on an SPT N-value of 8, it would be considered reasonable to utilise a presumed bearing capacity of around 70 kN/m^2. This should ensure that total and differential settlements remain within normal acceptable limits (i.e. total settlements less than 25 mm). This assumes that the foundations extend below the level of any localised softer spots, buried features and deeper Made Ground. For square pad foundations, a presumed bearing value of around 100 kN/m^2 could be assumed at such levels, reflecting the inherent rigidity of such an arrangement. Acknowledging that a bearing capacity of this magnitude could be insufficient for a four storey block of the type proposed, for deeper foundations taken down into the underlying firmer materials, higher bearing values could be utilised. In this regard, based on a minimum N-value of 12 at 3 m depth a presumed bearing capacity of around 100 kN/m^2 would be considered reasonable for trench fill foundations at this level, or around 130 kN/m^2 for pads. Soil strengths increase further beyond this level, such that a presumed bearing value of at least 200 kN/m^2 could be utilised for pad foundations constructed within stiff clay subsoils at 4 m depth, although this would be greater than normally considered practical for a spread footing.

Foundations should be constructed in the same stratum, wherever possible, in order to reduce the potential for differential settlements to occur. Consideration should be afforded in this regard, to the potential for bands of rock, which could act as “hard spots”. In this regard, consideration could be afforded to the use of reinforcement to mitigate potential differential settlement and/or taking the foundations down into consistent materials.

Based upon the groundwater conditions encountered during the investigation, groundwater ingress within the anticipated depth of new foundations could be problematic, and some form of groundwater control is likely to be required. As discussed within the earlier sections of this report, there is potential for perched water to be present within the Made Ground and/or associated with buried substructures. It should be appreciated in this context that groundwater conditions can vary seasonally and with climatic conditions, and that any groundwater seepages (and/or inclement weather) could influence the stability of excavations.

6.3.1.2 Specialist Foundations

Given the significant depths of excavation required for traditional foundations and the consequent practical difficulties, together with the volumes of concrete required, it is possible that a more specialist foundation solution, for example involving piles, could present a more practical and economically viable option. In this regard, it should also be appreciated that the use of a specialist foundation of this type could also reduce the cost of disposal of potentially contaminated excavation spoil and of dealing with ingress of potentially contaminated water seepages.

Piles would be expected to be supported by a combination of end bearing and shaft friction within the underlying Forest Marble Formation strata, but should be sleeved or slip coated within the zone of influence of any nearby trees. Anti-heave precautions should also be provided to the undersides and faces of ground beams.

Piled foundations should be designed by an experienced and competent specialist piling contractor who should select appropriate design parameters and guarantee safe working loads, together with maximum total and differential settlements, which should be within acceptable tolerances for the proposed

structures. The choice of piling technique should be agreed with the contractor. Soil parameters for the strata to be penetrated will depend on the piling technique selected and the precise method of working.

The piling contractors should satisfy themselves and confirm to the Client that the available site investigation data provides sufficient information upon which to base the design. Any requirement for further data should be identified and the information obtained prior to the pile design being finalised. In this regard, further investigation would need to be undertaken to provide design parameters for piled foundations, involving the drilling of deeper boreholes, which would be most practically completed using cable percussive drilling techniques, within the footprint of the buildings following demolition. The piling contractor should monitor the pile installations to ensure that the encountered ground conditions are as good as, or better than, assumed in the design.

Assurances should be sought from prospective specialist contractors concerning the potential environmental impact of the works, including reference to the potential for vibration or displacement damage to the immediately adjacent buildings that are to be retained or that bound the site. Moreover, piling methods would need to be designed to mitigate the potential risk of creating contaminant migration pathways and liaison with the regulatory authorities would likely be required in this regard, together with the submission of detailed method statements.

Acknowledging the significant potential for obstruction, the pile positions would likely need to be pre-excavated down to the natural ground.

6.3.2 Proposed Council Storage Building

6.3.2.1 Spread Foundations

Subject to full consideration of the potential influence of trees on the plastic clay subsoils, the proposed council storage building could be supported by traditional spread foundations constructed within the undisturbed Forest Marble Formation. The depth of the foundations will need to reflect the presence of any encountered Made Ground or disturbed subsoils, together with the potential influence of trees/vegetation and any variations encountered during the groundworks phase of construction. In this regard, unlike the St George's Works area, fewer significant structures or buried sub-structures are expected to be present.

In particular, the determination of appropriate foundation depths will need to take into consideration the soil plasticity of the cohesive subsoils, as indicated by the results of the classification tests presented in Appendix E, in the context of the potential influence of any existing or recently removed trees, or proposed planting. In this regard, at least four mature trees are to be removed to make way for the new development.

It is recommended minimum formation levels are determined on the basis of NHBC guidelines (Ref. 7), affording consideration to the worst case high volume change potential of the cohesive subsoils. In this regard, for high volume change potential soils, a minimum foundation depth of 1.0 m is required by the NHBC. However, the actual formation levels would need to be significantly deeper than this, probably in the range of 2 – 3 m, depending on the moisture demand of the particular trees. Where the trees are removed, notwithstanding their influence on soil moisture contents, the root systems will need to be grubbed up to realise the construction of the building, thus causing significant further disturbance.

For foundations of up to 1 m width, constructed within the undisturbed Forest Marble Formation at a nominal depth of around 1.0 m, and below any encountered Made Ground or disturbance, based on the results of the in-situ tests completed in the boreholes, it would be considered reasonable to utilise a presumed bearing capacity in the region of 70 kN/m^2. This should ensure that total and differential settlements remain within normal acceptable limits (i.e. total settlements less than 25 mm). For square pad foundations constructed in the same soils, it would be considered appropriate to adopt a higher

presumed bearing capacity, in the region of at least 100 kN/m^2, owing to the inherent rigidity of such an arrangement. As with the residential development, for deeper foundations taken down into the underlying firmer materials, higher bearing values could be utilised, although would likely to be unnecessary for the storage building. In this regard, based on a minimum N-value of 12 at 3 m depth a presumed bearing capacity of around 100 kN/m^2 would be considered reasonable for trench fill foundations at this level, or around 130 kN/m^2 for pads.

6.3.2.2 Specialist Foundations

Acknowledging the potential influence of the trees and the significant depths of excavation required for traditional foundations and consequent practical difficulties, together with the volumes of concrete required, it is possible, as with the proposed residential development, that a more specialist foundation solution, for example involving piles or mini-piles, could present a more practical and economically viable option. Piles would be expected to be supported by a combination of end bearing and shaft friction within the underlying Forest Marble Formation strata, but should be sleeved or slip coated within the zone of influence of the trees. Anti-heave precautions should also be provided to the undersides and faces of ground beams.

Piled foundations should be designed by an experienced and competent specialist piling contractor who should select appropriate design parameters and guarantee safe working loads, together with maximum total and differential settlements, which should be within acceptable tolerances for the proposed structures. The choice of piling technique should be agreed with the contractor. Soil parameters for the strata to be penetrated will depend on the piling technique selected and the precise method of working.

The piling contractors should satisfy themselves and confirm to the Client that the available site investigation data provides sufficient information upon which to base the design. Any requirement for further data should be identified and the information obtained prior to the pile design being finalised. The piling contractor should monitor the pile installations to ensure that the encountered ground conditions are as good as, or better than, assumed in the design. In this regard, further investigation would need to be undertaken to provide design parameters for piled foundations, involving the drilling of deeper boreholes, which would be most practically completed using cable percussive drilling techniques. The piling contractor should monitor the pile installations to ensure that the encountered ground conditions are as good as, or better than, assumed in the design.

Assurances should be sought from prospective specialist contractors concerning the potential environmental impact of the works, including reference to the potential for vibration or displacement damage to the immediately adjacent buildings that are to be retained or that bound the site.

6.4 Ground Floor Slabs

Acknowledging the variable thicknesses of Made Ground, coupled with the disturbance due to pre-existing subsurface construction and the removal of mature trees, fully suspended ground floor slabs would be recommended for both parts of the development.

A requirement for gas and hydrocarbon vapour protection has been identified based on the monitoring undertaken for ground gasses (see Section 5.4 above).

It is recommended that the design of the floor slabs is agreed with the regulators and any warranty providers prior to any construction works commencing. In particular, the gas/VOC protection for the retained building to be converted into apartments should be carefully considered and appropriately designed as it will need to be retro-fitted.

6.5 Pavements

The design and construction of the proposed access road and parking areas should take into consideration the presence of Made Ground and disturbance associated with the previous site structures, together with the potential influence of trees and root systems, including the physical influence of roots. The new pavements should be engineered accordingly, incorporating an appropriate sub-base thickness and specification to mitigate potential surface deterioration. It should be appreciated in this context that where mature trees are removed from beneath parking new parking areas it may not be practical to entirely mitigate the risk of subsequent ground heave, such that some requirement for future maintenance may need to be envisaged.

The CBR values measured within the trial pits ranged between 1 % and 4 %. It may be a prudent precaution in this regard to assume a CBR value of <2 % for preliminary design purposes for the council yard area, acknowledging the relatively low ground support indicated for the shallow subsoils and also, the potential influence of trees and root systems. Elsewhere, subject to the exposed formations being proof rolled to identify any relatively loose areas, which should be excavated and re-compacted/replaced with suitably engineered fill, it would probably be reasonable to assume a CBR value of 2%. It is presumed that a significant proportion of the existing hard surfacing may be re-used within the St George's Works area, subject to appropriate engineering assessment.

6.6 Soakaways

The results of the in-situ soil infiltration tests, presented in Appendix C, indicate very low infiltration rates ranging between approximately 3×10^{-7} and 1×10^{-6} m/s. Very careful engineering consideration would therefore need to be afforded to the design of any form of sustainable drainage system. Conventional soakaway drainage would be unlikely to perform satisfactorily in this regard and consideration should be afforded to appropriate attenuation, or some form of specialist system to provide the combination of a relatively large storage volume and surface area, as dictated by the lower bound infiltration rate. We understand from the Client in this regard that the site benefits from existing surface water drainage system which could potentially be re-used, subject to appropriate permissions.

It should also be acknowledged in the above context that the St George's Works site has been subject to significant past contaminative land use, such that the use of a soakaway type drainage system could be prohibited on this basis.

If soakaways are to be adopted, their use should be agreed with the Environment Agency. The Agency requires that the base of the soakaway be constructed within natural ground, and located at least 1 m above the groundwater table.

TABLES

St George's Works, Trowbridge

Table 1 - Estimation of Chronic Human Health Risks for

Standard Residential Land Use with Plant Uptake (1% SOM)

Contaminant		Units	GAC	Pass criteria?	WS01	WS02A	WS03	WS05	WS02A	WS04	WS04	WS06	WS6	WS07
					0.50 - 0.60m	1.80 - 1.90m	0.60 - 0.70m	0.60 - 0.70m	0.30 - 0.40m	0.90 - 1.00m	1.60 - 1.70m	0.70 - 0.80m	1.20 - 1.30m	0.40 - 0.50m
pH value		-	-	-	8.2	8.3	7.5	8.8	8.3	10.7	8.4	8.0	8.1	7.7
Soil Organic Matter		%	-	-	4.0	1.6	4.9	1.9	9.5	4.8	0.8	3.2	6.3	6.1
Asbestos Fibres Screen		-	-	-	NAI	NAI	NAI	NAI	NAI	NAI	NAI	NAI	NAI	NAI
Metals and inorganics	Arsenic	mg/kg	37	✓	13.4	9.6	25.2	16.7	33.8	29.8	8.7	15.4	14.8	19.5
	Boron	mg/kg	290	✓	3.3	2.1	3.7	0.7	3.7	3.5	8.8	2.8	2.4	2.2
	Cadmium	mg/kg	11	✓	0.5	< 0.5	1.3	< 0.5	1.2	0.6	< 0.5	0.6	< 0.5	0.5
	Chromium	mg/kg	910	✓	35.5	40.0	32.3	13.4	26.6	21.2	28.2	27.9	32.0	27.4
	Chromium (VI)	mg/kg	6	✓	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
	Copper	mg/kg	2400	✓	62.8	33.9	107	46.4	138	150	22.6	57.9	78.1	92.3
	Lead	mg/kg	200[C4SL]	×	116	77.0	417	109	344	221	17.6	185	185	96.9
	Inorganic Mercury	mg/kg	40	✓	< 0.5	< 0.5	1.5	0.9	0.8	< 0.5	< 0.5	0.5	< 0.5	0.7
	Nickel	mg/kg	130	✓	29.0	27.2	30.3	10.7	44.5	36.0	35.4	28.8	35.7	28.0
	Selenium	mg/kg	250	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Zinc	mg/kg	3700	✓	159	103	237	107	215	179	120	160	161	185
	Cyanide	mg/kg	41[GI]	✓	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Organics	Phenols	mg/kg	120	✓	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
PAHs	Naphthalene	mg/kg	2.3	×	0.12	< 0.01	< 0.01	0.03	12.9	0.19	< 0.01	< 0.01	0.20	< 0.01
	Acenaphthylene	mg/kg	170	✓	0.26	< 0.01	< 0.01	0.04	5.78	0.04	< 0.01	< 0.01	0.02	< 0.01
	Acenaphthene	mg/kg	210	✓	0.02	< 0.01	< 0.01	< 0.01	0.08	< 0.01	< 0.01	< 0.01	0.08	< 0.01
	Fluorene	mg/kg	170	✓	0.26	< 0.01	< 0.01	< 0.01	0.55	0.02	< 0.01	< 0.01	0.20	< 0.01
	Phenanthrene	mg/kg	95	✓	3.19	< 0.01	0.01	0.12	10.0	0.34	< 0.01	< 0.01	0.64	< 0.01
	Anthracene	mg/kg	2400	✓	0.80	< 0.01	< 0.01	0.05	3.28	0.11	< 0.01	< 0.01	0.08	< 0.01
	Fluoranthene	mg/kg	280	✓	2.47	0.01	< 0.01	0.33	17.5	0.42	< 0.01	< 0.01	0.04	< 0.01
	Pyrene	mg/kg	620	✓	1.79	< 0.01	< 0.01	0.31	13.8	0.33	< 0.01	< 0.01	0.07	< 0.01
	Benzo(a)anthracene	mg/kg	7.2	×	1.13	0.03	< 0.01	0.21	15.7	0.24	< 0.01	< 0.01	0.18	< 0.01
	Chrysene	mg/kg	15	×	1.08	0.04	0.01	0.32	16.7	0.33	< 0.01	< 0.01	0.07	< 0.01
	Benzo(b)fluoranthene	mg/kg	2.6	×	0.77	0.02	< 0.01	0.32	16.5	0.23	< 0.01	< 0.01	0.04	< 0.01
	Benzo(k)fluoranthene	mg/kg	77	✓	0.65	0.02	< 0.01	0.30	17.6	0.20	< 0.01	< 0.01	0.03	< 0.01
	Benzo(a)pyrene	mg/kg	2.2	×	0.67	0.01	< 0.01	0.30	15.6	0.21	< 0.01	< 0.01	< 0.01	< 0.01
	Indeno(1,2,3-c,d)pyrene	mg/kg	27	✓	0.35	< 0.01	< 0.01	0.23	20.7	0.15	< 0.01	< 0.01	< 0.01	< 0.01
	Dibenzo(ah)anthracene	mg/kg	0.24	×	0.15	< 0.01	< 0.01	0.08	8.45	0.05	< 0.01	< 0.01	< 0.01	< 0.01
	Benzo(g,h,i)perylene	mg/kg	320	✓	0.33	< 0.01	< 0.01	0.27	29.5	0.14	< 0.01	< 0.01	< 0.01	< 0.01
BTEX	Benzene	mg/kg	0.087	✓	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Toluene	mg/kg	130	✓	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Ethyl Benzene	mg/kg	47	✓	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Xylenes	mg/kg	56	✓	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPHs (Aromatics)	>nC_5-nC_7	mg/kg	70	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_7-nC_8	mg/kg	130	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_8-nC_{10}	mg/kg	34	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	18.6	< 1.0
	>nC_{10}-nC_{12}	mg/kg	74	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	46.2	< 1.0
	>nC_{12}-nC_{16}	mg/kg	140	✓	< 1.0	< 1.0	< 1.0	< 1.0	3.5	< 1.0	< 1.0	< 1.0	127	< 1.0
	>nC_{16}-nC_{21}	mg/kg	260	×	< 1.0	< 1.0	< 1.0	< 1.0	65.1	< 1.0	< 1.0	< 1.0	539	< 1.0
	>nC_{21}-nC_{35}	mg/kg	1100	×	< 1.0	2.8	< 1.0	3.5	921	2.2	< 1.0	< 1.0	1570	4.8
	>nC_{35}-nC_{44}	mg/kg	1100	✓	< 1.0	2.2	< 1.0	< 1.0	58.7	< 1.0	< 1.0	< 1.0	43.3	2.3
TPHs (Aliphatics)	>nC_5-nC_6	mg/kg	42	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_6-nC_8	mg/kg	100	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_8-nC_{10}	mg/kg	27	×	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	29.9	< 1.0
	>nC_{10}-nC_{12}	mg/kg	130	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	62.8	< 1.0
	>nC_{12}-nC_{16}	mg/kg	1100	✓	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1.0	159	< 1.0
	>nC_{16}-nC_{21}	mg/kg	65000	✓	< 1.0	< 1.0	< 1.0	< 1.0	77.2	< 1.0	< 1.0	< 1.0	536	< 1.0
	>nC_{21}-nC_{35}	mg/kg	65000	✓	< 1.0	4.8	2.7	1.5	1010	1.6	< 1.0	< 1.0	1390	3.8
PCB	7 congeners	mg/kg	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
VOC	Trichloroethene	mg/kg	0.016	×	0.0249	0.028	0.0339	0.0127	0.536	0.0821	<0.01	0.0901	0.0331	<0.01
	cis-1,2-dichloroethene	mg/kg	0.37	×	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.396	0.0125	0.17	0.0149
	trans-1,2-dichloroethene	mg/kg	0.7	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0107	<0.01	0.04	<0.01
	1,1,2,2-tetrachloroethane	mg/kg	1.6	✓	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0785	<0.01
	1,3,5,trimethylbenzene	mg/kg	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0147	<0.01
	1-methylpropylbenzene	mg/kg	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0133	<0.01
	All others in suite	mg/kg	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes

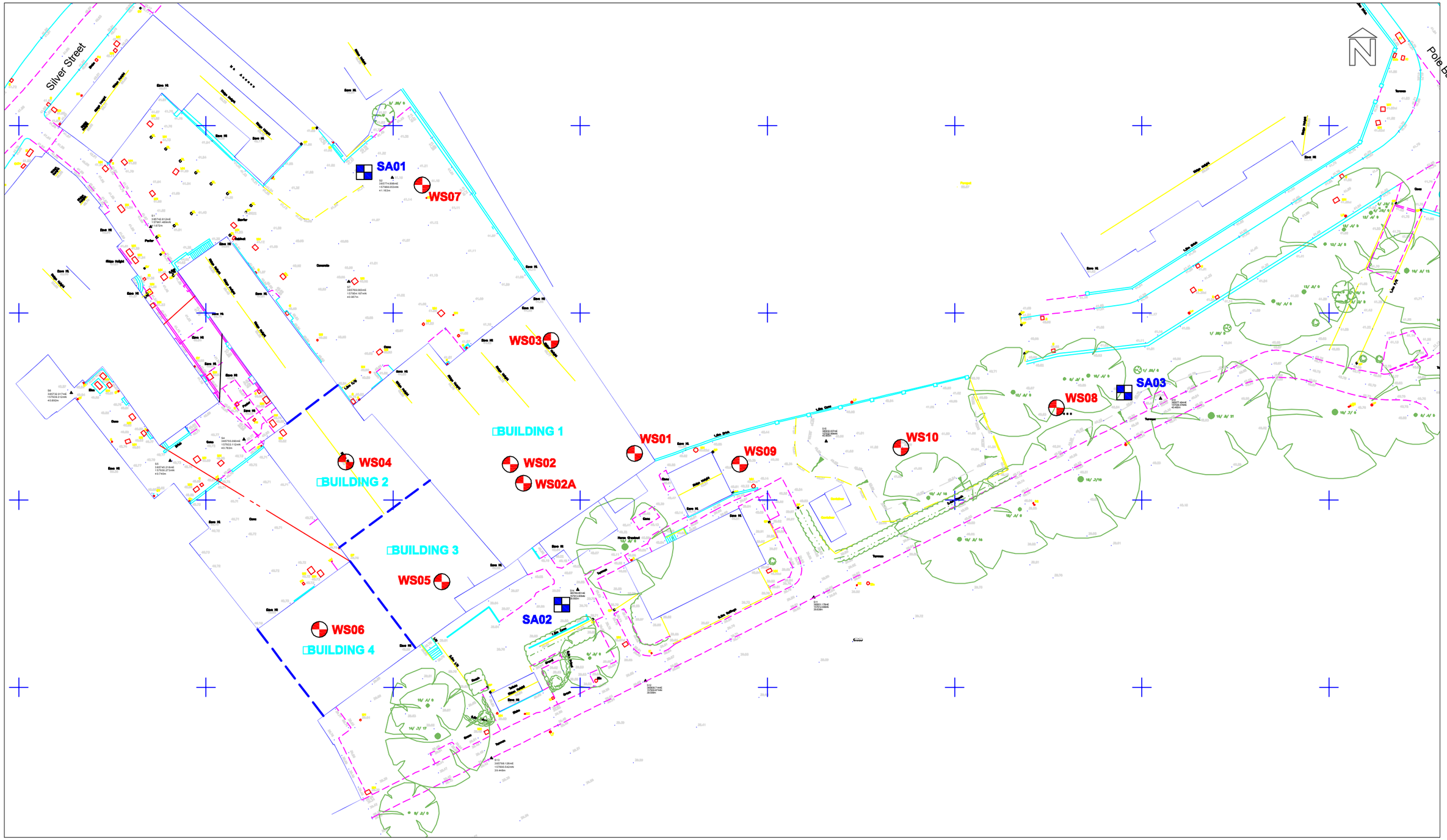
GAC	Generic Assessment Criteria. All GAC are S4ULs published by CIEH/LQM in 2014, unless otherwise stated.
C4SL	Catergory 4 Screening Level published by DEFRA in 2013.
GI	GAC derived in-house by GI.
NAI	No asbestos identified
Value	Shaded cells indicate samples in which GAC is exceeded.

St George's Works, Trowbridge								
Table 2 - Estimation of Chronic Human Health Risks for								
Standard Commercial Land Use (1% SOM)								
Contaminant		Units	**GAC**	Pass criteria?	WS08	WS08	WS09	WS10
					0.10 - 0.20m	0.60 - 0.70m	0.10 - 0.20m	0.40 - 0.50m
pH value		-	**-**	-	7.7	8.0	8.1	8.0
Soil Organic Matter		%	**-**	-	12	1.6	3.4	16
Asbestos Fibres Screen		-	**-**	-	NAI	NAI	NAI	NAI
Metals and inorganics	Arsenic	mg/kg	**640**	✓	22.7	9.6	19.7	9.0
	Boron	mg/kg	**240,000**	✓	2.9	1.8	2.5	4.9
	Cadmium	mg/kg	**190**	✓	1.0	< 0.5	0.7	< 0.5
	Chromium	mg/kg	**8,600**	✓	34.3	38.5	78.0	12.3
	Chromium (VI)	mg/kg	**33**	✓	< 0.8	< 0.8	< 0.8	< 0.8
	Copper	mg/kg	**68,000**	✓	54.3	13.8	48.0	19.4
	Lead	mg/kg	**2300**^{C4SL}	✓	210	23.0	193	62.8
	Inorganic Mercury	mg/kg	**1,100**	✓	0.6	< 0.5	< 0.5	< 0.5
	Nickel	mg/kg	**980**	✓	30.1	15.1	53.8	7.7
	Selenium	mg/kg	**12,000**	✓	1.7	< 1.0	< 1.0	< 1.0
	Zinc	mg/kg	**730,000**	✓	245	73.7	223	105
	Cyanide	mg/kg	**41**^{GI}	✓	< 1.0	< 1.0	< 1.0	< 1.0
Organics	Phenols	mg/kg	**440**	✓	< 6	< 6	< 6	< 6
PAHs	Naphthalene	mg/kg	**190**	✓	0.45	< 0.01	< 0.01	0.03
	Acenaphthylene	mg/kg	**83,000**	✓	0.25	< 0.01	< 0.01	0.07
	Acenaphthene	mg/kg	**84,000**	✓	0.01	< 0.01	< 0.01	< 0.01
	Fluorene	mg/kg	**63,000**	✓	0.02	< 0.01	< 0.01	0.01
	Phenanthrene	mg/kg	**22,000**	✓	0.50	< 0.01	0.03	0.15
	Anthracene	mg/kg	**520,000**	✓	0.19	< 0.01	0.01	0.08
	Fluoranthene	mg/kg	**23,000**	✓	1.45	< 0.01	0.08	0.74
	Pyrene	mg/kg	**54,000**	✓	1.27	< 0.01	0.07	0.69
	Benzo(a)anthracene	mg/kg	**170**	✓	0.89	< 0.01	0.04	0.44
	Chrysene	mg/kg	**350**	✓	1.12	< 0.01	0.06	0.61
	Benzo(b)fluoranthene	mg/kg	**44**	✓	1.09	< 0.01	0.07	0.53
	Benzo(k)fluoranthene	mg/kg	**1,200**	✓	1.14	< 0.01	0.05	0.56
	Benzo(a)pyrene	mg/kg	**35**	✓	0.98	< 0.01	0.05	0.46
	Indeno(1,2,3-c,d)pyrene	mg/kg	**500**	✓	0.88	< 0.01	0.04	0.31
	Dibenzo(ah)anthracene	mg/kg	**3.5**	✓	0.31	< 0.01	0.01	0.13
	Benzo(g,h,i)perylene	mg/kg	**3,900**	✓	1.14	< 0.01	0.05	0.34
BTEX	Benzene	mg/kg	**27**	✓	<0.01	<0.01	<0.01	<0.01
	Toluene	mg/kg	**56,000**	✓	<0.01	<0.01	<0.01	<0.01
	Ethyl Benzene	mg/kg	**5,700**	✓	<0.01	<0.01	<0.01	<0.01
	Xylenes	mg/kg	**5,900**	✓	<0.01	<0.01	<0.01	<0.01
TPHs (Aromatics)	>nC_5-nC_7	mg/kg	**26,000**	✓	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_7-nC_8	mg/kg	**56,000**	✓	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_8-nC_{10}	mg/kg	**3,500**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{10}-nC_{12}	mg/kg	**16,000**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{12}-nC_{16}	mg/kg	**36,000**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{16}-nC_{21}	mg/kg	**28,000**	✓	< 1.0	< 1.0	< 1.0	1.6
	>nC_{21}-nC_{35}	mg/kg	**28,000**	✓	4.4	< 1.0	< 1.0	35.6
	>nC_{35}-nC_{44}	mg/kg	**28,000**	✓	< 1.0	< 1.0	< 1.0	12.2
TPHs (Aliphatics)	>nC_5-nC_6	mg/kg	**3,200**	✓	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_6-nC_8	mg/kg	**7,800**	✓	< 0.01	< 0.01	< 0.01	< 0.01
	>nC_8-nC_{10}	mg/kg	**2,000**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{10}-nC_{12}	mg/kg	**9,700**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{12}-nC_{16}	mg/kg	**59,000**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{16}-nC_{21}	mg/kg	**1,600,000**	✓	< 1.0	< 1.0	< 1.0	< 1.0
	>nC_{21}-nC_{35}	mg/kg	**1,600,000**	✓	1.5	< 1.0	< 1.0	20.3
PCB	7 congeners	mg/kg	**-**	-	<0.03	<0.03	<0.03	<0.03
VOC	cis-1,2-dichloroethene	mg/kg	**47**	✓	<0.01	<0.01	0.013	<0.01
	All others in suite	mg/kg	**-**	-	<0.01	<0.01	<0.01	<0.01

Notes

GAC	Generic Assessment Criteria. All GAC are S4ULs published by CIEH/LQM in 2014, unless otherwise stated.
C4SL	Catergory 4 Screening Level published by DEFRA in 2013.
GI	GAC derived in-house by GI.
NAI	No asbestos identified
Value	Shaded cells indicate samples in which GAC is exceeded.

FIGURES



- Continuous Percussion Borehole Location
- Trial Pit Location
- Approximate Building Boundary

Ground Investigation
Unit 3, Westfield Court, Barns Ground, Kenn, Clevedon, BS21 6FQ
TEL: 01275 876903 | **FAX:** 01275 879662
www.ground-investigation.com

Site: St George's Works, Trowbridge	
Client: TC Sports Limited & Trowbridge Town Council	
Project No: p-sw-1037	Scale: 1:500 (@A3 size)
Filename: p-sw-1037.fig1.dwg	

FIGURE 1

Exploratory Hole Positions

Existing Layout

Continuous Percussion Borehole Location

Trial Pit Location

Ground Investigation
Unit 3, Westfield Court, Barns Ground, Kenn, Clevedon, BS21 6FQ
TEL: 01275 876903 | **FAX:** 01275 879662
www.ground-investigation.com

Site: St George's Works, Trowbridge	
Client: TC Sports Limited & Trowbridge Town Council	
Project No: p-sw-1037	Scale: 1:500 (@A3 size)
Filename: p-sw-1037.fig2.dwg	

FIGURE 2

Exploratory Hole Positions

Proposed Layout

APPENDIX A

Engineering Records of Continuous Percussion Boreholes

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS01
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 09/01/18 **End Date:** 09/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No		Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
						(0.26) 0.26	CONCRETE. 65% fine to coarse subangular limestone gravel in a 35% sand/cement matrix.	
						0.35	Grey sandy gravel of subangular to angular limestone and occasional bricks. **MADE GROUND (Subbase)**	
						0.45	[Soft] yellow grey sandy gravelly silty clay. Gravel is limestone. **MADE GROUND (Fill)**	
0.50-0.60	ES/1					(0.75)	[Soft] dark brown grey sandy gravelly silty clay with frequent pockets of ashy sand. Gravel is subangular to subrounded limestone, brick, concrete, clinker and charcoal. **MADE GROUND (Fill)** Brick cobble at 0.9m depth.	
1.00-1.45	C		N=6 (1,1:1,1,2,2)			1.20		
1.30-1.40	D/2					(0.30) 1.50	Soft brownish grey sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**	
						(0.30) 1.80	Firm bluish grey mottled orange with red veining slightly sandy (fine) silty CLAY with occasional fine shell material and occasional root traces. **FOREST MARBLE FORMATION**	
2.00-2.45	C		N=8 (2,2:2,2,2,2)			(0.65) 2.45	Soft to firm orange mottled grey silty CLAY. **FOREST MARBLE FORMATION**	
2.30-2.40	D/3							
3.00-3.45	C		N=12 (2,2:3,3,3,3)			(1.15) 3.60	Firm brown grey mottled orange silty CLAY with pockets of white silty SAND. **FOREST MARBLE FORMATION**	
						(0.30) 3.90	Firm orange laminated bluish grey slightly sandy silty CLAY. **FOREST MARBLE FORMATION**	
4.00-4.42	C		N>50 (4,6:7,9,16,18/45mm)			(0.40) 4.30	Very stiff dark bluish grey sandy silty CLAY with shell material. **FOREST MARBLE FORMATION**	
4.20-4.30	D/4					(0.26) 4.56	Extremely weak dark bluish grey arenaceous LIMESTONE. Recovered as gravel fragments. **FOREST MARBLE FORMATION**	
4.50-4.56	C		N>50 (25/15mm50/40mm)					

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
09/01/18	10:00	4.56		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.56	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 4.56m and 50mm HDPE gas monitoring standpipe installed.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS02
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 09/01/18 **End Date:** 09/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				Water	STRATA			Backfill & Inst
Depth	Type / No		Result / Remark		Legend	Depth (thick.)	Description	
						0.05	CONCRETE. 40% fine to coarse subangular to subrounded limestone gravel in a 60% sand/cement matrix.	
						0.15	CONCRETE. 65% fine to coarse subangular limestone gravel in a 35% sand/cement matrix. 6 mm reinforcements at base.	
						(1.05)	BRICKWORK. Recovered as full diameter core red brick cobbles in a grey sand/cement matrix. **Unknown Underground Structure**	
1.00-1.45	C		N=4 (3,3:2,2,0,0)			1.20		
						(1.50)	VOID. Tape extended to 2.7 m depth. **Unknown Underground Structure**	
						2.70		

Boring Progress and Water Observations					Water Strikes					Hole Diameter		Casing Diameter	
Date	Time	Hole Depth	Casing Depth	Water Depth	Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed	Depth	Diameter (mm)	Depth	Diameter (mm)
09/01/18	11:30	2.70		Dry						1.00	102		

General Remarks:
1) Borehole terminated at 1.20 m on encountering void and loosing drill rods.
2) Tape extended in void to a depth of 2.7m.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS02A
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No	Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
					0.05	CONCRETE. 40% fine to coarse subangular to subrounded limestone gravel in a 60% sand/cement matrix.	
					0.15	CONCRETE.65% fine to coarse subangular limestone gravel in a 35% sand/cement matrix. 6 mm reinforcements at base.	
					0.25	Grey sandy gravel of limestone. **MADE GROUND (Subbase)**	
0.30-0.40	ES/1				(0.20) 0.45	[Medium dense] black ashy sandy gravel of limestone, clinker and slag. **MADE GROUND (Fill)**	
					(0.25) 0.70	[Medium dense] red and grey sandy gravel and cobbles of brick, concrete and slate. **MADE GROUND (Fill)**	
0.80-0.90	ES/2				(0.30) 1.00	[Soft] grey brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded limestone, concrete, brick and occasional charcoal and clinker. **MADE GROUND (Fill)**	
1.00-1.45	S	N=6 (2,1:1,1,2,2)			(0.70) 1.70	[Soft] light grey silty clay with rare brick and concrete fragments. **MADE GROUND (Fill)**	
1.80-1.90	ES/3				(0.50) 2.20	[Soft] brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded brick, concrete, limestone charcoal and clinker. **MADE GROUND (Fill)**	
2.00-2.45	S	N=6 (1,0:1,1,2,2)					
2.30-2.40	D/4				(0.60) 2.80	Soft blue grey mottled orange silty CLAY with frequent root traces. **FOREST MARBLE FORMATION**	
3.00-3.45	S	N=14 (2,2:3,3,4,4)			(0.65) 3.45	Firm to stiff dark blue grey mottled orange slightly sandy silty CLAY with occasional gypsum crystals. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
10/01/18	13:00	3.45		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
3.45	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:

1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 3.45m and backfilled with arisings.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS03
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 09/01/18 **End Date:** 09/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				Water	STRATA			Backfill & Inst
Depth	Type / No		Result / Remark		Legend	Depth (thick.)	Description	
						(0.20) 0.20	CONCRETE.65% fine to coarse subangular limestone gravel in a 35% sand/cement matrix.	
						0.35	Dark grey sandy gravel of slate, brick, concrete and clinker. **MADE GROUND (Subbase)**	
0.40-0.50	ES/1					(0.20) 0.55	[Soft] yellow and brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone and occasional brick. **MADE GROUND (Fill)**	
0.60-0.70	ES/2					(0.25) 0.80	[Soft] dark brown slightly sandy gravelly silty clay. Gravel is subangular to subrounded brick, concrete limestone and occasional clinker charcoal and wood fragments. **MADE GROUND (Fill)**	
						(0.30) 1.10	[Soft] yellow and brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone and occasional brick. **MADE GROUND (Fill)**	
1.00-1.45	S		N=7 (1,1:1,2,2,2)					
1.20-1.60	D/3					(0.20) 1.30	Soft bluish grey mottled orange with red veining slightly sandy (fine) silty CLAY with occasional fine shell material and occasional root traces. **FOREST MARBLE FORMATION**	
						(0.50) 1.80	Soft grey mottled orange silty CLAY with occasional root traces and rare limestone gravel. **FOREST MARBLE FORMATION**	
						(0.20) 2.00	Firm grey, orange and red mottled silty CLAY. **FOREST MARBLE FORMATION**	
2.00-2.45	S		N=12 (2,2:2,3,3,4)			(0.40) 2.40	Firm grey with orange mottling sandy (medium to coarse) silty CLAY with abundant gypsum crystals and occasional pockets of white silty sand. **FOREST MARBLE FORMATION**	
2.50-2.60	D/4					(1.00) 3.40	Stiff grey mottled orange sandy (fine) silty CLAY with occasional gypsum crystals. **FOREST MARBLE FORMATION**	
3.00-3.45	S		N=16 (3,2:3,3,4,6)					
						(0.80) 4.20	Very stiff dark bluish grey fissured silty CLAY with rare gypsum crystals. **FOREST MARBLE FORMATION**	
4.00-4.45	S		N=45 (5,5:10,10,10,15)			(0.25) 4.45	Very stiff dark bluish grey sandy silty CLAY with shell material. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
09/01/18	13:00	4.45		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.45	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 4.45m and backfilled with arisings.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS04
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 09/01/18 **End Date:** 09/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				Water	STRATA			Backfill & Inst
Depth	Type / No		Result / Remark		Legend	Depth (thick.)	Description	
						(0.21) 0.21	Floor tiles over; CONCRETE. 50% fine to coarse subangular limestone gravel in a 50% sand/cement matrix. 6mm reinforcements at 0.12 m depth.	
						(0.59) 0.80	Light yellow grey oolitic limestone boulder. Recovered as full dimater core. **MADE GROUND (Possible relict floor slab)**	
0.90-1.00	ES/1					(0.30) 1.10	[Loose] grey sandy gravel of brick, concrete and occasional clinker and charcoal. **MADE GROUND (Fill)**	
1.00-1.45	S		N=7 (1,1:1,2,2,2)					
1.20-1.30	ES/2					(0.40) 1.50	[Soft] brown grey slightly sandy slightly gravelly silty clay. Gravel is angular to rounded fine to medium brick concrete and limestone. **MADE GROUND (Fill)**	
1.60-1.70	ES/3					(0.50) 2.00	Soft to firm bluish grey mottled orange silty CLAY with occassional root traces. **FOREST MARBLE FORMATION**	
2.00-2.45	S		N=12 (2,2:3,3,3,3)			(0.50) 2.50	Firm bluish grey mottled orange sandy silty CLAY with numerous gypsum crystals. **FOREST MARBLE FORMATION**	
2.70-2.80	D/4					(0.40) 2.90	Firm grey mottled orange slightly sandy silty CLAY with occasional gypsum crystals. **FOREST MARBLE FORMATION**	
3.00-3.45	S		N=15 (3,3:3,3,4,5)			(0.80) 3.70	Firm to stiff dark bluish grey with orange staining silty CLAY with occasional gypsum crystals. **FOREST MARBLE FORMATION**	
4.00-4.45	S		N=30 (5,5:6,8,8,8)			(0.75) 4.45	Very stiff dark bluish grey fissured CLAY with rare gypsum crystals. Fissures have some yellow clay infill. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
09/01/18	15:00	4.45		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.45	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 4.45m and 50mm HDPE gas monitoring standpipe installed.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS05
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 09/01/18 **End Date:** 09/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No	Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
					(0.25) 0.25	Floor tiles over; CONCRETE. 50% fine to coarse subangular limestone gravel in a 50% sand/cement matrix. 6mm reinforcements at 0.12 m depth.	
					(0.25) 0.50	Dark grey sandy gravel of slate, brick, concrete and clinker. **MADE GROUND (Subbase)**	
0.60-0.70	ES/1				(0.90) 1.40	[Medium dense] dark grey and light grey sandy gravel and cobbles of subangular brick, concrete, oolitic limestone, charcoal and clinker. **MADE GROUND (Fill)**	
1.00-1.45	S	N=17 (3,5:5,4,4,4)					
1.50-1.60	ES/2		1		(0.30) 1.70	[Medium dense] dark grey sandy gravel of subrounded slag, clinker and occasional concrete and limestone. **MADE GROUND (Fill)**	
					(0.30) 2.00	[Medium dense] grey sandy gravel of subangular to subrounded limestone and concrete. Wet. **MADE GROUND (Fill)**	
2.00-2.45	S	N=7 (2,1:1,2,2,2)			(0.80) 2.80	Soft orange mottled blue grey silty CLAY with occasional root traces. **FOREST MARBLE FORMATION**	
2.50-2.60	D/3						
3.00-3.45	S	N=14 (2,2:3,3,3,5)			(0.60) 3.40	Firm to stiff bluish grey mottled orange sandy (fine) silty CLAY with occasional gysum crystals. **FOREST MARBLE FORMATION**	
					(0.50) 3.90	Stiff dark bluish grey laminated orange slightly sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**	
4.00-4.10	D/4				(0.48) 4.38	Very stiff dark bluish grey slightly sandy (fine) silty CLAY with frequent shell material. **FOREST MARBLE FORMATION**	
4.00-4.38	S	N>50 (7,7:9,10,31/75mm)					

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
09/01/18	17:00	4.38		3.00
10/01/18	08:30	4.38		2.00

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed
1.80	Perched-some inflow			

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.38	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater encountered at base of made ground at 1.80 m.
5) Some borehole collpase during drilling, on encountering groundwater.
5) Borehole terminated at 4.38m and backfilled with arisings.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS06
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				Water	STRATA			Backfill & Inst
Depth	Type / No		Result / Remark		Legend	Depth (thick.)	Description	
						0.17	CONCRETE. 65% fine to coarse subangular limestone gravel in a 35% sand/cement matrix.	
						(0.33)	Grey sandy gravel of subangular to subrounded oolitic limestone and concrete. **MADE GROUND (Subbase)**	
						0.50		
						0.60	Dark grey sandy gravel of clinker and slag. **MADE GROUND (Fill)**	
0.70-0.80	ES/1					(0.50)	[Soft] dark brown grey slightly sandy gravelly silty CLAY. Gravel is subangular to subrounded limestone, charcoal, clinker and brick. **MADE GROUND (Fill)**	
1.00-1.45	S		N=0 (3,2:0,0,0,0)			1.10		
1.20-1.30	ES/2			1		(0.90)	[Very soft] brown grey with dark grey staining slightly sandy gravelly silty clay with a strong hydrocarbon odour. Gravel is limestone. **MADE GROUND (Fill)**	
2.00-2.45	S		N=8 (1,1:2,2,2,2)			2.00	Soft to firm blue grey mottled orange silty CLAY. **FOREST MARBLE FORMATION**	
2.40-2.50	D/3					(0.60)		
						2.60	Firm dark grey mottled orange slightly sandy (fine) silty CLAY with occasional gypsum crystals. **FOREST MARBLE FORMATION**	
3.00-3.45	S		N=12 (2,3:3,3,3,3)			(0.90)		
						3.50	Stiff dark grey laminated orange slightly sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**	
4.00-4.45	S		N=38 (7,8:8,9,9,12)			(0.50)		
						4.00	Very stiff dark blue grey sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**	
						(0.45)		
						4.45		

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
10/01/18	09:30	4.45		1.00

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed
1.20	Strike-significant inflow			

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.45	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:

1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) Strong hydrocarbon odour and staining in made ground.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater strike at 1.20 m, standing water depth at 1.0 m on completion.
5) Borehole collpasing during drilling, on encountering groundwater.
5) Borehole terminated at 4.45m and backfilled with arisings.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS07
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No	Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
					(0.22) 0.22	CONCRETE. 50% fine to coarse subangular limestone gravel in a 50% sand/cement matrix.	
					0.30	Pinky grey sandy gravel of limestone. **MADE GROUND (Subbase)**	
0.40-0.50	ES/1				(0.40) 0.70	[Soft] dark grey brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded fine to medium charcoal and occasional clinker and limestone. **MADE GROUND (Fill)**	
0.80-0.90	D/2				(0.40) 1.10	Soft to firm blue grey mottled orange silty CLAY with root traces. **FOREST MARBLE FORMATION**	
1.00-1.45	S	N=12 (2,3:2,3,3,4)			(0.40) 1.50	Firm blue grey mottled orange silty CLAY with root traces. **FOREST MARBLE FORMATION**	
1.80-1.90	D/3				(1.00) 2.50	Stiff bluish grey mottled orange slightly sandy (fine to medium) silty CLAY with numerous gypsum crystals and occasional root traces. **FOREST MARBLE FORMATION**	
2.00-2.45	S	N=19 (3,3:4,4,5,6)					
3.00-3.45	S	N=21 (4,5:5,5,5,6)			(1.20) 3.70	Stiff dark bluish grey laminated orange silty CLAY with occasional gypsum crystals and pockets of silty sand. **FOREST MARBLE FORMATION**	
4.00-4.45	S	N=30 (6,6:6,8,8,8)			(0.75) 4.45	Very stiff dark bluish grey silty CLAY. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
10/01/18	11:00	4.45		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
4.00	65
4.45	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 4.45m and 50mm HDPE gas monitoring standpipe installed.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS08
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No	Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
0.10-0.20	ES/1				(0.30) 0.30	Dark grey slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone and bricks. Rootlets and roots up to 25 mm diameter. **MADE GROUND (Topsoil)**	
					(0.20) 0.50	[Firm] brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone and occasional brick and black carbonaceous material. **MADE GROUND (Fill)**	
0.60-0.70	ES/2					Firm orangish brown mottled grey slightly sandy (fine) silty CLAY with roots up to 3 mm in diameter. **FOREST MARBLE FORMATION**	
1.00-1.45	S	N=8 (2,2:2,2,2,2)			(1.20) 1.70		
1.80-1.90	D/3				(0.50) 2.20	Stiff orange mottled grey slightly sandy silty CLAY with shell material. **FOREST MARBLE FORMATION**	
2.00-2.45	S	N=50 (5,8:12,13,14,11)			(0.30) 2.50	Very stiff orange mottled grey slightly sandy gravelly silty CLAY. Gravel is subangular to subrounded arenaceous limestone. **FOREST MARBLE FORMATION**	
2.50-2.60	S	N>50 (25/55mm50/40mm)			2.60	Extremely weak dark bluish grey arenaceous LIMESTONE. Recovered as gravel fragments. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
10/01/18	14:00	2.60		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
2.50	75
2.60	50

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 2.60m and 50mm HDPE gas monitoring standpipe installed.

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Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS09
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				STRATA			
Depth	Type / No	Result / Remark	Water	Legend	Depth (thick.)	Description	Backfill & Inst
0.10-0.20	ES/1				(0.25) 0.25	Brown slightly sandy gravelly silty clay. Gravel is angular to subrounded brick, limestone and black carbonaceous material. **MADE GROUND (Fill)**	
0.40-0.50	D/2				(0.45) 0.70	Firm to stiff dessicated dark greenish grey slightly sandy silty CLAY with slight organic odour and occasional plant material. **FOREST MARBLE FORMATION**	
					(0.30) 1.00	Firm dark greenish grey slightly sandy silty CLAY with slight organic odour and occasional plant material. **FOREST MARBLE FORMATION**	
1.00-1.45	S	N=8 (1,1:2,2,2,2)			(0.40) 1.40	Firm orange mottled blue grey silty CLAY with occasional root traces. **FOREST MARBLE FORMATION**	
1.50-1.60	D/3				(0.40) 1.80	Soft to firm orange mottled blue grey silty CLAY with occasional root traces. **FOREST MARBLE FORMATION**	
					(0.30) 2.10	Firm bluish grey mottled orange slightly sandy silty CLAY with occasional pockets of silty sand. **FOREST MARBLE FORMATION**	
2.00-2.45	S	N=25 (2,2:3,6,8,8)			(0.50) 2.60	Stiff bluish grey mottled orange slightly sandy silty CLAY with occasional pockets of silty sand. **FOREST MARBLE FORMATION**	
					(0.40) 3.00	Stiff becoming very stiff dark grey with orange staining sandy silty CLAY with occasional shell material. **FOREST MARBLE FORMATION**	
3.00-3.17	S	N>50 (7,18:50/40mm)			3.17	Extremely weak dark bluish grey arenaceous LIMESTONE. Recovered as gravel fragments. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations					Water Strikes					Hole Diameter		Casing Diameter	
Date	Time	Hole Depth	Casing Depth	Water Depth	Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed	Depth	Diameter (mm)	Depth	Diameter (mm)
10/01/18	15:00	3.17		Dry						1.00 2.00 3.00 3.17	102 87 75 55		

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 3.17m and 50mm HDPE gas monitoring standpipe installed.

T 01275 876903 | E southwest@ground-investigation.com | www.ground-investigation.com

Ground Investigation

Continuous Percussion Borehole Record

Hole ID
WS10
Sheet 1 of 1 (0.00m-5.00m)
All dimensions in metres
Scale 1:25

Site: St George's Works, Trowbridge
Client: TC Sports Ltd & Trowbridge Town Council
Job No: P-SW-1037
Method/Plant Used: Archway Competitor
Start date: 10/01/18 **End Date:** 10/01/18 **Logged By:** EM
Easting: **Northing:** **Elevation:**

SAMPLES & IN-SITU TESTS				Water	STRATA			Backfill & Inst
Depth	Type / No		Result / Remark		Legend	Depth (thick.)	Description	
						(0.35) 0.35	Grey slightly clayey/silty sandy gravel and cobbles of limestone. **MADE GROUND (Fill)**	
0.40-0.50	ES/1					(0.45) 0.80	[Soft] dark grey very sandy slightly gravelly silty clay. Gravel is wood fragments and occasional fine to medium limestone and brick. **MADE GROUND (Topsoil Fill)**	
1.00-1.45	S		N=10 (2,3:2,3,2,3)			(1.20) 2.00	Firm brown grey with red veining silty CLAY with occasional root traces. **FOREST MARBLE FORMATION**	
1.50-1.60	D/2							
2.00-2.45	S		N=17 (3,3:3,4,5,5)			(1.00) 3.00	Stiff grey and orange mottled slightly sandy silty CLAY with occasional shell material. **FOREST MARBLE FORMATION**	
2.50-2.60	D/3							
3.00-3.34	S		N>50 (4,6:12,20,18/40mm)			(0.50) 3.50	Very stiff dark grey with orange staining sandy slightly gravelly silty CLAY with shell material. Gravel is subrounded arenaceous limestone. **FOREST MARBLE FORMATION**	
						3.60	Extremely weak dark bluish grey arenaceous LIMESTONE. Recovered as gravel fragments. **FOREST MARBLE FORMATION**	

Boring Progress and Water Observations

Date	Time	Hole Depth	Casing Depth	Water Depth
10/01/18	16:00	3.60		Dry

Water Strikes

Strike Depth	Flow Rate	Post Strike Depth	Elapsed Minutes	Depth Sealed

Hole Diameter

Depth	Diameter (mm)
1.00	102
2.00	87
3.00	75
3.60	65

Casing Diameter

Depth	Diameter (mm)

General Remarks:
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Recovered particle size controlled by diameter of sampling barrels within coarser grained materials or bands of rock. These materials may be fragmented by sample barrels.
4) Groundwater not encountered.
5) Borehole terminated at 3.60m and backfilled with arisings.

APPENDIX B

Engineering Records of Trial Pits

T 01275 876903 | E southwest@ground-investigation.com | www.ground-investigation.com

Ground Investigation

Trial Pit Record

Hole ID
SA01
Sheet 1 of 1 (0.00m-3.00m)
All dimensions in metres
Scale 1:15

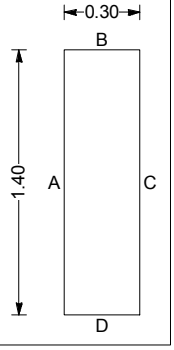
Site: St George's Works, Trowbridge	**Method/Plant Used:** 3 Tonne Tracked Excavator		
Client: TC Sports Ltd & Trowbridge Town Council	**Start date:** 01/02/18	**End Date:** 01/02/18	**Logged By:** DH
Job No: P-SW-1037	**Easting:**	**Northing:**	**Elevation:**

SAMPLES & IN-SITU TESTS			WATER	STRATA		
Depth	**Type / No**	**Results / Remarks**		**Legend**	**Depth**	**Description**
					(0.30) 0.30	Pinky grey sandy gravel of limestone. **MADE GROUND (Subbase)**
					(0.40) 0.70	[Soft] grey to yellowish brown slightly sandy slightly gravelly silty clay with high cobble content. Gravel and cobbles are subangular to subrounded of argillaceous and bioclastic limestone, and fragments of brick and concrete. **MADE GROUND (Fill)**
0.80		CBR @ 0.80m: 2-3%			(0.50) 1.20	Stiff blue grey mottled orange silty CLAY with occasional root traces. **FOREST MARBLE FORMATION**
1.20		CBR @ 1.20m: 2-3%				
1.20		HSV @ 1.20m: 86, 92, 96kPa				

Groundwater Observations

Strike Depth	Flow Rate Remarks
1.15	Seepage

Shoring/Support: None
Side Stability: Stable.



General Remarks
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken. Square brackets indicate approximation within Made Ground.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Slight water seepage recorded at 1.15m, pooling in base of pit.
4) Infiltration test undertaken upon reaching full depth, and backfilled following completion.
5) Apparent cohesion indicated by Pilcon Hand Shear Vane ('HSV').
6) Indicative CBR values indicated by Mexecone Penetrometer ('CBR').

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Ground Investigation

Trial Pit Record

Hole ID
SA02
Sheet 1 of 1 (0.00m-3.00m)
All dimensions in metres
Scale 1:15

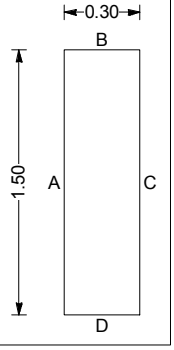
Site: St George's Works, Trowbridge	**Method/Plant Used:** 3 Tonne Tracked Excavator		
Client: TC Sports Ltd & Trowbridge Town Council	**Start date:** 01/02/18	**End Date:** 01/02/18	**Logged By:** DH
Job No: P-SW-1037	**Easting:**	**Northing:**	**Elevation:**

SAMPLES & IN-SITU TESTS			WATER	STRATA		
Depth	**Type / No**	**Results / Remarks**		**Legend**	**Depth**	**Description**
					(0.20) 0.20	Dark greyish brown slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone. Frequent rootlets and occasional roots throughout. **MADE GROUND (Topsoil)**
0.50		CBR @ 0.50m: 3-4%			(0.70) 0.90	[Firm] grey to yellowish brown slightly sandy silty clay. **Probable MADE GROUND (Reworked Forest Marble Formation)**
1.00 1.00		CBR @ 1.00m: 1-2% HSV @ 1.00m: 52, 54, 58kPa	≈		(0.30) 1.20	Firm grey to orangish brown slightly sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**

Groundwater Observations

Strike Depth	Flow Rate Remarks
1.10	Seepage

Shoring/Support: None
Side Stability: Stable.



General Remarks
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken. Square brackets indicate approximation within Made Ground.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Slight water seepage recorded at 1.10m, pooling in base of pit.
4) Infiltration test undertaken upon reaching full depth, and backfilled following completion.
5) Apparent cohesion indicated by Pilcon Hand Shear Vane ('HSV').
6) Indicative CBR values indicated by Mexecone Penetrometer ('CBR').

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Ground Investigation

Trial Pit Record

Hole ID
SA03
Sheet 1 of 1 (0.00m-3.00m)
All dimensions in metres
Scale 1:15

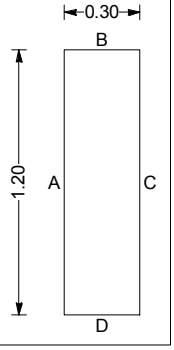
Site: St George's Works, Trowbridge	**Method/Plant Used:** 3 Tonne Tracked Excavator		
Client: TC Sports Ltd & Trowbridge Town Council	**Start date:** 01/02/18	**End Date:** 01/02/18	**Logged By:** DH
Job No: P-SW-1037	**Easting:**	**Northing:**	**Elevation:**

SAMPLES & IN-SITU TESTS			WATER	STRATA		
Depth	**Type / No**	**Results / Remarks**		**Legend**	**Depth**	**Description**
					(0.25) 0.25	Dark grey slightly sandy slightly gravelly silty clay. Gravel is subangular to subrounded limestone and bricks. Frequent rootlets and occasional roots throughout. **MADE GROUND (Topsoil)**
0.50		CBR @ 0.50m: 3-4%			(0.35) 0.60	[Firm] grey to yellowish brown slightly sandy slightly gravelly silty clay with occasional brown organic pockets. Gravel is subangular to subrounded limestone. Occasional roots to 0.40m. **MADE GROUND (Fill)**
1.00		CBR @ 1.00m: 2-3%			(0.50) 1.10	Stiff orangish brown mottled grey slightly sandy (fine) silty CLAY. **FOREST MARBLE FORMATION**
1.00		HSV @ 1.00m: 108, 110, 114kPa	≈			

Groundwater Observations

Strike Depth	Flow Rate Remarks
1.05	Seepage

Shoring/Support: None
Side Stability: Stable.



General Remarks
1) All recorded strengths and densities based on visual observations, where field tests have not been undertaken. Square brackets indicate approximation within Made Ground.
2) No obvious visual or olfactory evidence of mobile contaminants.
3) Slight water seepage recorded at 1.05m, pooling in base of pit.
4) Infiltration test undertaken upon reaching full depth, and backfilled following completion.
5) Apparent cohesion indicated by Pilcon Hand Shear Vane ('HSV').
6) Indicative CBR values indicated by Mexecone Penetrometer ('CBR').

APPENDIX C

Results of In-situ Soil Infiltration Tests

St Georges Works, Trowbridge — Test Location: SA01

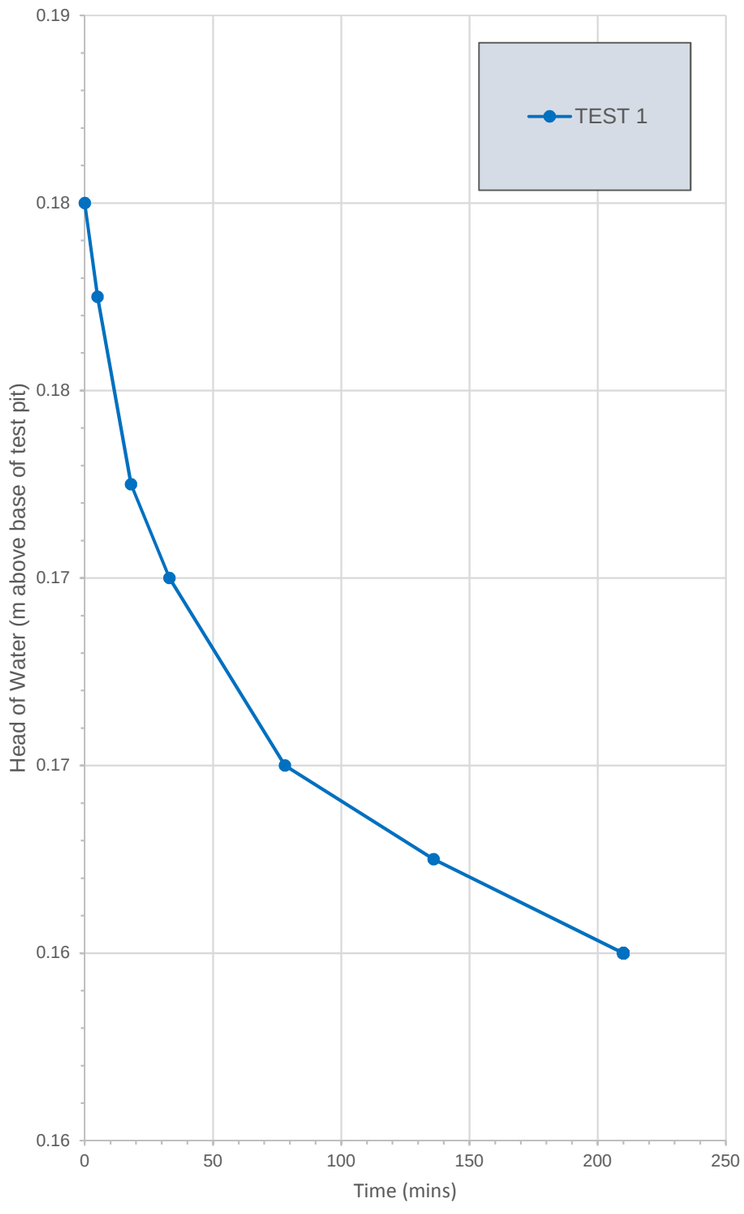
TEST PIT DIMENSIONS

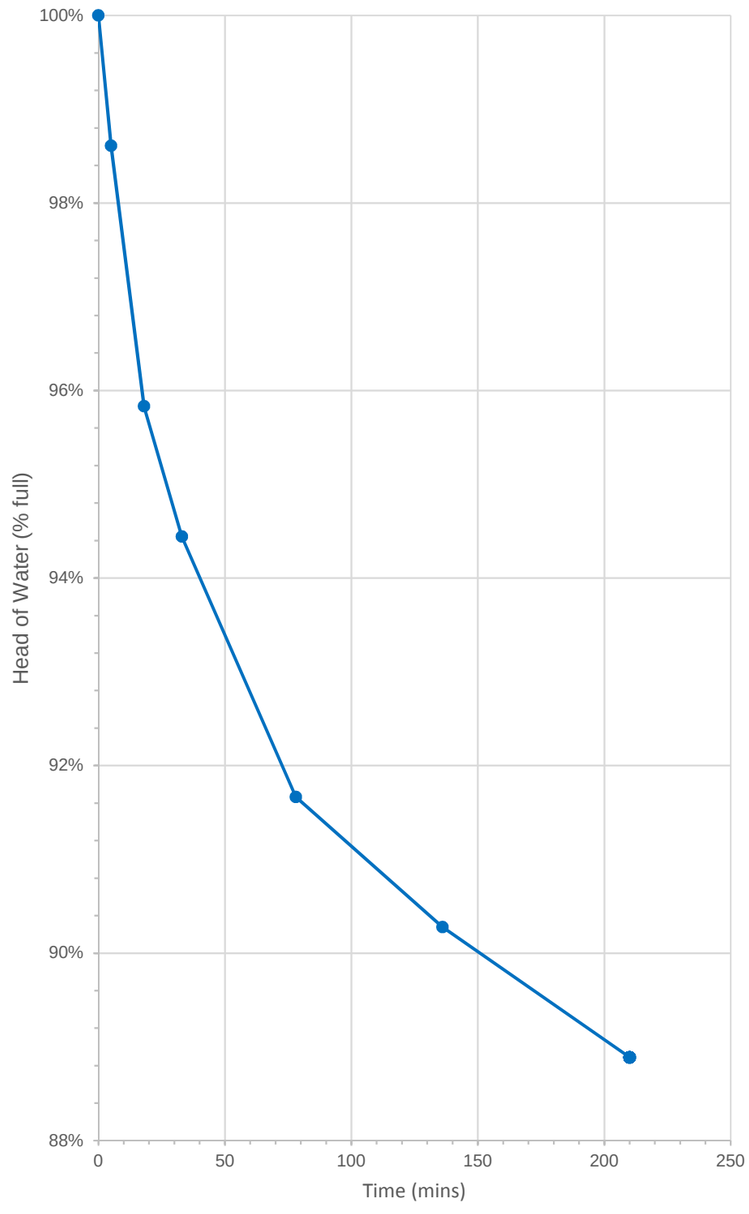
Length		Width		Depth	
1.40	m	0.30	m	1.20	m

	TEST 1		TEST 2		TEST 3	
Observation No.	Time (min)	Head (m)	Time (min)	Head (m)	Time (min)	Head (m)
1	0.00	0.180				
2	5.00	0.178				
3	18.00	0.173				
4	33.00	0.170				
5	78.00	0.165				
6	136.00	0.163				
7	210.00	0.160				
8	-	-				
9	-	-				
10	-	-				
11	-	-				
12	-	-				
13	-	-				
14	-	-				
15	-	-				
16	-	-				
17	-	-				
18	-	-				
19	-	-				
20	-	-				
21	-	-				
22	-	-				
23	-	-				
24	-	-				
25	-	-				
V_{p75-25} (m^3)	0.004					
a_{p50} (m^2)	0.998					
t_{p75-25} (sec)	3,990					
f (m/sec)	0.000001055 1.05E-06					

Soil infiltration rate, $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Comments:
1) Only one test undertaken, due to low infiltration rate.





St Georges Works, Trowbridge — Test Location: SA02

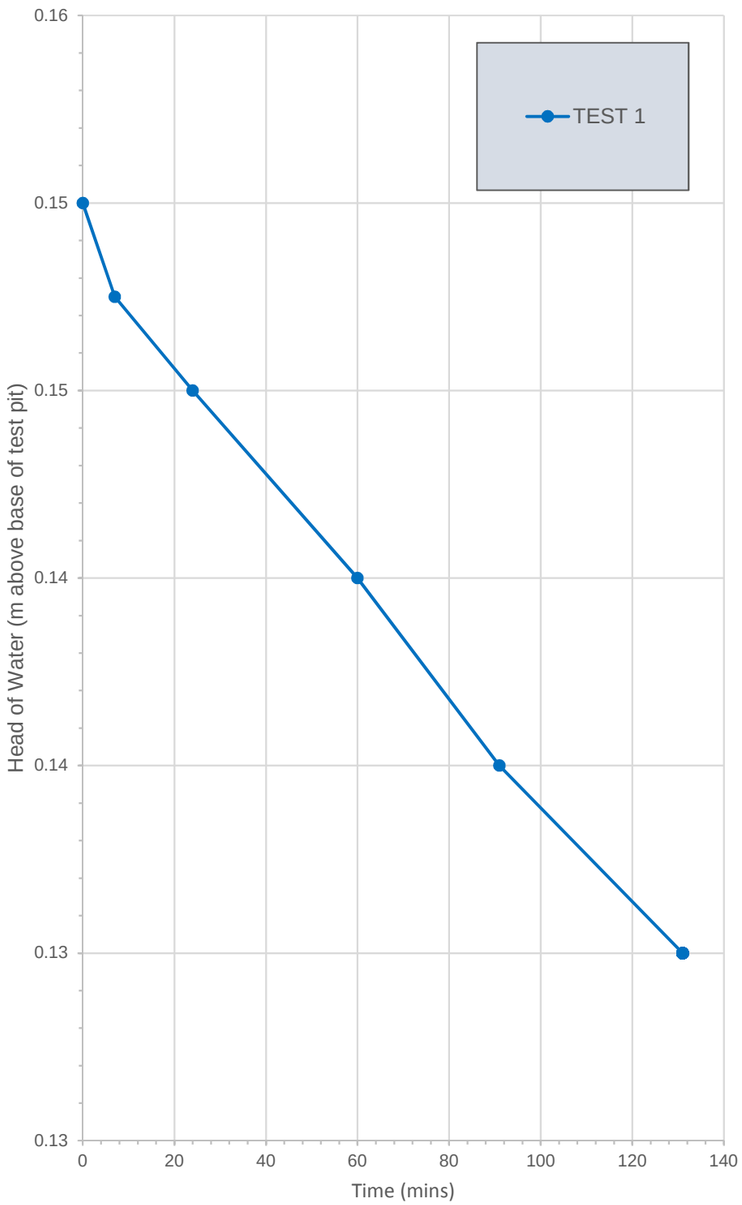
TEST PIT DIMENSIONS

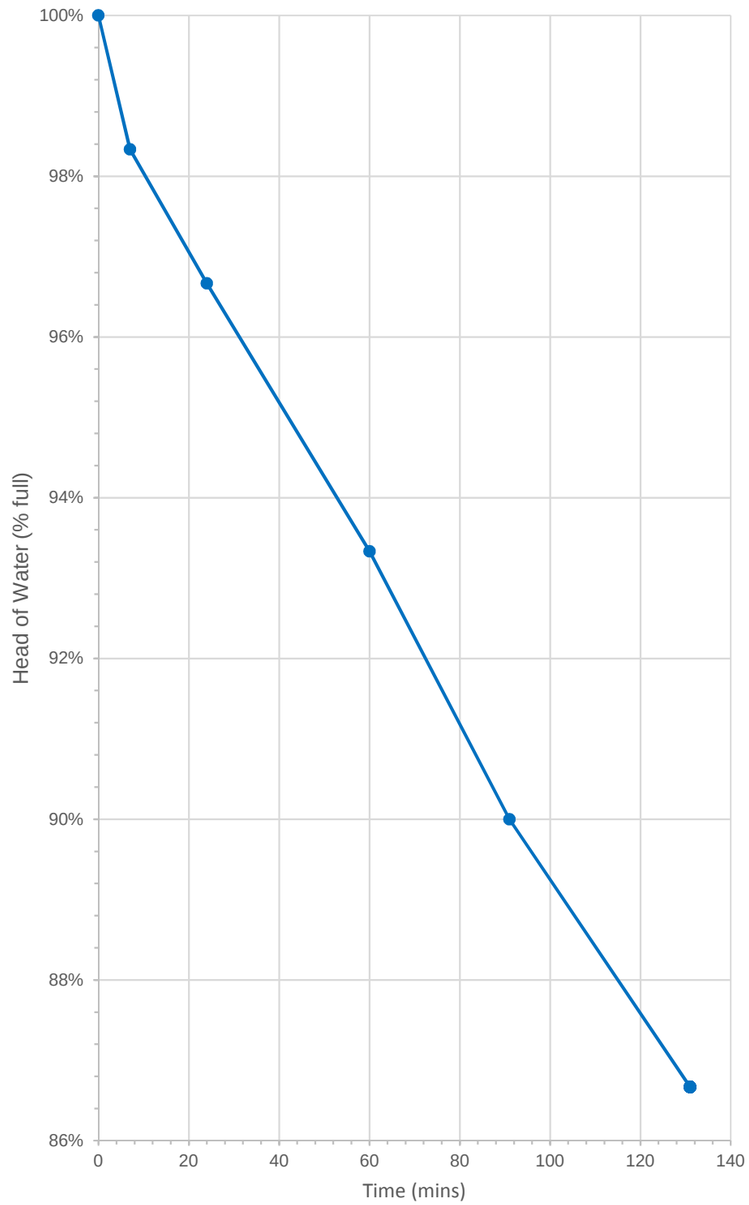
Length		Width		Depth	
1.50	m	0.30	m	1.20	m

	TEST 1		TEST 2		TEST 3	
Observation No.	Time (min)	Head (m)	Time (min)	Head (m)	Time (min)	Head (m)
1	0.00	0.150				
2	7.00	0.148				
3	24.00	0.145				
4	60.00	0.140				
5	91.00	0.135				
6	131.00	0.130				
7	-	-				
8	-	-				
9	-	-				
10	-	-				
11	-	-				
12	-	-				
13	-	-				
14	-	-				
15	-	-				
16	-	-				
17	-	-				
18	-	-				
19	-	-				
20	-	-				
21	-	-				
22	-	-				
23	-	-				
24	-	-				
25	-	-				
V_{p75-25} (m^3)	0.005					
a_{p50} (m^2)	0.954					
t_{p75-25} (sec)	4,020					
f (m/sec)	0.000001173 1.17E-06					

Soil infiltration rate, $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Comments:
1) Only one test undertaken, due to low infiltration rate.





St Georges Works, Trowbridge — Test Location: SA03

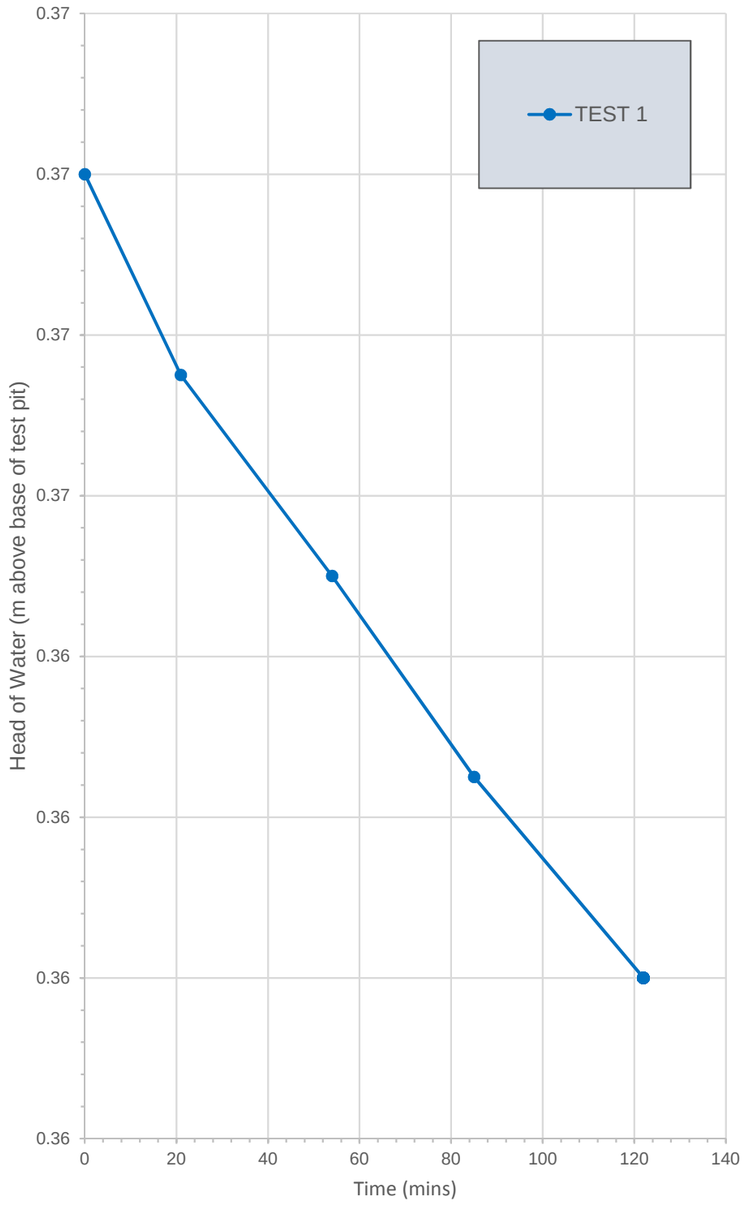
TEST PIT DIMENSIONS

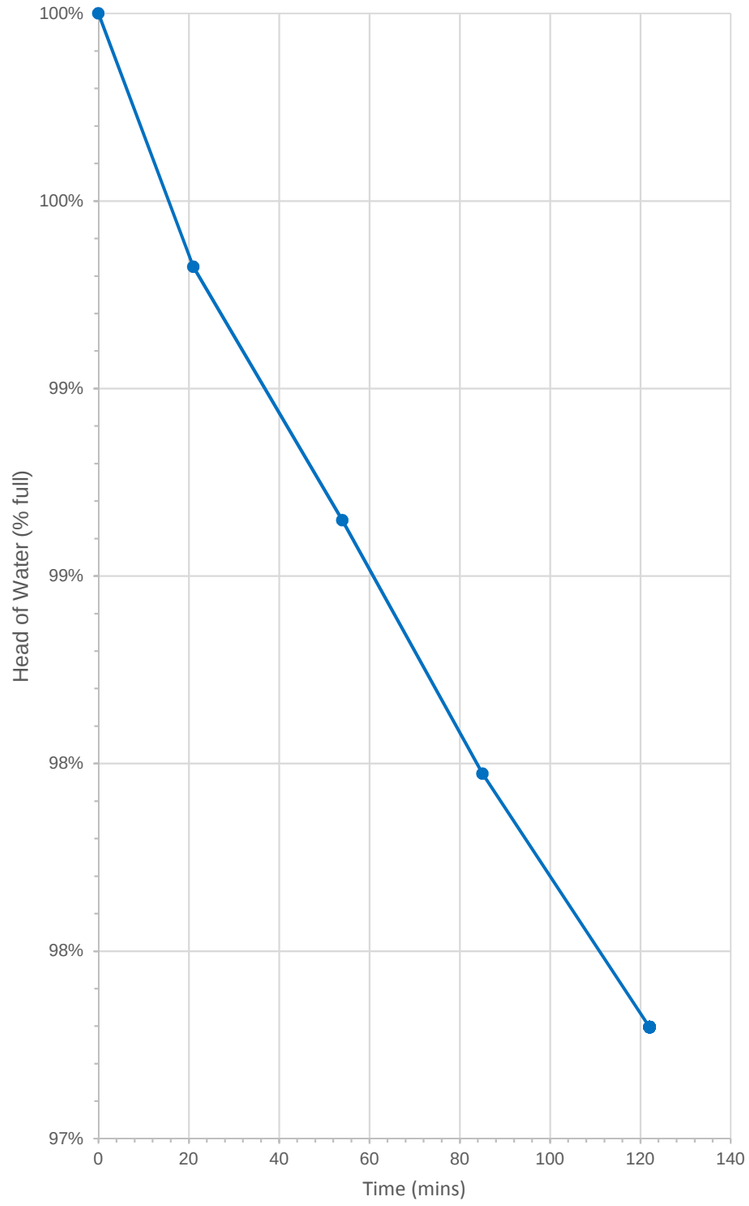
Length		Width		Depth	
1.20	m	0.30	m	1.10	m

	TEST 1		TEST 2		TEST 3	
Observation No.	Time (min)	Head (m)	Time (min)	Head (m)	Time (min)	Head (m)
1	0.00	0.370				
2	21.00	0.368				
3	54.00	0.365				
4	85.00	0.363				
5	122.00	0.360				
6	-	-				
7	-	-				
8	-	-				
9	-	-				
10	-	-				
11	-	-				
12	-	-				
13	-	-				
14	-	-				
15	-	-				
16	-	-				
17	-	-				
18	-	-				
19	-	-				
20	-	-				
21	-	-				
22	-	-				
23	-	-				
24	-	-				
25	-	-				
V_{p75-25} (m^3)	0.002					
a_{p50} (m^2)	1.455					
t_{p75-25} (sec)	3,840					
f (m/sec)	0.000000322 3.22E-07					

Soil infiltration rate, $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Comments:
1) Only one test undertaken, due to low infiltration rate.





APPENDIX D

Results of Field Monitoring

Ground Investigation
Unit 3, Westfield Court, Barns Ground, Kenn, Clevedon, Bristol, BS21 6FQ
Email: southwest@ground-investigation.com
Tel: 01275 876903

Field Gas Monitoring Records

Site Name:	St Georges Works, Trowbridge				
Job No:	p-sw-1037	**Monitoring Date:**	17/01/2018	**Field Personnel:**	EM
Weather Conditions:	Sun.				
Atmospheric Pressure Trend:	Low & falling.				
Instrument Type:	Geotechnical Instruments GA5000 infra-red field gas analyser with integral flow pod.				
Instrument Serial No:	G501295	**Instrument Serial No:**	G501295		

Well ID	Barometric Pressure (mBar)	Water Depth (m)	Flow Rate (l/hr)	CH_4 peak (% vol)	CH_4 steady (% vol)	CO_2 steady (% vol)	O_2 steady (% vol)
WS01	1002	1.60	<0.1	<0.1	<0.1	0.2	22.4
WS04	1002	1.45	<0.1	0.1	0.1	1.3	21.3
WS07	1002	2.35	<0.1	<0.1	<0.1	4.7	19.6
WS08	1002	1.60	<0.1	<0.1	<0.1	0.7	21.0
WS09	1002	1.55	<0.1	0.3	0.3	3.7	15.8

Ground Investigation

Unit 3, Westfield Court, Barns Ground, Kenn, Clevedon, Bristol, BS21 6FQ
Email: southwest@ground-investigation.com
Tel: 01275 876903

Field Gas Monitoring Records

Site Name:	St Georges Works, Trowbridge				
Job No:	p-sw-1037	**Monitoring Date:**	1/2/2018	**Field Personnel:**	RC
Weather Conditions:	Sunny, cold, windy.				
Atmospheric Pressure Trend:	Low & stable.				
Instrument Type:	Geotechnical Instruments GA5000 infra-red field gas analyser with integral flow pod.				
Instrument Serial No:	G501295	**Instrument Serial No:**	G501295		

Well ID	Barometric Pressure (mBar)	Water Depth (m)	Flow Rate (l/hr)	CH_4 peak (% vol)	CH_4 steady (% vol)	CO_2 steady (% vol)	O_2 steady (% vol)
WS01	1002	2.51	<0.1	<0.1	<0.1	0.6	20.6
WS04	1002	1.17	<0.1	<0.1	<0.1	1.0	19.5
WS07	1002	2.37	<0.1	<0.1	<0.1	6.5	14.9
WS08	1002	1.54	<0.1	<0.1	<0.1	0.8	19.5
WS09	1002	1.56	<0.1	<0.1	<0.1	9.3	9.0

Ground Investigation

Unit 3, Westfield Court, Barns Ground, Kenn, Clevedon, Bristol, BS21 6FQ
Email: southwest@ground-investigation.com
Tel: 01275 876903

Field Gas Monitoring Records

Site Name:	St Georges Works, Trowbridge				
Job No:	p-sw-1037	**Monitoring Date:**	14/2/2018	**Field Personnel:**	EM
Weather Conditions:	Raining, cold, windy.				
Atmospheric Pressure Trend:	Low & falling.				
Instrument Type:	Geotechnical Instruments GA5000 infra-red field gas analyser with integral flow pod.				
Instrument Serial No:	G501295	**Instrument Serial No:**	G501295		

Well ID	Barometric Pressure (mBar)	Water Depth (m)	Flow Rate (l/hr)	CH_4 peak (% vol)	CH_4 steady (% vol)	CO_2 steady (% vol)	O_2 steady (% vol)
WS01	995	2.65	<0.1	<0.1	<0.1	0.6	20.3
WS04	995	1.30	<0.1	<0.1	<0.1	0.8	18.5
WS07	995	2.20	<0.1	<0.1	<0.1	6.5	13.5
WS08	995	1.50	<0.1	<0.1	<0.1	1.8	16.7
WS09	995	1.45	<0.1	<0.1	<0.1	11.2	1.9

APPENDIX E

Results of Chemical Laboratory Tests

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618
Facsimile: (01424) 729911
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	18-15695
Issue:	1
Date of Issue:	23/01/2018
Contact:	Ed Minchin
Customer Details:	Ground Investigation (South West) Ltd Unit 3, Westfield Court Barnes Ground Clevedon BristolBS21 6FO
Quotation No:	Q14-00071
Order No:	Not Supplied
Customer Reference:	p-sw-1037
Date Received:	15/01/2018
Date Approved:	23/01/2018
Details:	St Georges Works, Trowbridge
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 18-15695

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
123344	WS01 0.50 - 0.60	10/01/2018	15/01/2018	Sandy silty loam	
123345	WS02A 1.80 - 1.90	10/01/2018	15/01/2018	Sandy clayey loam	
123346	WS03 0.60 - 0.70	10/01/2018	15/01/2018	Silty loam	
123347	WS05 0.60 - 0.70	10/01/2018	15/01/2018	Sandy silty loam + brick	
123348	WS02A 0.30 - 0.40	10/01/2018	15/01/2018	Sandy silty loam	
123349	WS04 0.90 - 1.00	10/01/2018	15/01/2018	Sandy loam	
123350	WS04 1.60 - 1.70	10/01/2018	15/01/2018	Clay	
123351	WS06 0.70 - 0.80	10/01/2018	15/01/2018	Silty loam	
123352	WS6 1.20 - 1.30	10/01/2018	15/01/2018	Silty clayey loam	
123353	WS07 0.40 - 0.50	10/01/2018	15/01/2018	Silty clayey loam	
123354	WS08 0.10 - 0.20	10/01/2018	15/01/2018	Silty loam	
123355	WS08 0.60 - 0.70	10/01/2018	15/01/2018	Silty clayey loam	
123356	WS09 0.10 - 0.20	10/01/2018	15/01/2018	Silty clayey loam	
123357	WS10 0.40 - 0.50	10/01/2018	15/01/2018	Silty loam	
123358	VS01, WS02A, WS03, WS05	10/01/2018	15/01/2018	Silty loam	
123359	bo 2 WS02A + WS04 0.30 -	10/01/2018	15/01/2018	Sandy silty loam	

Results Summary

Report No.: 18-15695

			ELAB Reference	123344	123345	123346	123347	123348	123349
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS01	WS02A	WS03	WS05	WS02A	WS04
			Sample Depth (m)	0.50 - 0.60	1.80 - 1.90	0.60 - 0.70	0.60 - 0.70	0.30 - 0.40	0.90 - 1.00
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**						
Metals									
Arsenic	M	mg/kg	1	13.4	9.6	25.2	^ 16.7	33.8	29.8
Cadmium	M	mg/kg	0.5	0.5	< 0.5	1.3	^ < 0.5	1.2	0.6
Chromium	M	mg/kg	5	35.5	40.0	32.3	^ 13.4	26.6	21.2
Copper	M	mg/kg	5	62.8	33.9	107	^ 46.4	138	150
Lead	M	mg/kg	5	116	77.0	417	^ 109	344	221
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	1.5	^ 0.9	0.8	< 0.5
Nickel	M	mg/kg	5	29.0	27.2	30.3	^ 10.7	44.5	36.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	^ < 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	159	103	237	^ 107	215	179
Anions									
Water Soluble Sulphate	M	g/l	0.02	0.95	0.17	0.26	^ 1.81	1.70	1.54
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	^ < 1.0	1.1	< 1.0
Total Sulphur	N	%	0.01	0.13	0.03	0.12	0.58	0.39	0.73
Total Potential Sulphate	N	%	0.01	0.39	0.09	0.37	1.75	1.17	2.18
Acid Soluble Sulphate (SO4)	U	%	0.02	0.34	0.10	0.20	2.10	1.03	1.89
Water Soluble Boron	N	mg/kg	0.5	3.3	2.1	3.7	0.7	3.7	3.5
Miscellaneous									
Acid Neutralisation Capacity	N	mol/kg	0.1	n/t	n/t	n/t	n/t	n/t	n/t
Loss On Ignition (450°C)	M	%	0.01	n/t	n/t	n/t	n/t	n/t	n/t
pH	M	pH units	0.1	8.2	8.3	7.5	^ 8.8	8.3	10.7
Soil Organic Matter	U	%	0.1	4.0	1.6	4.9	1.9	9.5	4.8
Total Organic Carbon	N	%	0.01	n/t	n/t	n/t	n/t	n/t	n/t
Phenols									
Total Phenols	N	mg/kg	6	< 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons									
Total PAH (Including Coronene)	N	mg/kg	2	n/t	n/t	n/t	n/t	n/t	n/t
Naphthalene GCMS	N	mg/kg	0.01	0.12	< 0.01	< 0.01	0.03	12.9	0.19
Acenaphthylene GCMS	N	mg/kg	0.01	0.26	< 0.01	< 0.01	0.04	5.78	0.04
Acenaphthene GCMS	N	mg/kg	0.01	0.02	< 0.01	< 0.01	< 0.01	0.08	< 0.01
Fluorene GCMS	N	mg/kg	0.01	0.26	< 0.01	< 0.01	< 0.01	0.55	0.02
Phenanthrene GCMS	N	mg/kg	0.01	3.19	< 0.01	0.01	0.12	10.0	0.34
Anthracene GCMS	N	mg/kg	0.01	0.80	< 0.01	< 0.01	0.05	3.28	0.11
Fluoranthene GCMS	N	mg/kg	0.01	2.47	0.01	< 0.01	0.33	17.5	0.42
Pyrene GCMS	N	mg/kg	0.01	1.79	< 0.01	< 0.01	0.31	13.8	0.33
Benzo(a)anthracene GCMS	N	mg/kg	0.01	1.13	0.03	< 0.01	0.21	15.7	0.24
Chrysene GCMS	N	mg/kg	0.01	1.08	0.04	0.01	0.32	16.7	0.33
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.77	0.02	< 0.01	0.32	16.5	0.23
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	0.65	0.02	< 0.01	0.30	17.6	0.20
Benzo (a) pyrene GCMS	N	mg/kg	0.01	0.67	0.01	< 0.01	0.30	15.6	0.21
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	0.35	< 0.01	< 0.01	0.23	20.7	0.15
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	0.15	< 0.01	< 0.01	0.08	8.45	0.05
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	0.33	< 0.01	< 0.01	0.27	29.5	0.14
Total PAH(16) GCMS	N	mg/kg	0.04	14.0	0.16	0.08	2.92	205	3.00

Results Summary

Report No.: 18-15695

	ELAB Reference	123344	123345	123346	123347	123348	123349
	Customer Reference						
	Sample ID						
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sample Location	WS01	WS02A	WS03	WS05	WS02A	WS04
	Sample Depth (m)	0.50 - 0.60	1.80 - 1.90	0.60 - 0.70	0.60 - 0.70	0.30 - 0.40	0.90 - 1.00
	Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes** / **Units** / **LOD**						
BTEX							
Benzene	M / ug/kg / 10	< 10.0	< 10.0	< 10.0	^ < 10.0	< 10.0	< 10.0
Toluene	M / ug/kg / 10	< 10.0	< 10.0	< 10.0	^ < 10.0	< 10.0	< 10.0
Ethylbenzene	M / ug/kg / 10	< 10.0	< 10.0	< 10.0	^ < 10.0	< 10.0	< 10.0
Xylenes	M / ug/kg / 10	< 10.0	< 10.0	< 10.0	^ < 10.0	< 10.0	< 10.0
MTBE	N / ug/kg / 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Total BTEX	M / mg/kg / 0.01	n/t	n/t	n/t	n/t	n/t	n/t
TPH CWG							
>C5-C6 Aliphatic	N / mg/kg / 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N / mg/kg / 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0
>C16-C21 Aliphatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	77.2	< 1.0
>C21-C35 Aliphatic	N / mg/kg / 1	< 1.0	4.8	2.7	1.5	1010	1.6
>C35-C40 Aliphatic	N / mg/kg / 1	< 1.0	3.4	2.1	< 1.0	35.8	< 1.0
>C5-C7 Aromatic	N / mg/kg / 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N / mg/kg / 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	3.5	< 1.0
>C16-C21 Aromatic	N / mg/kg / 1	< 1.0	< 1.0	< 1.0	< 1.0	65.1	< 1.0
>C21-C35 Aromatic	N / mg/kg / 1	< 1.0	2.8	< 1.0	3.5	921	2.2
>C35-C40 Aromatic	N / mg/kg / 1	< 1.0	2.2	< 1.0	< 1.0	58.7	< 1.0
Total (>C5-C40) Ali/Aro	N / mg/kg / 1	< 1.0	13.2	4.8	4.9	2170	3.8
Total Petroleum Hydrocarbons							
Mineral Oil	U / mg/kg / 5	n/t	n/t	n/t	n/t	n/t	n/t
PCB (ICES 7 congeners)							
PCB (Total of 7 Congeners)	M / mg/kg / 0.03	< 0.03	< 0.03	< 0.03	^ < 0.03	< 0.03	< 0.03

Results Summary

Report No.: 18-15695

			ELAB Reference	123350	123351	123352	123353	123354	123355
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS04	WS06	WS6	WS07	WS08	WS08
			Sample Depth (m)	1.60 - 1.70	0.70 - 0.80	1.20 - 1.30	0.40 - 0.50	0.10 - 0.20	0.60 - 0.70
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**						
Metals									
Arsenic	M	mg/kg	1	8.7	15.4	14.8	19.5	22.7	9.6
Cadmium	M	mg/kg	0.5	< 0.5	0.6	< 0.5	0.5	1.0	< 0.5
Chromium	M	mg/kg	5	28.2	27.9	32.0	27.4	34.3	38.5
Copper	M	mg/kg	5	22.6	57.9	78.1	92.3	54.3	13.8
Lead	M	mg/kg	5	17.6	185	185	96.9	210	23.0
Mercury	M	mg/kg	0.5	< 0.5	0.5	< 0.5	0.7	0.6	< 0.5
Nickel	M	mg/kg	5	35.4	28.8	35.7	28.0	30.1	15.1
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	1.7	< 1.0
Zinc	M	mg/kg	5	120	160	161	185	245	73.7
Anions									
Water Soluble Sulphate	M	g/l	0.02	0.42	0.16	0.14	0.08	0.06	0.07
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	N	%	0.01	0.04	0.07	0.16	0.07	0.10	0.01
Total Potential Sulphate	N	%	0.01	0.12	0.20	0.48	0.22	0.29	0.03
Acid Soluble Sulphate (SO4)	U	%	0.02	0.18	0.14	0.12	0.10	0.12	0.05
Water Soluble Boron	N	mg/kg	0.5	8.8	2.8	2.4	2.2	2.9	1.8
Miscellaneous									
Acid Neutralisation Capacity	N	mol/kg	0.1	n/t	n/t	n/t	n/t	n/t	< 0.1
Loss On Ignition (450°C)	M	%	0.01	n/t	n/t	n/t	n/t	n/t	4.87
pH	M	pH units	0.1	8.4	8.0	8.1	7.7	7.7	8.0
Soil Organic Matter	U	%	0.1	0.8	3.2	6.3	6.1	12	1.6
Total Organic Carbon	N	%	0.01	n/t	n/t	n/t	n/t	n/t	0.81
Phenols									
Total Phenols	N	mg/kg	6	< 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons									
Total PAH (Including Coronene)	N	mg/kg	2	n/t	n/t	n/t	n/t	n/t	< 2
Naphthalene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.20	< 0.01	0.45	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.02	< 0.01	0.25	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.08	< 0.01	0.01	< 0.01
Fluorene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.20	< 0.01	0.02	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.64	< 0.01	0.50	< 0.01
Anthracene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.08	< 0.01	0.19	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.04	< 0.01	1.45	< 0.01
Pyrene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.07	< 0.01	1.27	< 0.01
Benzo(a)anthracene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.18	< 0.01	0.89	< 0.01
Chrysene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.07	< 0.01	1.12	< 0.01
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.04	< 0.01	1.09	< 0.01
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.03	< 0.01	1.14	< 0.01
Benzo (a) pyrene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.98	< 0.01
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.88	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.31	< 0.01
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	1.14	< 0.01
Total PAH(16) GCMS	N	mg/kg	0.04	< 0.04	< 0.04	1.67	< 0.04	11.7	< 0.04

Results Summary

Report No.: 18-15695

			ELAB Reference	123350	123351	123352	123353	123354	123355
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS04	WS06	WS6	WS07	WS08	WS08
			Sample Depth (m)	1.60 - 1.70	0.70 - 0.80	1.20 - 1.30	0.40 - 0.50	0.10 - 0.20	0.60 - 0.70
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**						
BTEX									
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Total BTEX	M	mg/kg	0.01	n/t	n/t	n/t	n/t	n/t	< 0.01
TPH CWG									
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	29.9	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	62.8	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	159	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	536	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	1390	3.8	1.5	< 1.0
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	37.4	1.5	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	18.6	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	46.2	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	127	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	< 1.0	539	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	< 1.0	< 1.0	1570	4.8	4.4	< 1.0
>C35-C40 Aromatic	N	mg/kg	1	< 1.0	< 1.0	43.3	2.3	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	< 1.0	< 1.0	4560	12.4	6.0	< 1.0
Total Petroleum Hydrocarbons									
Mineral Oil	U	mg/kg	5	n/t	n/t	n/t	n/t	n/t	< 5
PCB (ICES 7 congeners)									
PCB (Total of 7 Congeners)	M	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

			ELAB Reference	123356	123357	123358	123359
			Customer Reference			WS01, WS02A, WS03, WS05	WS02A + WS04
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS09	WS10	Combo 1	Combo 2
			Sample Depth (m)	0.10 - 0.20	0.40 - 0.50	0.50 - 1.90	0.30 - 1.00
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
Metals							
Arsenic	M	mg/kg	1	19.7	9.0	n/t	n/t
Cadmium	M	mg/kg	0.5	0.7	< 0.5	n/t	n/t
Chromium	M	mg/kg	5	78.0	12.3	n/t	n/t
Copper	M	mg/kg	5	48.0	19.4	n/t	n/t
Lead	M	mg/kg	5	193	62.8	n/t	n/t
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	n/t	n/t
Nickel	M	mg/kg	5	53.8	7.7	n/t	n/t
Selenium	M	mg/kg	1	< 1.0	< 1.0	n/t	n/t
Zinc	M	mg/kg	5	223	105	n/t	n/t
Anions							
Water Soluble Sulphate	M	g/l	0.02	0.08	0.11	n/t	n/t
Inorganics							
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	n/t	n/t
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	n/t	n/t
Total Sulphur	N	%	0.01	0.04	0.07	n/t	n/t
Total Potential Sulphate	N	%	0.01	0.11	0.20	n/t	n/t
Acid Soluble Sulphate (SO4)	U	%	0.02	0.07	0.07	n/t	n/t
Water Soluble Boron	N	mg/kg	0.5	2.5	4.9	n/t	n/t
Miscellaneous							
Acid Neutralisation Capacity	N	mol/kg	0.1	n/t	n/t	< 0.1	0.2
Loss On Ignition (450°C)	M	%	0.01	n/t	n/t	3.99	4.54
pH	M	pH units	0.1	8.1	8.0	7.8	11.0
Soil Organic Matter	U	%	0.1	3.4	16	n/t	n/t
Total Organic Carbon	N	%	0.01	n/t	n/t	1.7	3.4
Phenols							
Total Phenols	N	mg/kg	6	< 6	< 6	n/t	n/t
Polyaromatic hydrocarbons							
Total PAH (Including Coronene)	N	mg/kg	2	n/t	n/t	< 2	345
Naphthalene GCMS	N	mg/kg	0.01	< 0.01	0.03	n/t	n/t
Acenaphthylene GCMS	N	mg/kg	0.01	< 0.01	0.07	n/t	n/t
Acenaphthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	n/t	n/t
Fluorene GCMS	N	mg/kg	0.01	< 0.01	0.01	n/t	n/t
Phenanthrene GCMS	N	mg/kg	0.01	0.03	0.15	n/t	n/t
Anthracene GCMS	N	mg/kg	0.01	0.01	0.08	n/t	n/t
Fluoranthene GCMS	N	mg/kg	0.01	0.08	0.74	n/t	n/t
Pyrene GCMS	N	mg/kg	0.01	0.07	0.69	n/t	n/t
Benzo(a)anthracene GCMS	N	mg/kg	0.01	0.04	0.44	n/t	n/t
Chrysene GCMS	N	mg/kg	0.01	0.06	0.61	n/t	n/t
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.07	0.53	n/t	n/t
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	0.05	0.56	n/t	n/t
Benzo (a) pyrene GCMS	N	mg/kg	0.01	0.05	0.46	n/t	n/t
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	0.04	0.31	n/t	n/t
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	0.01	0.13	n/t	n/t
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	0.05	0.34	n/t	n/t
Total PAH(16) GCMS	N	mg/kg	0.04	0.57	5.18	n/t	n/t

Results Summary

Report No.: 18-15695

	ELAB Reference	123356	123357	123358	123359
	Customer Reference			WS01, WS02A, WS03, WS05	WS02A + WS04
	Sample ID				
	Sample Type	SOIL	SOIL	SOIL	SOIL
	Sample Location	WS09	WS10	Combo 1	Combo 2
	Sample Depth (m)	0.10 - 0.20	0.40 - 0.50	0.50 - 1.90	0.30 - 1.00
	Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
BTEX							
Benzene	M	ug/kg	10	< 10.0	< 10.0	n/t	n/t
Toluene	M	ug/kg	10	< 10.0	< 10.0	n/t	n/t
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	n/t	n/t
Xylenes	M	ug/kg	10	< 10.0	< 10.0	n/t	n/t
MTBE	N	ug/kg	10	< 10.0	< 10.0	n/t	n/t
Total BTEX	M	mg/kg	0.01	n/t	n/t	< 0.01	< 0.01
TPH CWG							
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	n/t	n/t
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	n/t	n/t
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C21-C35 Aliphatic	N	mg/kg	1	< 1.0	20.3	n/t	n/t
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	6.3	n/t	n/t
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	n/t	n/t
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	n/t	n/t
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	n/t	n/t
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	1.6	n/t	n/t
>C21-C35 Aromatic	N	mg/kg	1	< 1.0	35.6	n/t	n/t
>C35-C40 Aromatic	N	mg/kg	1	< 1.0	12.2	n/t	n/t
Total (>C5-C40) Ali/Aro	N	mg/kg	1	< 1.0	76.0	n/t	n/t
Total Petroleum Hydrocarbons							
Mineral Oil	U	mg/kg	5	n/t	n/t	< 5	224
PCB (ICES 7 congeners)							
PCB (Total of 7 Congeners)	M	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

			ELAB Reference	123344	123345	123346	123347
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS01	WS02A	WS03	WS05
			Sample Depth (m)	0.50 - 0.60	1.80 - 1.90	0.60 - 0.70	0.60 - 0.70
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
VOC							
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
cis-1,2-dichloroethene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Trichloroethylene	M	ug/kg	10	24.9	28.0	33.9	^ 12.7
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	^ < 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

			ELAB Reference	123344	123345	123346	123347
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS01	WS02A	WS03	WS05
			Sample Depth (m)	0.50 - 0.60	1.80 - 1.90	0.60 - 0.70	0.60 - 0.70
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
VOC							
VOC TIC							
Vinyl chloride	N	ug/kg	10	< 10	< 10	< 10	< 10
Various	N	ug/kg	10	None Detected	None Detected	None Detected	None Detected
TIC							
17-Pentatriacontene	N	ug/kg	10	-	-	-	-
Cyclohexane, (2-methylpropyl)-	N	ug/kg	10	-	-	-	-
Cyclohexane, 1,1,2,3-tetramethyl-	N	ug/kg	10	-	-	-	-
Cyclohexane, 1,1-dimethyl-2-propyl-	N	ug/kg	10	-	-	-	-
Cyclotetradecane	N	ug/kg	10	-	-	-	-
Decane, 2,6,7-trimethyl-	N	ug/kg	10	-	-	-	-
Decane, 3-methyl-	N	ug/kg	10	-	-	-	-
Decane, 4-methyl-	N	ug/kg	10	-	-	-	-
Hexadecane, 1-chloro-	N	ug/kg	10	-	-	-	-
Hexadecane, 2,6,10,14-tetramethyl-	N	ug/kg	10	-	-	-	-
Hexane, 1-(hexyloxy)-4-methyl-	N	ug/kg	10	-	-	-	-
Hydroxylamine, O-decyl-	N	ug/kg	10	-	-	-	-
Nonane, 3-methyl-	N	ug/kg	10	-	-	-	-
Oxalic acid, cyclobutyl dodecyl ester	N	ug/kg	10	-	-	-	-
Tetradecane, 1-chloro-	N	ug/kg	10	-	-	-	-
Undecane, 2,6-dimethyl-	N	ug/kg	10	-	-	-	-
Undecane, 2-methyl-	N	ug/kg	10	-	-	-	-

Results Summary

Report No.: 18-15695

			ELAB Reference	123348	123349	123350	123351
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS02A	WS04	WS04	WS06
			Sample Depth (m)	0.30 - 0.40	0.90 - 1.00	1.60 - 1.70	0.70 - 0.80
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
VOC							
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	< 10.0	< 10.0	396	12.5
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	536	82.1	< 10.0	90.1
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	10.7	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

			ELAB Reference	123348	123349	123350	123351
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	WS02A	WS04	WS04	WS06
			Sample Depth (m)	0.30 - 0.40	0.90 - 1.00	1.60 - 1.70	0.70 - 0.80
			Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
VOC							
VOC TIC							
Vinyl chloride	N	ug/kg	10	< 10	< 10	< 10	< 10
Various	N	ug/kg	10	None Detected	None Detected	None Detected	None Detected
TIC							
17-Pentatriacontene	N	ug/kg	10	-	-	-	-
Cyclohexane, (2-methylpropyl)-	N	ug/kg	10	-	-	-	-
Cyclohexane, 1,1,2,3-tetramethyl-	N	ug/kg	10	-	-	-	-
Cyclohexane, 1,1-dimethyl-2-propyl-	N	ug/kg	10	-	-	-	-
Cyclotetradecane	N	ug/kg	10	-	-	-	-
Decane, 2,6,7-trimethyl-	N	ug/kg	10	-	-	-	-
Decane, 3-methyl-	N	ug/kg	10	-	-	-	-
Decane, 4-methyl-	N	ug/kg	10	-	-	-	-
Hexadecane, 1-chloro-	N	ug/kg	10	-	-	-	-
Hexadecane, 2,6,10,14-tetramethyl-	N	ug/kg	10	-	-	-	-
Hexane, 1-(hexyloxy)-4-methyl-	N	ug/kg	10	-	-	-	-
Hydroxylamine, O-decyl-	N	ug/kg	10	-	-	-	-
Nonane, 3-methyl-	N	ug/kg	10	-	-	-	-
Oxalic acid, cyclobutyl dodecyl ester	N	ug/kg	10	-	-	-	-
Tetradecane, 1-chloro-	N	ug/kg	10	-	-	-	-
Undecane, 2,6-dimethyl-	N	ug/kg	10	-	-	-	-
Undecane, 2-methyl-	N	ug/kg	10	-	-	-	-

Results Summary

Report No.: 18-15695

				ELAB Reference	123352	123353	123354	123355
				Customer Reference				
				Sample ID				
				Sample Type	SOIL	SOIL	SOIL	SOIL
				Sample Location	WS6	WS07	WS08	WS08
				Sample Depth (m)	1.20 - 1.30	0.40 - 0.50	0.10 - 0.20	0.60 - 0.70
				Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**				
VOC							
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	91.3	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	170	14.9	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	33.1	< 10.0	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	78.5	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	40.0	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	14.7	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	13.3	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

				ELAB Reference	123352	123353	123354	123355
				Customer Reference				
				Sample ID				
				Sample Type	SOIL	SOIL	SOIL	SOIL
				Sample Location	WS6	WS07	WS08	WS08
				Sample Depth (m)	1.20 - 1.30	0.40 - 0.50	0.10 - 0.20	0.60 - 0.70
				Sampling Date	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**					
VOC								
VOC TIC								
Vinyl chloride	N	ug/kg	10		< 10	< 10	< 10	< 10
Various	N	ug/kg	10		Y	None Detected	None Detected	None Detected
TIC								
17-Pentatriacontene	N	ug/kg	10		1579.41	-	-	-
Cyclohexane, (2-methylpropyl)-	N	ug/kg	10		1570.22	-	-	-
Cyclohexane, 1,1,2,3-tetramethyl-	N	ug/kg	10		592.98	-	-	-
Cyclohexane, 1,1-dimethyl-2-propyl-	N	ug/kg	10		912.93	-	-	-
Cyclotetradecane	N	ug/kg	10		151.76	-	-	-
Decane, 2,6,7-trimethyl-	N	ug/kg	10		1940.41	-	-	-
Decane, 3-methyl-	N	ug/kg	10		1068.47	-	-	-
Decane, 4-methyl-	N	ug/kg	10		382.96	-	-	-
Hexadecane, 1-chloro-	N	ug/kg	10		1298.88	-	-	-
Hexadecane, 2,6,10,14-tetramethyl-	N	ug/kg	10		1363.85	-	-	-
Hexane, 1-(hexyloxy)-4-methyl-	N	ug/kg	10		1112.19	-	-	-
Hydroxylamine, O-decyl-	N	ug/kg	10		1056.61	-	-	-
Nonane, 3-methyl-	N	ug/kg	10		1145.23	-	-	-
Oxalic acid, cyclobutyl dodecyl ester	N	ug/kg	10		486.89	-	-	-
Tetradecane, 1-chloro-	N	ug/kg	10		219.01	-	-	-
Undecane, 2,6-dimethyl-	N	ug/kg	10		2959.81	-	-	-
Undecane, 2-methyl-	N	ug/kg	10		301.18	-	-	-

Results Summary

Report No.: 18-15695

			ELAB Reference	123356	123357
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	WS09	WS10
			Sample Depth (m)	0.10 - 0.20	0.40 - 0.50
			Sampling Date	10/01/2018	10/01/2018
Determinand	**Codes**	**Units**	**LOD**		
VOC					
Heptane	N	ug/kg	10	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	13.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 18-15695

ELAB Reference	123356	123357
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	WS09	WS10
Sample Depth (m)	0.10 - 0.20	0.40 - 0.50
Sampling Date	10/01/2018	10/01/2018

Determinand	Codes	Units	LOD		
VOC					
VOC TIC					
Vinyl chloride	N	ug/kg	10	< 10	< 10
Various	N	ug/kg	10	None Detected	None Detected
TIC					
17-Pentatriacontene	N	ug/kg	10	-	-
Cyclohexane, (2-methylpropyl)-	N	ug/kg	10	-	-
Cyclohexane, 1,1,2,3-tetramethyl-	N	ug/kg	10	-	-
Cyclohexane, 1,1-dimethyl-2-propyl-	N	ug/kg	10	-	-
Cyclotetradecane	N	ug/kg	10	-	-
Decane, 2,6,7-trimethyl-	N	ug/kg	10	-	-
Decane, 3-methyl-	N	ug/kg	10	-	-
Decane, 4-methyl-	N	ug/kg	10	-	-
Hexadecane, 1-chloro-	N	ug/kg	10	-	-
Hexadecane, 2,6,10,14-tetramethyl-	N	ug/kg	10	-	-
Hexane, 1-(hexyloxy)-4-methyl-	N	ug/kg	10	-	-
Hydroxylamine, O-decyl-	N	ug/kg	10	-	-
Nonane, 3-methyl-	N	ug/kg	10	-	-
Oxalic acid, cyclobutyl dodecyl ester	N	ug/kg	10	-	-
Tetradecane, 1-chloro-	N	ug/kg	10	-	-
Undecane, 2,6-dimethyl-	N	ug/kg	10	-	-
Undecane, 2-methyl-	N	ug/kg	10	-	-

Results Summary

Report No.: 18-15695

WAC Analysis								
Elab Ref:	123359					**Landfill Waste Acceptance Criteria Limits**		
Sample Date:	10/01/2018					**Inert Waste Landfill**	**Stable Non-reactive Hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:	Combo 2 WS02/							
Depth (m)	0.30 - 1.00							
Site:	St Georges Works, Trowbridge							
Determinand		**Code**	**Units**					
Total Organic Carbon		N	%		3.40	3	5	6
Loss on Ignition		M	%		4.5	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		224	500	--	--
Total (of 17) PAHs		N	mg/kg		345.0	100	--	--
pH		M			11.0	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		0.2	--	To evaluate	To evaluate
Eluate Analysis			**10:1**		**10:1**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
			mg/l		**mg/kg**			
Arsenic		N	< 0.005		< 0.05	0.5	2	25
Barium		N	0.036		0.36	20	100	300
Cadmium		N	< 0.001		< 0.01	0.04	1	5
Chromium		N	< 0.005		< 0.05	0.5	10	70
Copper		N	0.028		0.28	2	50	100
Mercury		N	< 0.005		< 0.01	0.01	0.2	2
Molybdenum		N	0.037		0.37	0.5	10	30
Nickel		N	< 0.001		< 0.05	0.4	10	40
Lead		N	< 0.001		< 0.05	0.5	10	50
Antimony		N	< 0.005		< 0.05	0.06	0.7	5
Selenium		N	< 0.005		< 0.05	0.1	0.5	7
Zinc		N	< 0.005		< 0.05	4	50	200
Chloride		N	19		193.00	800	15000	25000
Fluoride		N	< 5		< 10	10	150	500
Sulphate		N	542		5420.00	1000	20000	50000
Total Dissolved Solids		N	1110		11100.00	4000	60000	100000
Phenol Index		N	< 0.01		< 0.10	1	-	-
Dissolved Organic Carbon		N	17.400		174.00	500	800	1000
Leach Test Information								
pH		N	10.9					
Conductivity (uS/cm)		N	1370					
Dry mass of test portion (g)			102.000					
Dry Matter (%)			82					
Moisture (%)			22					
Eluent Volume (ml)			978					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ELAB cannot be held responsible for any discrepencies with current legislation

Results Summary

Report No.: 18-15695

WAC Analysis								
Elab Ref:	123358					**Landfill Waste Acceptance Criteria Limits**		
Sample Date:	10/01/2018					**Inert Waste Landfill**	**Stable Non-reactive Hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:	Combo 1 WS01,							
Depth (m)	0.50 - 1.90							
Site:	St Georges Works, Trowbridge							
Determinand		**Code**	**Units**					
Total Organic Carbon		N	%		1.70	3	5	6
Loss on Ignition		M	%		4.0	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		< 5	500	--	--
Total (of 17) PAHs		N	mg/kg		< 2	100	--	--
pH		M			7.8	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate
Eluate Analysis			**10:1**		**10:1**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
			mg/l		**mg/kg**			
Arsenic		N	0.005		0.05	0.5	2	25
Barium		N	0.034		0.34	20	100	300
Cadmium		N	< 0.001		< 0.01	0.04	1	5
Chromium		N	< 0.005		< 0.05	0.5	10	70
Copper		N	< 0.005		< 0.05	2	50	100
Mercury		N	< 0.005		< 0.01	0.01	0.2	2
Molybdenum		N	0.008		0.08	0.5	10	30
Nickel		N	0.001		< 0.05	0.4	10	40
Lead		N	< 0.001		< 0.05	0.5	10	50
Antimony		N	< 0.005		< 0.05	0.06	0.7	5
Selenium		N	< 0.005		< 0.05	0.1	0.5	7
Zinc		N	< 0.005		< 0.05	4	50	200
Chloride		N	24		238.00	800	15000	25000
Fluoride		N	< 5		< 10	10	150	500
Sulphate		N	609		6090.00	**1000**	20000	50000
Total Dissolved Solids		N	1100		11000.00	**4000**	60000	100000
Phenol Index		N	< 0.01		< 0.10	1	-	-
Dissolved Organic Carbon		N	5.610		56.00	500	800	1000
Leach Test Information								
pH		N	7.6					
Conductivity (uS/cm)		N	1400					
Dry mass of test portion (g)			100.000					
Dry Matter (%)			77					
Moisture (%)			31					
Eluent Volume (ml)			951					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
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Results Summary

Report No.: 18-15695

WAC Analysis								
Elab Ref:	123355					**Landfill Waste Acceptance Criteria Limits**		
Sample Date:	10/01/2018					**Inert Waste Landfill**	**Stable Non-reactive Hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:	WS08							
Depth (m)	0.60 - 0.70							
Site:	St Georges Works, Trowbridge							
Determinand		**Code**	**Units**					
Total Organic Carbon		N	%		0.81	3	5	6
Loss on Ignition		M	%		4.9	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		< 5	500	--	--
Total (of 17) PAHs		N	mg/kg		< 2	100	--	--
pH		M			8.0	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate
Eluate Analysis			**10:1**		**10:1**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
			mg/l		**mg/kg**			
Arsenic		N	< 0.005		< 0.05	0.5	2	25
Barium		N	< 0.005		< 0.05	20	100	300
Cadmium		N	< 0.001		< 0.01	0.04	1	5
Chromium		N	< 0.005		< 0.05	0.5	10	70
Copper		N	< 0.005		< 0.05	2	50	100
Mercury		N	< 0.005		< 0.01	0.01	0.2	2
Molybdenum		N	< 0.005		< 0.05	0.5	10	30
Nickel		N	0.002		< 0.05	0.4	10	40
Lead		N	< 0.001		< 0.05	0.5	10	50
Antimony		N	< 0.005		< 0.05	0.06	0.7	5
Selenium		N	< 0.005		< 0.05	0.1	0.5	7
Zinc		N	0.012		0.12	4	50	200
Chloride		N	< 5		< 50	800	15000	25000
Fluoride		N	< 5		< 10	10	150	500
Sulphate		N	6		58.90	1000	20000	50000
Total Dissolved Solids		N	< 10		< 100	4000	60000	100000
Phenol Index		N	< 0.01		< 0.10	1	-	-
Dissolved Organic Carbon		N	15.000		150.00	500	800	1000
Leach Test Information								
pH		N	7.9					
Conductivity (uS/cm)		N	118					
Dry mass of test portion (g)			100.000					
Dry Matter (%)			80					
Moisture (%)			25					
Eluent Volume (ml)			931					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
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Results Summary

Report No.: 18-15695

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
123344	0.50 - 0.60	WS01	Brown sandy soil,Clinker,stones,brick	No asbestos detected	n/t	n/t	n/t	n/t
123345	1.80 - 1.90	WS02A	Brown sandy soil,Stones,clinker,Brick	No asbestos detected	n/t	n/t	n/t	n/t
123346	0.60 - 0.70	WS03	Brown soil,Stonres,clinker,brick	No asbestos detected	n/t	n/t	n/t	n/t
123347	0.60 - 0.70	WS05	Brown soil,Stones,brick	No asbestos detected	n/t	n/t	n/t	n/t
123348	0.30 - 0.40	WS02A	Brown sandy soil,Stonres,clinker,brick,concrete	No asbestos detected	n/t	n/t	n/t	n/t
123349	0.90 - 1.00	WS04	Brown sandy soil,Stones,brick,Clinker,concrete	No asbestos detected	n/t	n/t	n/t	n/t
123350	1.60 - 1.70	WS04	Brown soil	No asbestos detected	n/t	n/t	n/t	n/t
123351	0.70 - 0.80	WS06	Brown sandy soil,Stones,clinker	No asbestos detected	n/t	n/t	n/t	n/t
123352	1.20 - 1.30	WS6	Brown sandy soil,Stones,clinker,brick	No asbestos detected	n/t	n/t	n/t	n/t
123353	0.40 - 0.50	WS07	Brown sandy soil,Stones	No asbestos detected	n/t	n/t	n/t	n/t
123354	0.10 - 0.20	WS08	Brown soil,Root stones	No asbestos detected	n/t	n/t	n/t	n/t
123355	0.60 - 0.70	WS08	Brown soil	No asbestos detected	n/t	n/t	n/t	n/t
123356	0.10 - 0.20	WS09	Brown soil,Stones,clinker	No asbestos detected	n/t	n/t	n/t	n/t
123357	0.40 - 0.50	WS10	Brown sandy soil,Stones,brick,twigs	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 18-15695

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
PAH (GC-MS)	N	As submitted sample	16/01/2018		GC-MS
VOC in solids	M	As submitted sample	17/01/2018		GC-MS
Hexavalent chromium	N	As submitted sample	17/01/2018	110	Colorimetry
Acid Soluble Sulphate	U	Air dried sample	22/01/2018	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	19/01/2018	118	ICPMS
Phenols in solids	N	As submitted sample	17/01/2018	121	HPLC
Water soluble anions	M	Air dried sample	19/01/2018	172	Ion Chromatography
VOC in solids	M	As submitted sample	17/01/2018	181	GC-MS
Water soluble boron	N	Air dried sample	18/01/2018	202	Colorimetry
Total cyanide	M	As submitted sample	17/01/2018	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	16/01/2018	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	19/01/2018	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	16/01/2018	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	19/01/2018	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	19/01/2018	214	GC-MS
Soil organic matter	U	Air dried sample	20/01/2018	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	19/01/2018	PMAN	Microscopy
Leachate					
Arsenic*	N		19/01/2018	101	ICPMS
Cadmium*	N		19/01/2018	101	ICPMS
Chromium*	N		19/01/2018	101	ICPMS
Lead*	N		19/01/2018	101	ICPMS
Nickel*	N		19/01/2018	101	ICPMS
Copper*	N		19/01/2018	101	ICPMS
Zinc*	N		19/01/2018	101	ICPMS
Mercury*	N		19/01/2018	101	ICPMS
Selenium*	N		19/01/2018	101	ICPMS
Antimony	N		19/01/2018	101	ICPMS
Barium*	N		19/01/2018	101	ICPMS
Molybdenum*	N		19/01/2018	101	ICPMS
pH Value*	N		19/01/2018	113	Electrometric
Electrical Conductivity*	N		19/01/2018	136	Probe
Dissolved Organic Carbon	N		19/01/2018	102	TOC analyser
Chloride*	N		19/01/2018	131	Ion Chromatography
Fluoride*	N		19/01/2018	131	Ion Chromatography
Sulphate*	N		19/01/2018	131	Ion Chromatography
Total Dissolved Solids	N		19/01/2018	144	Gravimetric
Phenol index	N		19/01/2018	121	HPLC
WAC Solids analysis	N				
pH Value**	M	Air dried sample	18/01/2018	113	Electrometric
Total Organic Carbon	N	Air dried sample	18/01/2018	210	IR
Loss on Ignition**	M	Air dried sample	18/01/2018	129	Gravimetric
Acid Neutralization Capacity to pH 7	N	Air dried sample	18/01/2018	NEN 737	Electrometric
Total BTEX**	M	As submitted sample	17/01/2018	181	GCMS
Mineral Oil**	U	As submitted sample	16/01/2018	117	GCFID
Total PCBs (7 congeners)	M	Air dried sample	17/01/2018	120	GCMS
Total PAH (17)**	N	As submitted sample	19/01/2018	133	GCFID

Tests marked N are not UKAS accredited

Report Information

Report No.: 18-15695

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

APPENDIX F

Results of Geotechnical Laboratory Tests

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 37868

Client Ref: **p-sw-1037**
Client PO:

Report Date: **26-01-2018**

Client **Ground Investigation (South West) Limited**
Unit 3, Westfield Court
Barnes Ground
Kenn
Clevedon
BS21 6FQ

Contract Title: **St Georges Works, Trowbridge**
For the attention of: **Edward Minchin**

Date Received: **15-01-2018**
Date Commenced: **15-01-2018**
Date Completed: **26-01-2018**

Test Description	Qty
Moisture Content BS 1377 : Part 2 : 3.2 - * UKAS	10
4 Point Liquid & Plastic Limit (LL/PL) BS 1377 Part 2 : 4.3 & 5.3 - * UKAS	10
(GI) BRE SD1 Reduced Suite pH, Acid Soluble Sulphate, Water Soluble Sulphate and Total Sulphur 1377 : 1990 Part 3 & BRE CP2/79 - @ Non Accredited Test	10
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative Assistant)
Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5) DESCRIPTIONS	
Contract Number	**37868**	
Site Name	**St Georges Works, Trowbridge**	

WS Window Sample	Sample Number	Sample Type	Depth (m)			Descriptions
WS01		D	1.30	-	1.40	Brown fine gravelly silty CLAY
WS02A		D	2.30	-	2.40	Grey/brown silty CLAY
WS03		D	1.50	-	1.60	Grey/brown silty CLAY
WS04		D	2.70	-	2.80	Brown silty CLAY
WS05		D	2.50	-	2.60	Grey/brown silty CLAY
WS06		D	2.40	-	2.50	Grey/brown silty CLAY
WS07		D	0.80	-	0.90	Grey/brown silty CLAY
WS08		D	1.80	-	1.90	Brown sandy fine gravelly silty CLAY
WS09		D	1.50	-	1.60	Grey/brown silty CLAY
WS10		D	2.50	-	2.60	Grey/brown fine to medium gravelly silty CLAY
				-		
				-		
				-		
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				-		
				-		

Operators	Checked	25/01/2018	Sean Penn	
RO/MH	Approved	26/01/2018	Ben Sharp	

UKAS TESTING
2788

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)	
Contract Number	**37868**	
Site Name	**St Georges Works, Trowbridge**	

WS Window Sample	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
WS01		D	1.30	-	1.40	40	74	30	44	90	CV Very High Plasticity
WS02A		D	2.30	-	2.40	33	71	30	41	100	CV Very High Plasticity
WS03		D	1.50	-	1.60	30	66	27	39	100	CH High Plasticity
WS04		D	2.70	-	2.80	30	67	27	40	100	CH High Plasticity
WS05		D	2.50	-	2.60	38	66	29	37	100	CH High Plasticity
WS06		D	2.40	-	2.50	37	66	27	39	100	CH High Plasticity
WS07		D	0.80	-	0.90	27	63	23	40	100	CH High Plasticity
WS08		D	1.80	-	1.90	17	35	18	17	89	CL/I Low/Inter. Plasticity
WS09		D	1.50	-	1.60	38	67	29	38	100	CH High Plasticity
WS10		D	2.50	-	2.60	19	65	26	39	83	CH High Plasticity
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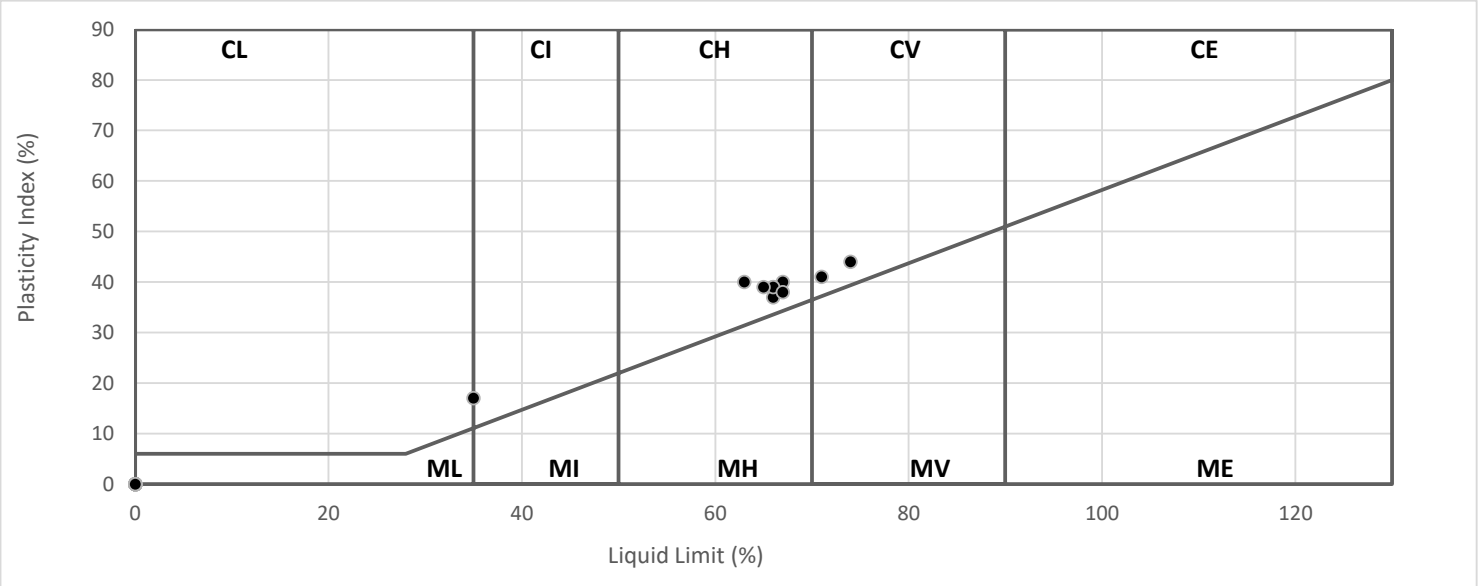
Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	25/01/2018	Sean Penn	
DB	Approved	26/01/2018	Ben Sharp	

UKAS TESTING 2788

GSTL	Certificate of Chemical Analysis (BRE BR 279)	Contract Number	37868
		Client Reference	p-sw-1037
Client	Ground Investigation (south west)	**Date Received**	
Site Name	St Georges Works, Trowbroidge	**Date Started**	23/01/2018
		Date Completed	26/01/2018
		No. of Samples	10

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
WS01		D	1.30	-	1.40	0.29	0.02		6.32	0.11		
WS02A		D	2.30	-	2.40	0.35	0.03		7.01	0.13		
WS03		D	1.50	-	1.60	0.37	0.03		6.89	0.13		
WS04		D	2.70	-	2.80	0.31	0.04		7.84	0.11		
WS05		D	2.50	-	2.60	0.49	0.04		8.01	0.18		
WS06		D	2.40	-	2.50	0.25	0.03		7.29	0.09		
WS07		D	0.80	-	0.90	0.33	0.02		7.55	0.12		
WS08		D	1.80	-	1.90	0.39	0.03		7.82	0.14		
WS09		D	1.50	-	1.60	0.37	0.02		7.04	0.13		
WS10		D	2.50	-	2.60	0.23	<0.01		7.69	0.08		
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Key	Reported As
Acid Soluble Sulphate	% SO_4
Aqueous Extract Sulphate	g/l SO_4
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO_4
Nitrate	NO_3 mg/l

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp
Darren Bourne	Date	26/01/2018	

APPENDIX G

References

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