



Main Investigation Report

at

**Warehouse Extension, Unit 3, Station Approach, North Street,
Emsworth, Hampshire PO10 7PW**

for

Racquet Sports Group

**Reference: I7974/MIR_R27
December 2019**

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

Soils Limited was commissioned by Racquet Sports Group to undertake an intrusive ground investigation and prepare a Main Investigation Report on land at Unit 3, Station Approach, North Street, Emsworth, Hampshire PO10 7PW. The scope of the investigation was outlined in the Soils Limited quotation reference Q22087, dated 27th October 2019.

This document comprises the Main Investigation Report and incorporates the results, discussion and conclusions to this intrusive works.

This Main Investigation Report must be read in conjunction with the Preliminary Investigation Report undertaken on the above site by Soils Limited, Report ref: 17974/PIR, dated December 2019.

Standards

The site works, soil descriptions and geotechnical testing was undertaken in accordance with the following standards:

- BS 5930:2015 and BS EN ISO 22476-2 2005+A1:2011
- BS EN ISO 14688-1:2002+A1:2013
- BS EN ISO 14688-2:2004+A1:2013
- BS 10175:2011+A1:2013

The geotechnical laboratory testing was performed by GEO Site & Testing Services Ltd (GSTL) in accordance with the methods given in BS 1377:1990 Parts 1 to 8 and their UKAS accredited test methods.

For the preparation of this report, the relevant BS code of practice was adopted for the geotechnical laboratory testing technical specifications, in the absence of the relevant Eurocode specifications (ref: ISO TS 17892).

The chemical analyses were undertaken by i2 Analytical in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce a trial hole.

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Section I Introduction

1.1 Objective of Investigation

Soils Limited was commissioned by Racquet Sports Group to undertake an intrusive ground investigation and to prepare a Main Investigation Report to supply the client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The investigation was to be undertaken to provide comment on appropriate foundation options for the proposed warehouse extension. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the trial holes.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any contamination identified as dictated by the Conceptual Site Model (CSM) in the Preliminary Investigation Report undertaken for the site by Soils Limited (Report ref: 17974/PIR, dated December 2019).

1.2 Location

The site was located at Unit 3, Station Approach, North Street, Emsworth, Hampshire PO10 7PW and had an approximate O.S Land Ranger Grid Reference of SU 746 063.

The site location plan is given in Figure 1.

1.3 Site Description

At the time of investigation, the site comprised a detached single storey warehouse unit with concrete courtyard and surrounds set on a raised embankment associated with adjacent railway infrastructure. The south and west site boundaries were heavily vegetated, and the site was bound by a railway line to the north, mixed industrial/commercial to the east and residential land to the south and west. The wider topography was undulating but sloping down to the south.

An aerial photograph has been included in Figure 2.

1.4 Proposed Development

The proposal comprised a new extension as a continuation from the existing single storey warehouse (west elevation) onsite, with the inclusion of a flat roof extension at the end of the new extension. The proposed development comprised hard landscaping to include a new parking platform near the entrance to the site. No soft landscaping formed part of the proposed development.

No information was available on the foundation configuration of the existing warehouse onsite.

In compiling this report reliance was placed on drawings reference 1727-D01, D03B, 002, D04 and D05 dated February 2019, prepared by Temple Ford Design Ltd. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

Development plans provided by the client are presented in Appendix D.

1.5 Anticipated Geology

The 1:50,000 BGS Geology map showed the site to be situated on the London Clay Formation bedrock, with overlying superficial deposits of Head. A significant thickness of Made Ground was anticipated underlying the site given its position on a former railway sidings embankment.

1.5.1 Head

Head deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands gravels and chalk of local derivation.

1.5.2 London Clay Formation

The London Clay Formation in the Hampshire region comprises silty and sandy clay, clayey and sandy silt, silty sand; sporadic claystones and thin beds of flint pebbles. The formation includes the Bognor Sand, Whitecliff Sand, Durley Sand, Portsmouth Sand and Nursling Sand Members. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The lowest part of the London Clay Formation rests on the Reading Formation (Lambeth Group).

1.6 Limitations and Disclaimers

This Main Investigation Report relates to the site located at Warehouse Extension, Unit 3, Station Approach, North Street, Emsworth, Hampshire PO10 7PW and was prepared for the sole benefit of Racquet Sports Group (The "Client"). The report was prepared solely for the brief described in Section 1.1 of this report.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data or any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. "Contaminated Land" is defined in Section 57 of the Environment Act 1995 as:

"Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused".

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets remains with Soils Limited. License is for the sole use of the client and may not be assigned, transferred or given to a third party.

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to aid the design of foundations for the proposed commercial development. The intended investigation, as outlined within the Soils Limited quotation (Q22087, dated 28th October 2019), was to comprise the following items:

- 4No. up to 4m deep windowless sampler boreholes
- 4No. up to 6m deep dynamic probes
- Geotechnical laboratory testing
- Contamination laboratory testing

1No. day of concrete coring, installation of 2No. soil gas and groundwater monitoring wells, a period of soil gas and groundwater monitoring and development of Soil Gas Risk Assessment was subsequently commissioned by the client via email correspondence.

2.1.1 Actual Project Works

The actual project works were undertaken on 18th November 2019 and comprised:

- 1No. day concrete coring
- 4No. windowless sampler boreholes (WS1 – WS4)
- 4No. super heavy dynamic probes (DP1 – DP4)
- 2No. installations of soil gas and groundwater monitoring wells
- Geotechnical laboratory testing
- Contamination laboratory testing

Two windowless sampler boreholes (WS1 and WS4) were backfilled with gravel and bentonite following the installation of monitoring wells. The remaining trial holes were backfilled with gravel on completion.

All trial hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for both contamination and geotechnical testing.

Four post-works soil gas and groundwater monitoring rounds undertaken weekly were requested by the client, undertaken between 25th November and 16th December 2019 to allow production of Soil Gas Risk Assessment for the site, which has been included within this report.

2.2 Ground Conditions

On 18th November 2019, four windowless sampler boreholes (WS1 – WS4) were each drilled to a depth of 4.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the client.

Four super heavy dynamic probes (DP1 – DP4) were driven prior and adjacent to their corresponding windowless sampler boreholes to depths ranging between 5.20m and 6.00m bgl. DP1 was terminated at 5.20m bgl on contact with an obstruction which could not be safely penetrated with the equipment available.

Monitoring standpipes were installed within windowless sampler borehole locations WS1 and WS4 to allow for continued monitoring of both groundwater and soil gas, where present. Four post-works monitoring visits were undertaken between 25th November and 16th December 2019.

The maximum depths of trial holes have been included in Table 2.1.

All trial holes were scanned with a Cable Avoidance Tool (C.A.T.) and signal generator (Genny) prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Trial Holes

Trial Hole	Depth (m bgl)	Trial Probe	Depth (m bgl)
WS1 ^w	4.00	DP1	5.20
WS2	4.00	DP2	6.00
WS3	4.00	DP3	6.00
WS4 ^w	4.00	DP4	6.00

Note: w - well installation

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for

the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised as:

**Made Ground (MG/TS)
Head (HEAD)
London Clay Formation (LCF) [not encountered]**

The ground conditions encountered in the trial holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG	Anthropocene	0.00	2.00–4.00 ¹	>4.00m	Concrete over black and brown clayey sandy GRAVEL, clayey gravelly SAND and gravelly CLAY. Gravel comprised fragments of clinker, ash, flint, brick, tarmac, chalk and ceramics.
HEAD	Quaternary	2.00- >4.00 ¹	6.00 ^{1,2}	Not proven	Orangish brown mottled greyish brown slightly sandy silty CLAY with rare angular to rounded fine to medium flint and ironstone gravel clasts.

Note: ¹ Final depth of trial hole. ² Depth inferred from dynamic probe. ³ Base of strata not encountered. 0.00 denotes ground level

2.3 Ground Conditions Encountered in Trial Holes

The ground conditions encountered in trial holes have been described below in descending order. The engineering logs are presented in Appendix A.1.

2.3.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in all four trial holes from ground level and persisted to depths ranging between 2.00m bgl (WS1) and full investigatory depth of 4.00m bgl for the remaining trial hole. The base of the Made Ground was inferred in the corresponding dynamic probes at depths of between 4.20m and 5.00m bgl.

The Made Ground comprised concrete over black and brown clayey sandy GRAVEL, clayey gravelly SAND and gravelly CLAY. Gravel comprised fragments of clinker, ash, flint, brick, tarmac, chalk and ceramics.

The final depths of Made Ground have been included in Table 2.3.

Table 2.3 Final Depth of Made Ground

Trial Hole	Depth (m bgl)
WS1	2.00

Trial Hole	Depth (m bgl)
WS2/DP2	4.00 ¹ /4.20 ²
WS3/DP3	4.00 ¹ /4.80 ²
WS4/DP4	4.00 ¹ /5.00 ²

Note: ¹ Final depth of trial hole. ² Depth inferred from dynamic probe

2.3.2 Head

Soils described as Head were encountered in one trial hole (WS1) underlying the Made Ground from 2.00m bgl and persisted to the full investigatory depth of 4.00m bgl.

The Head comprised orangish brown mottled greyish brown slightly sandy silty CLAY with rare angular to rounded fine to medium flint and ironstone gravel clasts.

The depth of Head has been included in Table 2.4.

Table 2.4 Final Depth of Head

Trial Hole	Depth (m bgl)
WS1/DPI	4.00 ¹ /5.20 ^{1,2}
DP2	6.00 ^{1,2}
DP3	6.00 ^{1,2}
DP4	6.00 ^{1,2}

Note: ¹ Final depth of trial hole. ² Inferred from dynamic probe

2.4 Roots

Roots/rootlets were observed within two of the four trial holes, persisting to depths of between 2.50m and 2.70m bgl.

The depths of root penetration have been included in Table 2.5.

Table 2.5 Depth of Root Penetration

Trial Hole	Depth (m bgl)
WS1	2.50
WS2	2.70
WS3	None
WS4	None

Roots/rootlets may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low. A direct observation such as from within a trial pit is necessary to gain a better indication of the maximum root depth.

2.5 Groundwater

No groundwater “strikes” were recorded during the drilling of the windowless sampler boreholes. Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in November (2019), when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September. The annual maximum (highest) elevation typically occurs around March.

Further groundwater monitoring was conducted within the standpipes installed on site following completion of site works and has been presented in Table 2.6.

Table 2.6 Groundwater Monitoring

Trial Hole	Depth to Water (m bgl)				Base of Well (m bgl)
	25/11/19	05/12/19	12/12/19	16/12/19	
WS1	3.78	3.34	3.22	2.75	4.00
WS4	DRY	DRY	DRY	DRY	4.00

Section 3 Discussion of Geotechnical In-Situ and Laboratory Testing

3.1 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at four locations (DP1 – DP4) prior and adjacent to their corresponding windowless sampler borehole to depths ranging between 5.20m and 6.00m bgl. DP1 was terminated at a depth of 5.20m on contact with an obstruction which could not be safely penetrated with the equipment available.

The results were converted to equivalent SPT “N60” values based on dynamic energy using commercial computer software (Geostru). The results were then interpreted based on the classifications outlined in Appendix B.1.

The SPT “N60” values presented have been corrected in accordance with BS EN 22476 Part 3, to account for the rig efficiency, borehole depth, overburden factors etc. Further correction of the ‘N’ values should therefore not be necessary. The energy ratio of the drilling rig was 78.58%. The energy ratio for each location is presented on the individual logs within Appendix A.1.

Soils described to comprise Made Ground recorded SPT “N60” values between <1 and 19 in cohesive soils and between 4 and 35 in granular soils. The cohesive soils were typically of very low strength with inferred cohesive strength <10kPa and the granular soils were typically of very loose relative density.

The Head recorded equivalent SPT “N60” values between 4 and 22, typically showing an increasing strength with depth trend. The cohesive soils were classified as low to high strength with inferred undrained cohesive strength of 20kPa to 110kPa.

A full interpretation of the DPSH tests are outlined in Appendix B.2, Table B.2.1.

3.2 Atterberg Limit Tests

Atterberg Limit tests were performed on two samples obtained from the Head. The results were classified in accordance with BRE Digest 240.

The Head was classified as low volume change potential in accordance with both BRE Digest 240.

A full interpretation of the Atterberg Limit tests are outlined in Table B.2.2, Appendix B.2 and the laboratory report in Appendix B.3.

3.3 Sulphate and pH Tests

One sample was taken from the Made Ground and one from the Head for water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment

Special Digest 1, 2005, 'Concrete in Aggressive Ground'. pH and W/S sulphate tests were undertaken on an addition four samples of Made Ground.

The tests recorded water soluble sulphate between 12mg/l and 35mg/l with pH values of 8.0 to 8.7.

The significance of the sulphate and pH test results are discussed in Section 4.4 and the laboratory report in Appendix B.3.

Section 4 Foundation Design

4.1 General

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the trial holes.

4.1.1 Made Ground and Topsoil

The terms *Fill* and *Made Ground (non-engineered fill)* are used to describe material, which has been placed by man either for a particular purpose e.g. to form an embankment, or to dispose of unwanted material. For the former use, the Fill and/or Made Ground may well have been selected for the purpose and placed and compacted in a controlled manner. With the latter, great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The BSI Code of Practice for Foundations, BS 8004:2015, Clause 4.1.2.2 states, *'Spread foundations should not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design.'*

Soils described as Made Ground were encountered in all four trial holes from ground level and persisted to depths ranging between 2.00m bgl (WS1) and full investigatory depth of 4.00m bgl for the remaining trial hole. The base of the Made Ground was inferred in the corresponding dynamic probes at depths of between 4.20m and 5.00m bgl.

The Made Ground comprised concrete over black and brown clayey sandy GRAVEL, clayey gravelly SAND and gravelly CLAY. Gravel comprised fragments of clinker, ash, flint, brick, tarmac, chalk and ceramics.

The final depths of Made Ground have been included in Table 2.3.

A result of the inherent variability, particularly of uncontrolled Topsoil, Fill and/or Made Ground is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should, therefore, be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

4.1.2 Head

Soils described as Head were encountered in one trial hole (WS1) underlying the Made Ground from 2.00m bgl and persisted to the full investigatory depth of 4.00m bgl. The Head comprised orangish brown mottled greyish brown slightly sandy silty CLAY with rare angular to rounded fine to medium flint and ironstone gravel clasts.

The results from DPSH testing inferred that the cohesive soils of the Head were of a low to high strength, with undrained cohesions of between 20kPa and 110kPa.

The results from Atterberg Limits tests confirmed that the soils of the Head had low volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Soils of the Head are normally consolidated, predominantly cohesive soils and as such are expected to display low to moderate bearing capacities with moderate to high settlement characteristics. The soils of the Head were considered a potential founding stratum for adoption of a deep foundation solution, given the depth to its upper horizon, providing a sufficient thickness can be proven underlying the Made Ground at depth. Notwithstanding, deeper piles into the London Clay Formation recorded to underlie the Head is considered a more viable approach.

4.1.3 Roots

Roots/rootlets were observed within two of the four trial holes, persisting to depths of between 2.50m and 2.70m bgl. Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs. Given the ground conditions encountered, roots/rootlets are not considered to present a complication as a deep foundation solution, extending below unsuitable soils of Made Ground and root penetrated cohesive soils must be adopted for this development.

4.1.4 Groundwater

No groundwater "strikes" were recorded during the drilling of the windowless sampler boreholes. Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in November (2019), when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September. The annual maximum (highest) elevation typically occurs around March.

The results from further monitoring undertaken between 25th November and 16th December 2019 recorded groundwater in one of the two (WS1) monitoring standpipes, rising from a depth of 3.78m bgl to a depth of 2.75m bgl over the monitoring period.

4.2 Foundation Scheme General

The proposal comprised a new extension as a continuation from the existing single storey warehouse onsite, with the addition of a flat roof extension at the end of new extension.. The proposed development comprised hard landscaping to include a new parking platform near the entrance to the site. No soft landscaping formed part of the proposed development.

No information was available on the foundation configuration of the existing warehouse

onsite.

In compiling this report reliance was placed on drawings reference 1727-D01, D03B, 002, D04 and D05 dated February 2019, prepared by Temple Ford Design Ltd. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

Development plans provided by the client are presented in Appendix D.

4.2.1 Guidance on Shrinkable Soils

The Building Research Establishment (BRE) Digests 240, 241 and 242 provide guidance on 'best practice' for the design and construction of foundations on shrinkable soils.

The results from Atterberg Limits Tests showed that the Head had **low volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Low volume change potential must therefore be adopted where foundations pass through or found within the Head.

The BRE Digest 241 states: "An increasingly common, potentially damaging situation is where trees or hedges have been cut down prior to building. The subsequent long-term swelling of the zone of clay desiccated by the roots, as moisture slowly returns to the ground, can be substantial. The rate at which the ground recovers is very difficult to predict and if there is any doubt that recovery is complete then bored pile foundations with suspended beams and floors should be used".

The BRE Digest 240 suggests: *"Two courses of action are open:*

Estimate the potential for swelling or shrinkage and try to avoid large changes in the water content, for example by not planting trees near the foundations.

Accept that swelling or shrinkage will occur and take account of it. The foundations can be designed to resist resulting ground movements or the superstructure can be designed to accommodate movement without damage."

The design of foundations suitable to withstand movements is presented in BRE Digest 241 "Low-rise buildings on shrinkable clay soils: Part 2"

4.3 Foundation Scheme

Foundations **must not** be constructed within any Made Ground due to the likely variability and potential for large load induced settlements both total and differential.

Considering the type of development and significant thickness of Made Ground (>4.00m) encountered underlaying the site, a deep foundation solution was considered the most suitable.

Further intrusive investigation via cable percussive boreholes is required to determine depth to the underlying London Clay Formation and obtain soil parameters inform the design of a piled foundation solution.

4.3.1 Piled Foundations

Piled foundations must be taken through any Made Ground into suitable strength soils of the Head/London Clay Formation at depth.

The construction of a piled foundation is a specialist job with the actual pile working load depending on the particular type pile and installation method. Prior to finalising the foundation design the advice from a reputable contractor who is familiar with the ground and groundwater conditions present at the site should be sought.

A supplementary intrusive investigation is required utilising cable percussive borehole methods to determine depth to the London Clay Formation and obtain soil parameters at greater depth to inform the design of a piled foundation solution.

4.4 Subsurface Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class DS-1 of the BRE Special Digest 1 2005, '*Concrete in Aggressive Ground*'. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of AC-1. The pH of the soils tested ranged between 8.0 and 8.7. The classification given was determined using the mobile groundwater case, in the view of groundwater being encountered. The laboratory results are presented in Appendix B.3.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, '*Concrete in Aggressive Ground*' taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

4.5 Excavations

Shallow excavations in the Made Ground are likely to be marginally stable in the short term at best.

Deeper excavations taken into the Head are unlikely to be stable given the thickness of overlying Made Ground encountered. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported or battered back to a safe angle of repose before excavations are entered by personnel.

Excavations beneath the groundwater table, where encountered, are likely to be unstable and dewatering of foundation trenches may be necessary.

Section 5 Determination of Chemical Analysis

5.1 Site Characterisation and Revised Conceptual Site Model

The Preliminary Investigation Report undertaken by Soils Limited (report ref: 17974/PIR dated December 2019) identified a low to moderate risk of ground contamination from previous usage of the site and offsite sources.

The main intrusive site investigation identified Made Ground to depths between 2.50m and at least >4.00m bgl. The Made Ground comprised concrete over black and brown clayey sandy GRAVEL, clayey gravelly SAND and gravelly CLAY. Gravel comprised fragments of clinker, ash, flint, brick, tarmac, chalk and ceramics.

Potential hydrocarbon odours were noted within WS2 and WS4 within Made Ground from depths of 1.90m and 0.60m respectively.

Superficial deposits of cohesive Head were encountered underlying the Made Ground from 2.00m bgl in WS1 and inferred from depths between 4.20m and 5.00m bgl in dynamic probes.

5.2 Soil Sampling

A non-targeted sampling strategy is appropriate when there is:

- No adequate information available regarding the likely locations of contamination;
- No sensitive areas where there is a need for a high degree of confidence.

A targeted sampling strategy is appropriate when there is:

- Adequate information available regarding the likely locations of contamination
- Sensitive areas where there is a need for a high degree of confidence.

The CSM identified potential sources and a targeted sampling pattern was adopted as appropriate to these sources. Table 5.1 outlines the sampling undertaken.

Table 5.1 Sampling Strategy

Sample	Strategy	Proposed Use
WS1:0.50	Former sidings embankment – Made Ground	Beneath building footprint
WS3:0.50	Former sidings embankment – Made Ground	Beneath building footprint
WS3:1.40	Former sidings embankment – Made Ground	Beneath building footprint
WS3:3.20	Former sidings embankment – Made Ground	Beneath building footprint
WS4:0.50	Former sidings embankment – Made Ground	Beneath building footprint

5.3 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the

Preliminary Investigation Report and Main Investigation Report intrusive investigation.
Table 5.2 outlines the specification for each sample tested.

Table 5.2 Chemical Analysis Specification

Substance	Locations:Depths (m bgl)				
	WS1:0.50 ^s	WS3:0.50 ^s	WS3:0.20 ^s	WS3:0.50 ^s	WS4:0.50 ^s
Asbestos Screen	✓	✓	✓	✓	✓
Total Phenols	✓	✓	✓	✓	✓
Organic Matter	✓	✓	✓	✓	✓
pH	✓	✓	✓	✓	✓
Metals	✓	✓	✓	✓	✓
Metalloids	✓	✓	✓	✓	✓
Organics	✓	✓	✓	✓	✓

Notes: **Metals:** Cd, Cr, Pb, Hg, Ni, Se, Cu, Zn, Bo, V. **metalloids:** As. **organics:** USEPA 16 speciated PAH, TPH-Texas **Asbestos screening** was undertaken in accordance with HSG 248. ^s = Soil sample.

Section 6 Qualitative Risk Assessment

6.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix C.3.

6.2 Representative Contamination Criteria - Soil

The proposal comprised a new extension as a continuation from the existing single storey warehouse onsite, with the addition of a flat roof extension at the end of the new extension. The proposed development comprised hard landscaping to include a new parking platform near the entrance to the site. No soft landscaping formed part of the proposed development.

No information was available on the foundation configuration of the existing warehouse onsite.

In compiling this report reliance was placed on drawings reference 1727-D01, D03B, 002, D04 and D05 dated February 2019, prepared by Temple Ford Design Ltd. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

The chemical laboratory results were compared against the representative contaminants concentration for human health receptor to Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) or Suitable 4 Use Level (S4UL) for "commercial" land-use scenario, given the type of proposed development.

Table 6.1 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 6.1 Summary of Chemical Analysis of Soils Sample Exceedance

Substance	Sample locations where SGV, C4SL or S4UL adopted were exceeded for the 'commercial' land-use scenario
No exceedances	
Asbestos locations where material found (no threshold just presence)	
Not detected	

To assess the potential toxicity to the human health receptor from the concentrations of organic compounds tested for, Soil Organic Matter (SOM) tests were undertaken on the samples submitted for chemical testing, which revealed SOM values of between 0.6% and 4.1%. For each soil sample tested, the Soil Organic Matter recorded was used to derive the appropriate guideline value for organic determinants.

In summary, none of the substances tested recorded concentrations above the commercial end-use screening values.

6.2.1 Asbestos

Although no Asbestos Containing Material (ACM) was detected any of the five samples tested, it is possible that asbestos is present in other areas of the site. If encountered, care must be taken to ensure any such material is separated and disposed of in an appropriate manner to a licensed waste facility.

6.3 Risk to Groundwater

Chemical analysis of groundwater samples lay outside the scope of this investigation. Groundwater samples may be obtained from the monitoring wells installed onsite should this be required. Given marginally elevated PAH and TPH recorded within soil chemical analysis results, chemical analysis of groundwater samples, where encountered, is recommended to quantify risk to underlying groundwater resource.

6.4 Soil Gas Risk Assessment

The Preliminary Investigation Report (Soils Limited report ref.: 17974/PIR, dated December 2019) identified a low risk of soil gas associated with significant thickness of Made Ground underlying the site. Hydrocarbon odours were noted within WS2 and WS4. Given the low risk of soil gas generation of the source and low sensitivity of development, four soil gas monitoring rounds were undertaken across a period of approximately four weeks using the monitoring wells installed within WS1 and WS4. The results of the spot monitoring are presented in Table 6.3.

The concentration of methane (both total and LEL), hydrogen sulphide, carbon monoxide, carbon dioxide and oxygen were measured using an LMS portable infrared gas monitor. Readings of flow-rate were taken with a differential manometer calibrated to give flow rate. A MultiRae Photo Ionisation Detector (PID) was used to detect for Volatile Organic Compounds (VOCs).

Table 6.2 Soil Gas Monitoring Results

Date	WS	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flow (l/h)	H ₂ O (m bgl)	VOC (ppm)	Dp
25/11/2019	ATM	0.0	0.0	21.1	0.0	0.0	0.0	1000	0.0	-	0	0.0
	WS1	0.0	2.3	18.9	0.0	0.0	0.0	1000	0.0	3.78	0	0.0
	WS4	0.0	2.3	19.7	0.0	0.0	0.0	1000	0.0	DRY	0	0.0
05/12/2019	ATM	0.0	0.0	19.9	0.0	0.0	0.0	1020	0.0	-	0	0.0
	WS1	0.0	1.1	19.0	0.0	0.0	0.0	1020	0.0	3.34	0	0.0
	WS4	0.0	1.3	19.0	0.0	0.0	0.0	1020	0.0	DRY	0	0.0
12/12/2019	ATM	0.0	0.0	19.8	0.0	0.0	0.0	981	0.0	-	0	0.0
	WS1	0.0	1.3	18.9	0.0	0.0	0.0	981	0.0	3.22	0	0.0
	WS4	0.0	0.9	19.4	0.0	0.0	0.0	982	0.0	DRY	0	0.0
16/12/2019	ATM	0.0	0.0	19.8	0.0	0.0	0.0	999	0.0	-	0	0.0
	WS1	0.0	1.4	18.8	0.0	0.0	0.0	999	0.0	2.75	0	0.0
	WS4	0.0	1.2	18.8	0.0	0.0	0.0	1000	0.0	DRY	0	0.0

Minimum	0.0	0.9	18.8	0.0	0.0	0.0	981	0.0	3.78	0	0.0
Maximum	0.0	2.3	19.7	0.0	0.0	0.0	2020	0.0	2.75	0	0.0

Note: Reading of 0.0 = below detection level. VOC=Volatile Organic Compounds. Dp=Pressure Difference.

The highest concentration of carbon dioxide was recorded at 2.3% v/v in both WS1 and WS4 on 25th November 2019.

Oxygen was recorded at concentrations between 18.8% and 19.7% v/v across the monitoring period.

No concentrations of methane, carbon monoxide, hydrogen sulphide or VOCs were recorded above instrument detection level.

No positive gas flow was recovered above instrument detection level (0.1lh) during the monitoring period.

To characterise the gas regime for the site the hazardous gas flow rate has been calculated based on the guidance presented in the "BS 8485:2015, Code of practice for the characterisation and remediation from soil-gas in affected developments". The hazardous gas flow rate (Q_{hg}) was calculated using Equation 1:

$$Q_{hg} = (C_{hg}/100) * q$$

Equation 1

Where:

C_{hg} is the measured hazardous gas concentration (in percentage volume-by-volume).

q is the flow rate in litres per hour of combined gases found by direct measurement.

As part of the assessment, the hazardous gas flow rate (Q_{hg}) was calculated for the highest, average, lowest and worst-case readings for carbon dioxide for each monitoring location using Equation 1, with the highest associated flow rate (0.1/h), thus reflecting the degree of conservatism adopted.

The results of the analysis are tabulated in Table 6.4 and Table 6.5.

Table 6.3 WS1 Hazardous Gas Flow Rates

Trial Hole: WS1		C_{hg}	Adopted Flow (l/hr)	Q_{hg}	Characteristic Situation BS8485 & C665
Carbon dioxide	Highest	2.3	0.1	0.0023	CSI
	Average	1.5	0.1	0.0015	CSI
	Lowest	1.1	0.1	0.0011	CSI
	Worst Case	2.3	0.1	0.0023	CSI

Notes: Methane was not recorded above instrument detection.

Table 6.4 WS4 Hazardous Gas Flow Rates

Trial Hole: WS4		C_{hg}	Adopted Flow (l/hr)	Q_{hg}	Characteristic Situation BS8485 & C665
Carbon dioxide	Highest	2.3	0.1	0.0023	CS1
	Average	1.4	0.1	0.0014	CS1
	Lowest	0.9	0.1	0.0009	CS1
	Worst Case	2.3	0.1	0.0023	CS1

Notes: Methane was not recorded above instrument detection.

The generated worst case site specific Gas Screening Value based on Site Characteristic hazardous gas flow rate (Q_{hg}) of 0.0023l/h for carbon dioxide showed the site to fall into Characteristic Gas Situation 1 (CS1) (very low risk), indicating no soil gas protection measures are required for the development.

6.5 Tier 1 Quantitative Risk Assessment

Quantitative risk assessments are undertaken for the soil, groundwater and soil gas. The CSM has been updated to take account of the assessments below and presented in Appendix C.1. The full laboratory chemical report is presented in Appendix D.2.

6.5.1 Soils

None of the samples tested showed concentrations in excess of the relevant screening values for a commercial land-use scenario.

The Tier 1 Quantitative risk assessment therefore established that there was **no risk to the human health receptors** of future end-users.

6.5.2 Groundwater

Chemical analysis of groundwater samples lay outside the scope of this investigation. Groundwater samples may be obtained from the monitoring wells installed onsite should this be required. Given marginally elevated PAH and TPH recorded within soil chemical analysis results, chemical analysis of groundwater samples, where encountered, is recommended to quantify risk to underlying groundwater resource.

6.5.3 Soil Gas

The Preliminary Investigation Report identified a low risk of soil gas associated with significant thickness Made Ground underlying the site.

Given the low gas generation potential of the source and the low sensitivity of the development (commercial), a total of four gas monitoring rounds were undertaken between 25th November and 16th December 2019, in-line with current guidance.

An assessment of the sites gassing regime has been undertaken based on the four monitoring visits undertaken, outlined in Section 6.4. In accordance with

BS8485:2015, CS1 (very low risk) was identified, which does not require gas protection measures to be adopted.

6.6 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust is generated as a result of construction activities. The site should be securely fenced at all times to prevent unauthorised access.

Washing facilities should be provided and eating restricted to mess huts.

6.7 Excavated Material

Excavated material as waste must be defined or classified prior to any disposal, transport, recycling or re-use at or by an appropriately licensed or exempt carrier and/or off-site disposal facility. The requirements inherent in both Duty of Care and Health and Safety must also be complied with. In order to determine what is to happen, what is suitable, appropriate and most effective in the disposal of wastes, especially those subject to CDM waste management plan requirements, several factors must be considered and competent advice should always be sought.

The amount, type and nature of the material to be removed will in part determine the amount and type of analysis that may be required to comply with current waste guidance, and thereby allow a competent person to suitably classify the material. Often this data is uncertain or unavailable, especially in the early stages of a project, and therefore further investigation, testing and analysis may be required as additional information regarding the development becomes available.

Wastes must be classified and defined by their solid characteristics to comply with current waste guidance. Existing information and analysis derived for environmental purposes may therefore be suitable for use in this context. Waste Acceptance Criteria (WAC) report the leachability of materials and therefore cannot be used to classify, characterise or define wastes. The only purpose of a WAC analysis is to determine the suitability of a given material for acceptance at one of the three different types of available licenced landfills (inert, stable non-reactive hazardous or hazardous).

Other options are available that may lead to significant savings against disposal to landfill and expert advice should always be sought from a competent person to advise on their relative costs or benefits and advise on any additional analysis, sampling or investigation that may be required to reduce remaining uncertainties and comply with current guidance. Further consideration of results using HazWasteOnline™ can be undertaken

on request to give an indication of potentially hazardous properties in the materials analysed.

6.8 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

Under the EPR, material that is contaminated but otherwise suitable for re-use is also classified as waste and its re-use should be in accordance with the Environmental Permitting Regulations 2007 (EPR). Environmental Permit Exemptions (EPE) are for the re-use of non-hazardous or inert waste only; hazardous waste cannot be re-used under a permit exemption. EPE apply only to imported inert waste materials; inert material arising on site and recovered on site is not classified as waste and does not require an exemption. It is possible that materials arising on-site will be classified as inert and would not need an exemption.

Environmental Permit Exemptions are only allowed for certain activities, placing controls on the quantities that can be stored and re-used. The re-use of waste shall be within areas and levels defined in planning applications and permissions for the development. An EPE requires a site-specific risk assessment for the receptor site to demonstrate that the materials are suitable for use, i.e. that they will not give rise to harm to human health or pollution of the environment.

Under the CL:AIRE voluntary code of practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within the site.

Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

Should it be necessary to import materials from another site where materials are excavated and which is not material from a quarry or produced under a WRAP protocol, then an EPE would be necessary for the imported material whether the work was managed under the CoP or the EPR.

6.9 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with

specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

6.10 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

Care should be taken during excavation works especially to investigate any soils, which appear by eye (e.g. such as fibrous materials, large amounts of ash and unusual discolouration), odour (e.g. fuel, oil and chemical type odours or unusual odours such as sweet odours or fishy odours) or wellbeing (e.g. light headedness and/or nausea, burning of nasal passages and blistering or reddening of skin due to contact with soil) to be contaminated or of unusual and/or different character to standard soils or those analysed.

In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded and the Local Authority, and a competent and appropriate third party Engineer/Environmental consultant notified immediately. An approval from the Local authority must be sought prior to implementing any proposed mitigation action.

The discovery strategy must remain on site at all times and must demonstrate a clear allocation of responsibility for reporting and dealing with contamination. A copy of the strategy must be placed on the health and safety notice board and /or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy.

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Appendix D Information Provided by the Client

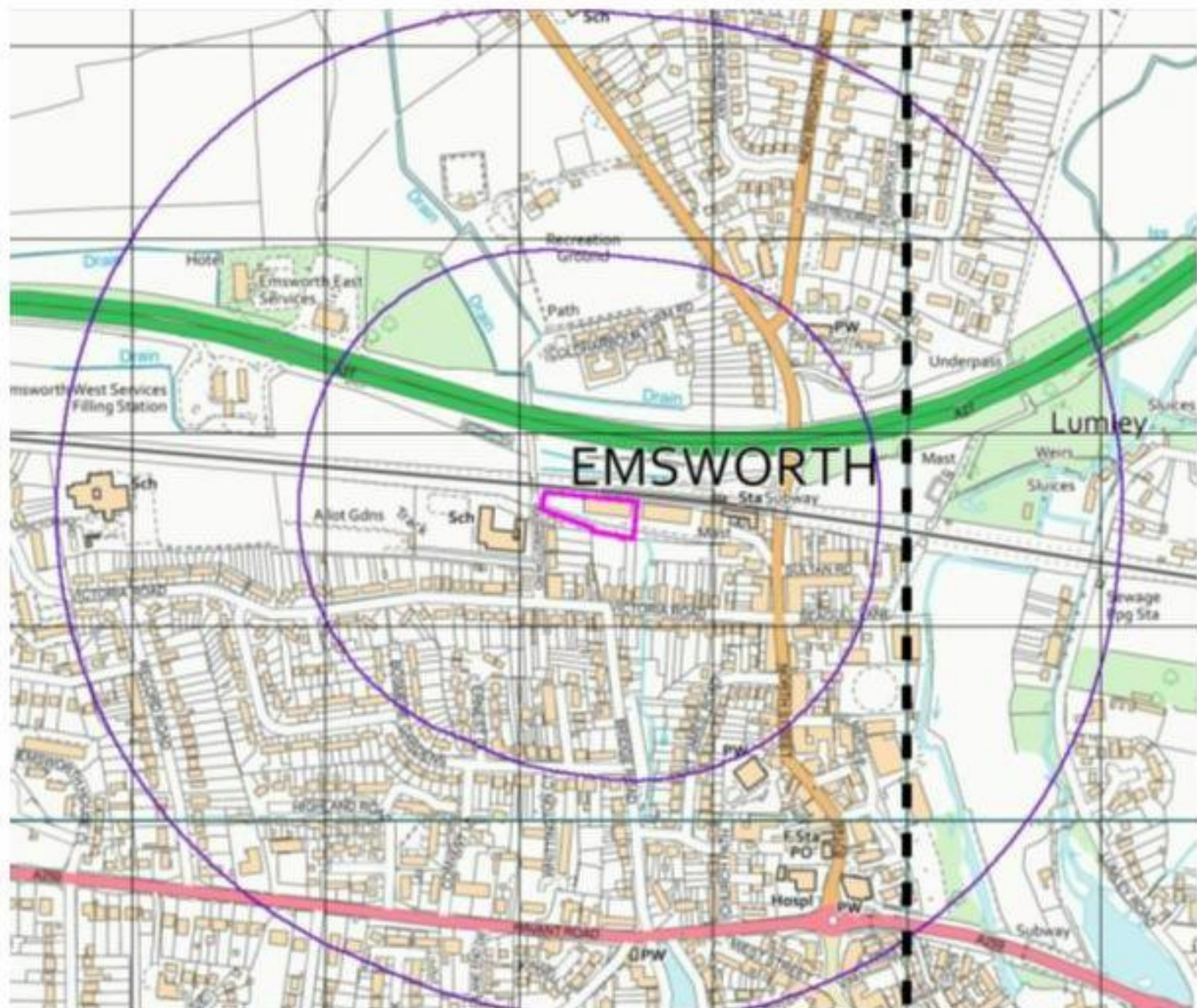


Figure 1 – Site Location Map



Job Number
17974

Client
Racquet Sports Group

Project
Warehouse Extension, Unit 3, Station Approach,
North Street, Emsworth, Hampshire PO10 7PW

Date
December 2019



Figure 2 – Aerial Photograph

Project

Warehouse Extension, Unit 3,
Station Approach, North Street,
Emsworth, Hampshire PO10 7PW

Client

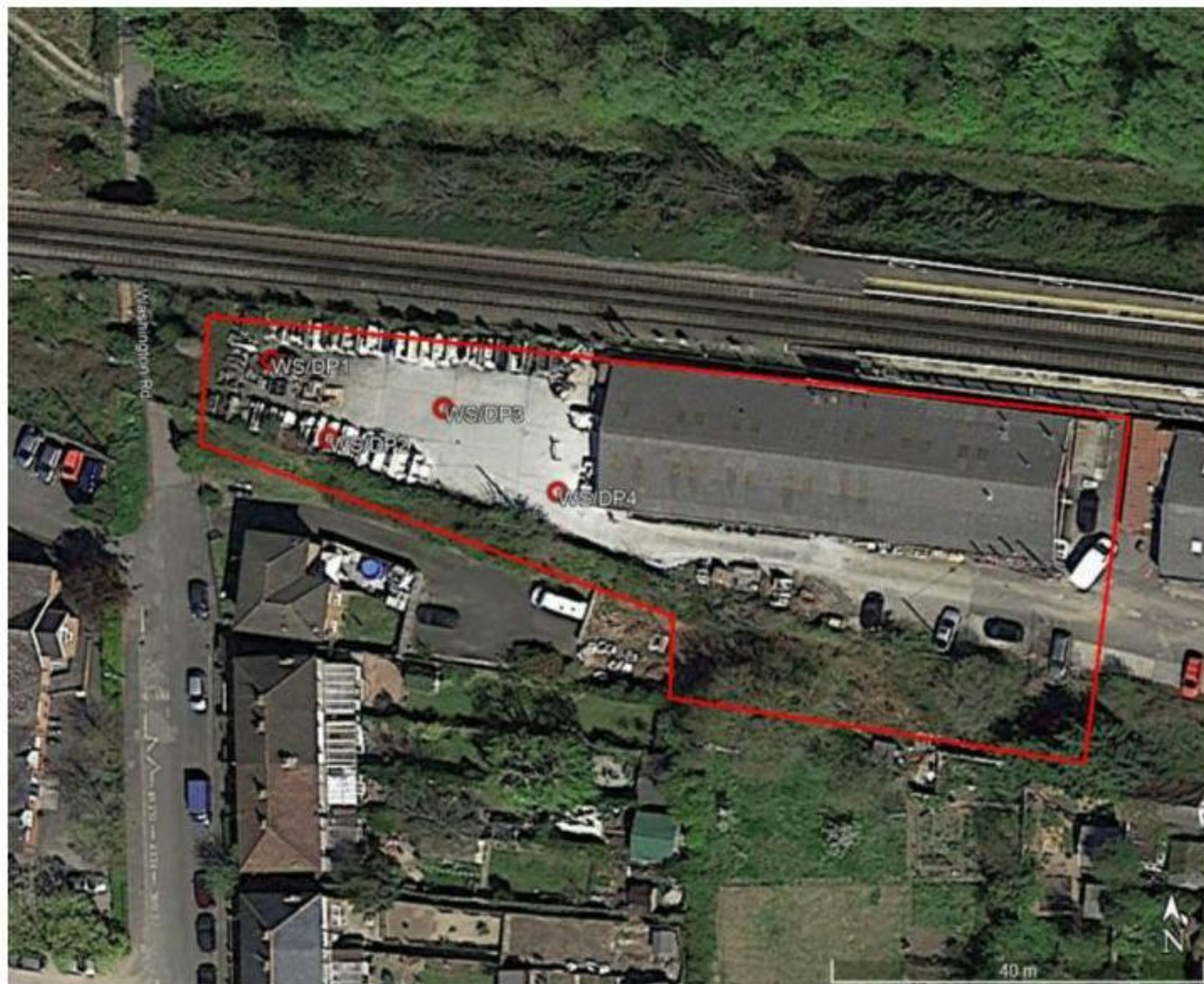
Racquet Sports Group

Date

December 2019

Job Number

17974

**Figure 3 – Trial Hole Plan****Project**

Warehouse Extension, Unit 3,
Station Approach, North Street,
Emsworth, Hampshire PO10 7PW

Client

Racquet Sports Group

Date

December 2019

Job Number

17974

Appendix A Field Work

Appendix A.1 Engineers Logs

	Contract Name: Warehouse Extension, Unit 3			Client: Racquet Sports Group Ltd.			Hole ID: WS1							
	Contract Number: 17974		Start and End Date: 18-11-19		Logged By: DW		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 20-12-2019		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.20	ES			0.17		From driller's logs: CONCRETE CORE.								
				0.40		Dark brown and black mottled, slightly silty, sandy GRAVEL. Gravel is angular to rounded, fine to coarse clinker and ash with rare flint. MADE GROUND.								
0.50	ES			0.60		Dark brown and white mottled, slightly clayey, sandy GRAVEL. Gravel is angular to rounded, fine to coarse flint, chalk and clinker. MADE GROUND.								
0.70	ES			(0.80)		Slightly greyish brown and black mottled, white, slightly silty, slightly clayey GRAVEL. Gravel is angular to rounded, fine to coarse chalk and rare flint and clinker. Black stained clay pockets from 0.6 - 0.75m bgl (odourless). MADE GROUND.								
1.30	ES			1.40		Firm, brown, slightly sandy, slightly sandy, very gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse chalk, flint and clinker. Band of chalk from 1.7 - 1.8m bgl. Occasional rootlets. MADE GROUND.								
1.50	ES			(0.60)										
				2.00		Orangish brown mottled, yellowish brown, slightly sandy silty CLAY. Occasional angular to rounded, fine to coarse flint and rare ironstone gravel. Rare rootlets. HEAD								
2.20	D ES			(1.00)										
2.70	D			3.00		Orangish brown mottled, greyish brown, slightly sandy silty CLAY. Occasional angular to rounded, fine to medium flint and rare fine ironstone gravel. HEAD								
3.10	D			(0.50)										
3.60	D ES			3.50		Black speckled and green mottled, greyish brown, slightly sandy silty CLAY. Occasional angular to rounded, fine to medium flint and rare fine ironstone gravel. Mild odour of decomposition. HEAD								
3.70	ES			(0.50)										
				4.00		End of Borehole at 4.00m								
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 2.5m bgl.					
Chiselling				Installation				Water Strikes						
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	33				0	0.00	No groundwater strikes recorded
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PiD reported in ppm.														

Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details				Groundwater						
Depth	Type	Results	Level (m AOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill Installation			
				0.17		From driller's logs: CONCRETE CORE.								
0.30	ES			(0.53)		Black, slightly silty, sandy GRAVEL. Gravel is angular to rounded, fine to coarse clinker and ash with rare flint, pottery, burnt shale, slag and ceramics. MADE GROUND.								
0.50	ES			0.70		Black and brown mottled, slightly clayey gravelly SAND. Gravel is angular to rounded, fine to coarse flint, clinker, ash, and brick. MADE GROUND.								
0.80	ES			(0.80)						1				
1.40	ES			1.50		Greyish brown, green and brown mottled, slightly clayey, very gravelly SAND. Gravel is angular to rounded, fine to coarse flint, clinker and rare brick. Occasional rootlets. Occasional brown clay pockets. Occasional black staining. MADE GROUND.								
1.60	D ES			(0.40)										
2.10	D ES			1.90		Brown, black and dark grey mottled, slightly sandy silty CLAY. Occasional angular to sub-angular, fine to coarse flint, brick, and tarmac gravel. Strong bitumen odour with tarmac gravel. MADE GROUND.				2				
				(0.70)										
2.70	D ES			2.60		Firm, black speckled greyish brown, slightly sandy silty CLAY. Occasional angular to rounded, fine to medium flint gravel. Rare rootlets. Very rare sub-angular fine to medium clinker gravel above 3.5m bgl. Mild odour of decomposition. Blue mottling at 2.7m bgl. MADE GROUND.				3				
3.30	D ES			(1.40)										
3.80	D ES			4.00		End of Borehole at 4.00m				4				
										5				
										6				
										7				
										8				
										9				
										10				
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 2.7m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater strikes recorded
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No rootlets observed.					
										Water Strikes				
Chiselling					Installation				Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)				0	0.00	No groundwater strikes recorded
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Warehouse Extension, Unit 3			Client: Racquet Sports Group Ltd.			Hole ID: WS4							
	Contract Number: 17974		Start and End Date: 18-11-19		Logged By: DW		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 20-12-2019		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOO)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.20	ES			0.15		From driller's logs: CONCRETE CORE.								
0.50	ES			(0.35)		Red, slightly silty, slightly sandy GRAVEL AND COBBLES. Gravel and cobbles are angular to sub-angular, fine to coarse brick, with rare flint and clinker. MADE GROUND.								
0.80	D			0.50		Multicoloured mottled, slightly clayey sandy GRAVEL. Gravel is angular to sub-angular, fine to coarse chalk, brick, flint, clinker and ash. Occasional clayey pockets. Hydrocarbon odour at 0.6m bgl with black staining. MADE GROUND.						1		
ES				(0.70)		Brown, slightly silty, gravelly SAND/sandy CLAY. Gravel is angular to rounded, fine to coarse flint, with rarer brick and clinker. MADE GROUND.								
1.40	D			1.40		Soft, slightly black mottled, yellowish brown, slightly gravelly, slightly sandy, silty CLAY. Gravel is angular to sub-angular, fine to coarse flint with rarer clinker and brick. MADE GROUND.						2		
ES				(0.95)										
1.90	D			2.35		Black and yellowish brown mottled, slightly sandy, CLAYEY gravel. Gravel is angular to sub-angular, fine to coarse chalk, clinker flint and brick. Pockets of clinker at 1.4, 2.0, and 3.9 - 4.0m bgl. MADE GROUND.						3		
ES				(1.65)		Low permeability (10% to 30% - 4.0m bgl)								
2.40	D			4.00		End of Borehole at 4.00m						4		
ES														
2.50	D											5		
2.90	D											6		
ES												7		
3.70	D											8		
ES												9		
												10		
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No rootlets observed.					
Chiselling				Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	33				0	0.00	No groundwater strikes recorded
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PiD reported in ppm.														

Appendix B Geotechnical In-Situ and Laboratory Testing

Appendix B.1 Classification

Classification based on SPT "N" values:

The inferred undrained strength of the cohesive soils was based on the SPT "N" blow counts, derived from the relationship suggested by Stroud (1974) and classified using Table B.1.1. (Ref: Stroud, M. A. 1974, "The Standard Penetration Test – its application and interpretation", Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.).

Table B.1.1 SPT "N" Blow Count Cohesive Classification

Classification	Undrained Cohesive Strength C_u (kPa)
Extremely low	<10
Very low	10 – 20
Low	20 – 40
Medium	40 – 75
High	75 – 150
Very high	150 – 300
Extremely high	> 300

Note: (Ref: BS EN ISO 14688-2:2004+A1:2013 Clause 5.3.)

The relative density of granular soils was classified based of the relationship given in Table B.1.2.

The *UK National Annex to Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing, NA 3.7 SPT test, BS EN 1997-2:2007, Annex F* states "Relative density descriptions on borehole records should also be based on uncorrected SPT N values, unless significantly disturbed, using the density classification in BS 5930:2015, Table 7.

Table B.1.2 SPT "N" Blow Count Granular Classification

Classification	SPT "N" blow count (blows/300mm)
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	Greater than 50

Note: (Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

Appendix B.2 Interpretation

Table B.2.1 Interpretation of DPSH Blow Counts

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DP1	MG 0.20 – 1.40 GRAVEL	15 – 35	Medium dense to dense
	MG 1.40 – 2.00 Gravelly CLAY	11 – 19	Medium to high ($C_u = 55 - 95\text{kPa}$)
	HEAD ¹ 2.00 – 4.20 Gravelly CLAY	4 – 7	Low ($C_u = 20 - 35\text{kPa}$)
	HEAD ¹ 4.20 – 5.20 CLAY	11 – 19	Medium to high ($C_u = 55 - 95\text{kPa}$)
DP2	MG 0.20 – 1.90 Gravelly SAND	4	Very loose
	MG 1.90 – 3.30 Gravelly CLAY	4	Very low ($C_u = <20\text{kPa}$)
	MG ¹ 3.30 – 4.20 Gravelly CLAY	4 – 7	Low ($C_u = 20 - 35\text{kPa}$)
	HEAD ¹ 4.20 – 6.00 CLAY	11 – 22	Medium to high ($C_u = 55 - 110\text{kPa}$)
DP3	MG 0.20 – 0.70 GRAVEL	15 – 18	Medium dense
	MG 0.70 – 2.50 Gravelly CLAY	<1	Extremely low ($C_u = <10\text{kPa}$)
	MG ¹ 2.50 – 4.80 Gravelly CLAY	4	Very low ($C_u = <20\text{kPa}$)
	HEAD ¹ 4.80 – 6.00 CLAY	11 – 19	Medium to high ($C_u = 55 - 95\text{kPa}$)
DP4	MG 0.20 – 1.40 GRAVEL	4 – 11	Loose to medium dense
	MG ¹ 1.40 – 5.00 Gravelly CLAY	4 – 7	Low ($C_u = 20 - 35\text{kPa}$)
	HEAD ¹ 5.00 – 6.00 Gravelly CLAY	7	Low ($C_u = 35\text{kPa}$)

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
----	--------	--------------------------------------	---

Note: ¹ Ground conditions inferred past the base of windowless sampler boreholes. Rig efficiency: 78.58%

Table B.2.2 Interpretation of Atterberg Limit Tests

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential BRE	NHBC
HEAD	18 - 24	20 - 26	90 - 75	18 - 20	CI	Low	Low

Note: BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)

NHBC Volume Change Potential refers to NHBC Standards Chapter 4.2

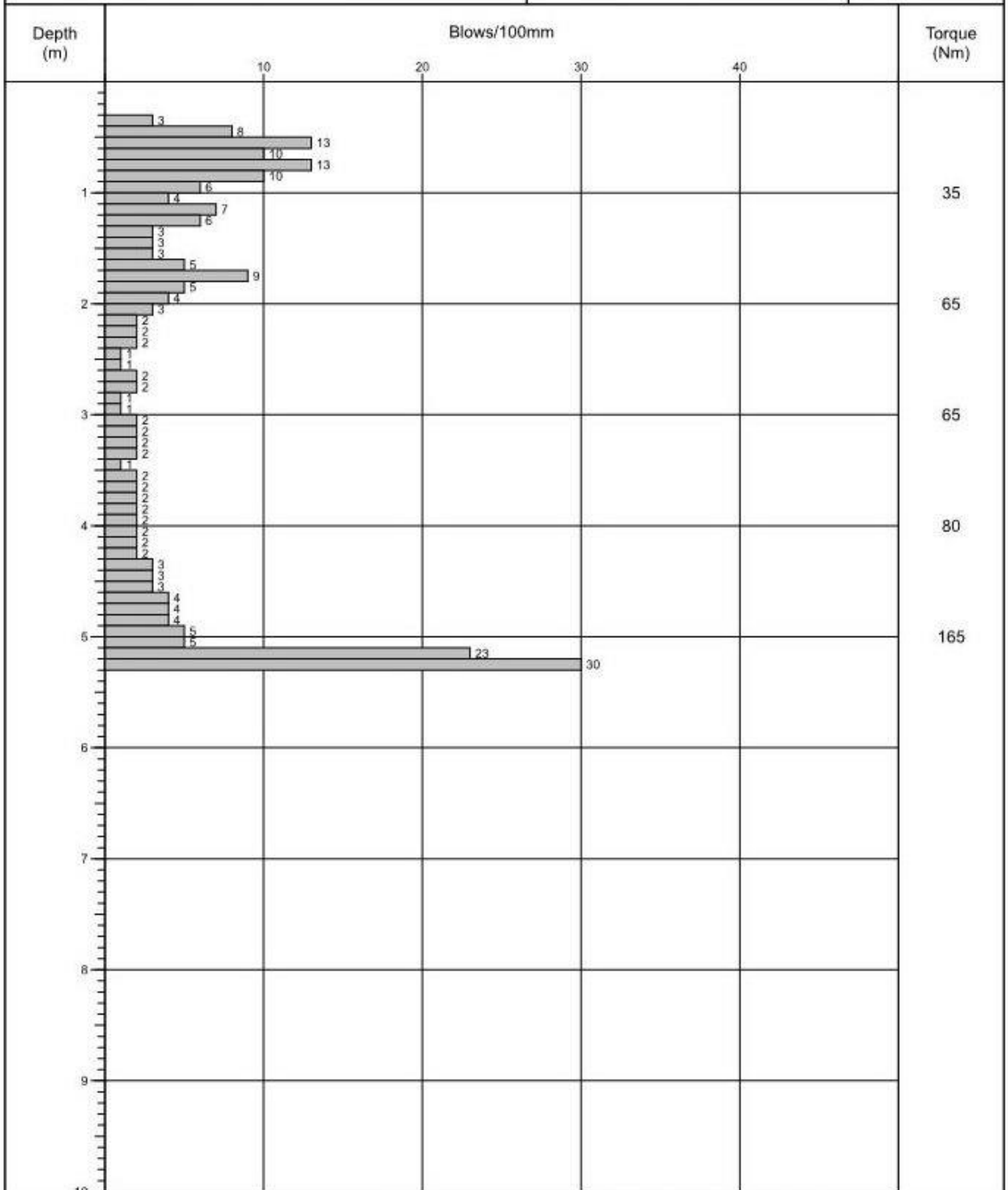
Soils Classification based on British Soil Classification System

The most common use of the term clay is to describe a soil that contains enough clay-sized material or clay minerals to exhibit cohesive properties. The fraction of clay-sized material required varies, but can be as low as 15%. Unless stated otherwise, this is the sense used in Digest 240. The term can be used to denote the clay minerals. These are specific, naturally occurring chemical compounds, predominately silicates. The term is often used as a particle size descriptor. Soil particles that have a nominal diameter of less than 2 µm are normally considered to be of clay size, but they are not necessarily clay minerals. Some clay minerals are larger than 2 µm and some particles, 'rock flour' for example, can be finer than 2 µm but are not clay minerals.

(The Atterberg Limit Tests were undertaken in accordance with BS 1377:Part 2:1990 Clauses 3.2, 4.3 and 5)

Appendix B.3 Geotechnical In-Situ and Laboratory Results

Project Name:	Warehouse Extension, Unit 3	Project No.	17974	Co-ords:		Hole Type	DP
Location:	Station Approach, North Street, Emsworth, Hampshire PO10 7PW	Level:	m AOD			Scale	1:50
Client:	Racquet Sports Group Ltd.	Dates:	18-11-2019			Logged By	



Remarks	Fall Height	750mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	5.2m
	Probe Type	DPSH-B	Energy Ratio (Er)	78.58%

Project Name:	Warehouse Extension, Unit 3	Project No.	17974	Co-ords:		Hole Type	DP
Location:	Station Approach, North Street, Emsworth, Hampshire PO10 7PW	Level:	m AOD			Scale	1:50
Client:	Racquet Sports Group Ltd.	Dates:	18-11-2019			Logged By	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0.0					5
0.1					
0.2					
0.3					
0.4					
0.5					
0.6					
0.7					
0.8					
0.9					
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					35
3.1					
3.2					
3.3					
3.4					
3.5					
3.6					
3.7					
3.8					
3.9					
4.0					75
4.1					
4.2					
4.3					
4.4					
4.5					
4.6					
4.7					
4.8					
4.9					
5.0					135
5.1					
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
6.0					
6.1					
6.2					
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7.0					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8.0					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9.0					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10.0					

Remarks	Fall Height	750mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	78.58%

Project Name:	Warehouse Extension, Unit 3	Project No.	17974	Co-ords:		Hole Type	DP
Location:	Station Approach, North Street, Emsworth, Hampshire PO10 7PW	Level:	m AOD			Scale	1:50
Client:	Racquet Sports Group Ltd.	Dates:	18-11-2019			Logged By	

Depth (m)	Blows/100mm	Torque (Nm)
0.0	12	5
0.1	5	
0.2	5	
0.3	5	
0.4	4	
0.5	2	
0.6	1	
0.7	1	
0.8	1	
0.9	1	
1.0	1	
1.1		
1.2		
1.3		
1.4		
1.5		
1.6		
1.7		
1.8		
1.9		
2.0		15
2.1		
2.2		
2.3		
2.4		
2.5		
2.6		
2.7		
2.8		
2.9		
3.0		20
3.1		
3.2		
3.3		
3.4		
3.5		
3.6		
3.7		
3.8		
3.9		
4.0	2	52
4.1	2	
4.2		
4.3		
4.4		
4.5		
4.6		
4.7		
4.8		
4.9		
5.0		
5.1	2	
5.2	3	
5.3	4	65
5.4		
5.5		
5.6	5	
5.7		
5.8		
5.9		
6.0		
6.1	4	
6.2	5	
6.3	5	160
6.4	5	
6.5		
6.6		
6.7		
6.8		
6.9		
7.0		
7.1		
7.2		
7.3		
7.4		
7.5		
7.6		
7.7		
7.8		
7.9		
8.0		
8.1		
8.2		
8.3		
8.4		
8.5		
8.6		
8.7		
8.8		
8.9		
9.0		
9.1		
9.2		
9.3		
9.4		
9.5		
9.6		
9.7		
9.8		
9.9		
10.0		

Remarks	Fall Height	750mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	78.58%

Project Name:	Warehouse Extension, Unit 3	Project No.	17974	Co-ords:		Hole Type	DP
Location:	Station Approach, North Street, Emsworth, Hampshire PO10 7PW	Level:	m AOD			Scale	1:50
Client:	Racquet Sports Group Ltd.	Dates:	18-11-2019			Logged By	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
0.5					
1					10
1.5					
2					50
2.5					
3					45
3.5					
4					55
4.5					
5					55
5.5					
6					60
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10					

Remarks	Fall Height	750mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	78.58%



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Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 46737

Client Ref: **17974**Report Date: **28-11-2019**Client PO: **17974**

Client **Soils Limited**
Thomas Telford House
Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Contract Title: **Unit 3 Emsworth (Warehouse Extension)**
 For the attention of: **Tim Rudkin**

Date Received: **25-11-2019**Date Completed: **28-11-2019**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	2
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	2
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

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

Approved Signatories:

Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)

Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - 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

NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)

Contract Number

46737

Project Location

Unit 3 Emsworth (Warehouse Extension)

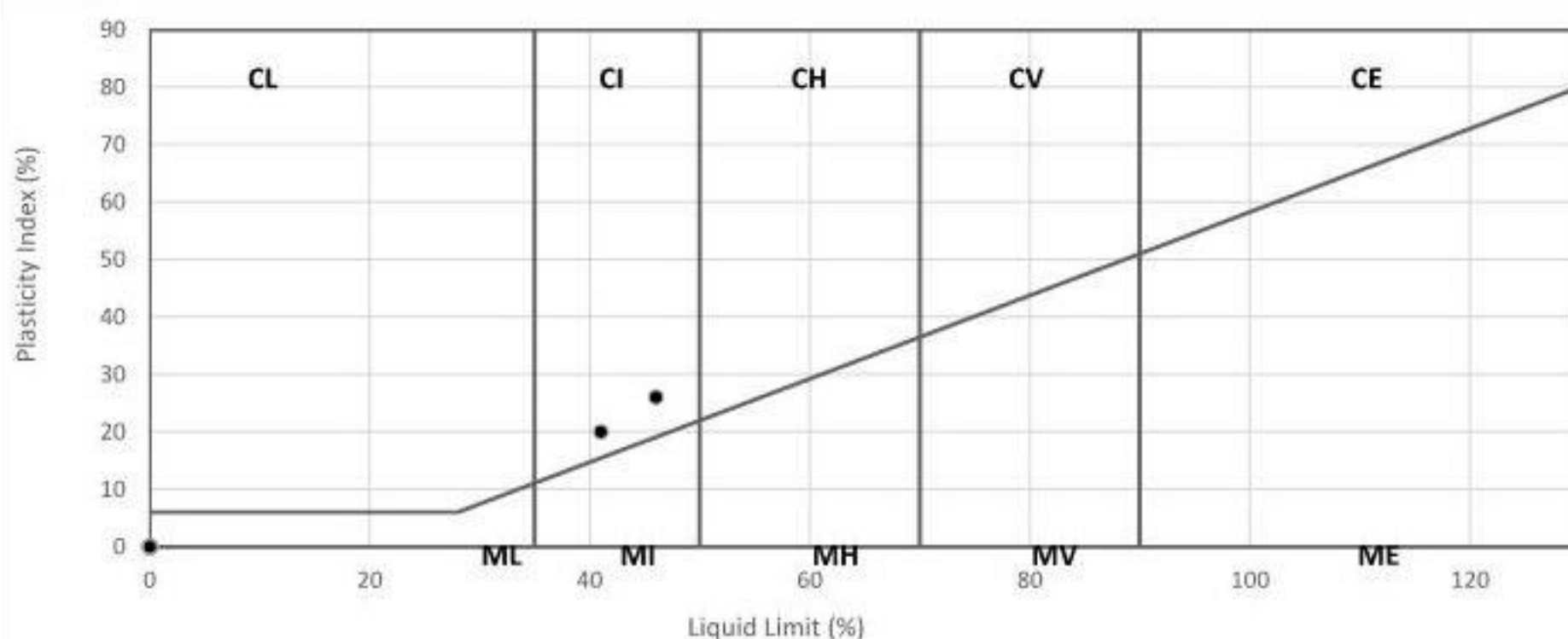
Date Tested

27/11/2019

[illegible]

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

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



Operators	Checked	28/11/2019	Wayne Honey (Administrative/Quality Assistant)
Darren Bourne	Approved	28/11/2019	Paul Evans (Quality/Technical Manager)

Tim Rudkin
Soils Ltd
Unit 11
Sun Valley Business Park
Winnall Close
Winchester
Hampshire
SO23 0LB

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

e: tr@soilslimited.co.uk

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

Analytical Report Number : 19-73500

Project / Site name:	Unit 3 Emsworth - Warehouse Extension	Samples received on:	25/11/2019
Your job number:	17974	Samples instructed on:	25/11/2019
Your order number:	17974	Analysis completed by:	29/11/2019
Report Issue Number:	1	Report issued on:	29/11/2019
Samples Analysed:	6 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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



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Environmental Science

Analytical Report Number: 19-73500

Project / Site name: Unit 3 Emsworth - Warehouse Extension

Your Order No: 17974

Lab Sample Number				1370480	1370481	1370482	1370483	1370484
Sample Reference				WS1	WS2	WS2	WS3	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.70	0.80	2.70	0.80	1.90
Date Sampled				28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	16	17	2.5	18
Total mass of sample received	kg	0.001	NONE	0.60	0.90	0.40	0.70	0.60

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0	8.2	8.1	8.7	8.3
Total Sulphate as SO ₄	%	0.005	MCERTS	0.028	-	-	0.034	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.012	0.012	0.035	0.017
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.2	-	-	35.4	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.1	-	-	2.6	-
Total Sulphur	%	0.005	MCERTS	0.015	-	-	0.054	-
Ammonium as NH ₄	mg/kg	0.5	MCERTS	< 0.5	-	-	< 0.5	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	-	-	< 2.0	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	5.7	-	-	15	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	2.9	-	-	7.5	-



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Environmental Science

Analytical Report Number: 19-73500

Project / Site name: Unit 3 Emsworth - Warehouse Extension

Your Order No: 17974

Lab Sample Number				1370485				
Sample Reference				WS3				
Sample Number				None Supplied				
Depth (m)				2.70				
Date Sampled				28/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	16				
Total mass of sample received	kg	0.001	NONE	0.40				

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5				
Total Sulphate as SO ₄	%	0.005	MCERTS	-				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.034				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-				
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-				
Total Sulphur	%	0.005	MCERTS	-				
Ammonium as NH ₄	mg/kg	0.5	MCERTS	-				
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-				
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-				

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	-				
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-				



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**Analytical Report Number : 19-73500****Project / Site name: Unit 3 Emsworth - Warehouse Extension**

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1370480	WS1	None Supplied	2.70	Brown loam and clay with gravel.
1370481	WS2	None Supplied	0.80	Brown loam and clay with gravel.
1370482	WS2	None Supplied	2.70	Brown loam and clay with gravel.
1370483	WS3	None Supplied	0.80	Brown loam and clay with gravel.
1370484	WS3	None Supplied	1.90	Brown loam and clay with gravel.
1370485	WS3	None Supplied	2.70	Brown loam and clay with gravel and chalk.



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Environmental Science

Analytical Report Number : 19-73500

Project / Site name: Unit 3 Emsworth - Warehouse Extension

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 extraction.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 °C)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests**	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006: Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Appendix C Chemical Laboratory Testing

Appendix C.1 Conceptual Site Model

Table C.I.1 CSM Revised Post Testing

Source	Identified Contaminant	Exposure Pathway	Receptor	Initial Assessment from Preliminary Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Made Ground – Embankment and former sidings Onsite source of potential contamination	Soil gas	Inhalation of Vapour/gases	Site Workers/Site Maintenance	Minor	Unlikely	Very low	Soil chemical analysis undertaken on samples of Made Ground did not record concentrations in exceedance of relevant screening values for commercial end-use scenario.	No remedial measures necessary with respect to protection of human health of end-users. Contractors to make their own risk assessments in line with CDM.
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
	None	Migration via surface runoff	Surface Water	Minor	None	None	Following CIRIA 665 guidance, four soil gas rounds were undertaken across a period of approximately four weeks. Sites gassing regime established as CSI, for which no gas protection measures are required in design.	Soil gas risk assessment identified sites gassing regime as CSI
			Surface Water	Minor	None	None		
		Migration in solution via groundwater	Shallow Aquifer	Minor	Unlikely	Very low		
			Deep Aquifer	Minor	None	None		
			Buried structures	Minor	Low	Very low		
			Buried Services	Minor	Low	Very low		
	Soil gas	Migration of gases via permeable soils	Site Workers/Site Maintenance	Minor	Unlikely	Very low		
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
			Building and confined spaces	Minor	Unlikely	Very low		
Builders Yard/Works On-site historic and current site usage	Soil gas	Inhalation of Vapour/gases	Site Workers/Site Maintenance	Minor	Unlikely	Very low	Soil chemical analysis undertaken on samples of Made Ground did not record concentrations in exceedance of relevant screening values for commercial end-use scenario.	No remedial measures necessary with respect to protection of human health of end-users. Contractors to make their own risk assessments in line with CDM.
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
	None	Migration via surface runoff	Surface Water	Minor	None	None	Following CIRIA 665 guidance, four soil gas rounds were undertaken across a period of approximately four weeks. Sites gassing regime established as CSI, for which no gas protection measures are required in design	Soil gas risk assessment identified sites gassing regime as CSI
			Surface Water	Minor	None	None		
		Migration in solution via groundwater	Shallow Aquifer	Minor	Unlikely	Very low		
			Deep Aquifer	Minor	None	None		
			Buried structures	Minor	Low	Very low		
			Buried Services	Minor	Low	Very low		
	Soil gas	Migration of gases via permeable soils	Site Workers/Site Maintenance	Minor	Unlikely	Very low		
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
			Building and confined spaces	Minor	Unlikely	Very low		

Appendix C.2 Chemical Laboratory Results

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Analytical Report Number : 19-73496

Project / Site name:	Unit 3 Emsworth - Warehouse Extension	Samples received on:	25/11/2019
Your job number:	17974	Samples instructed on:	25/11/2019
Your order number:	17974	Analysis completed by:	02/12/2019
Report Issue Number:	1	Report issued on:	03/12/2019
Samples Analysed:	5 soil samples		

Signed:



Karolina Marek
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

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

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

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

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

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



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Environmental Science

Analytical Report Number: 19-73496

Project / Site name: Unit 3 Emsworth - Warehouse Extension

Your Order No: 17974

Lab Sample Number	1370457	1370458	1370459	1370460	1370461
Sample Reference	WS1	WS3	WS3	WS3	WS4
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.50	0.50	1.40	3.20	0.50
Date Sampled	18/11/2019	18/11/2019	18/11/2019	18/11/2019	18/11/2019
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	6.9	11
Total mass of sample received	kg	0.001	NONE	0.90	0.90

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.3	8.2	8.2	8.4
Organic Matter	%	0.1	MCERTS	0.6	4.1	2.4	2.6	2.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-------	-------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.56	0.24	< 0.05	0.51
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.64
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.27	< 0.05	< 0.05	0.80
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.22	< 0.05	< 0.05	0.54
Phenanthrene	mg/kg	0.05	MCERTS	0.45	4.3	0.88	1.3	10
Anthracene	mg/kg	0.05	MCERTS	0.16	1.1	0.20	0.28	4.0
Fluoranthene	mg/kg	0.05	MCERTS	1.8	10	2.0	4.0	54
Pyrene	mg/kg	0.05	MCERTS	1.9	9.2	2.0	3.7	52
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.4	5.9	1.3	3.3	41
Chrysene	mg/kg	0.05	MCERTS	1.4	5.6	1.5	2.4	29
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.8	6.1	1.3	2.8	37
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.0	2.9	1.2	2.3	26
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.4	5.6	1.3	3.2	42
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.56	2.1	0.48	1.0	14
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.16	0.45	< 0.05	< 0.05	3.2
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.79	2.3	0.58	1.2	16

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	13.0	56.8	12.9	25.5	332
-----------------------------	-------	-----	--------	------	------	------	------	-----

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.3	18	26	19	9.0
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.8	1.6	1.6	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.1	< 0.2	0.4	0.3	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	24	25	61	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	51	92	120	35	40
Lead (aqua regia extractable)	mg/kg	1	MCERTS	45	66	360	92	52
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	1.7	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	22	25	48	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	21	45	39	36	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	180	180	75	61

Petroleum Hydrocarbons

TPH Texas (C6 - C8)	mg/kg	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	2.0
TPH Texas (C12 - C16)	mg/kg	4	MCERTS	< 4.0	8.3	< 4.0	< 4.0	34
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	15	50	< 10	13	190
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	30	99	25	33	640
TPH Texas (C6 - C40)	mg/kg	10	NONE	45	160	25	46	860

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

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**Analytical Report Number : 19-73496****Project / Site name: Unit 3 Emsworth - Warehouse Extension**

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1370457	WS1	None Supplied	0.50	Brown loam and clay with gravel.
1370458	WS3	None Supplied	0.50	Brown loam and clay with gravel.
1370459	WS3	None Supplied	1.40	Brown loam and clay with gravel.
1370460	WS3	None Supplied	3.20	Brown loam and clay with gravel.
1370461	WS4	None Supplied	0.50	Brown loam and clay with gravel and chalk.



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Environmental Science

Analytical Report Number : 19-73496

Project / Site name: Unit 3 Emsworth - Warehouse Extension

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH Texas (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Appendix C.3 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

1.1 Introduction

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC).

GAC are conservative values adopted to ensure that they are applicable to the majority of possible contaminated site. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC derived by a third party or the Environment Agency/ DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC to ensure that they are used appropriately. Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific values for relevant soil contaminants based on the site specific conditions.

1.2 General Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'.

1.2.1 Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

- EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
 - EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
 - EA CLEA Bulletin (2009).
 - CLEA software version 1.04 (2009)
 - Toxicological reports and SGV technical notes.
-

The CLEA guidance and tools:

1. do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures.
 2. do not cover risks to the environment, such as groundwater, ecosystems or buildings.
 3. do not provide a definitive test for telling when human health risks are significant.
 4. are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.
-

1.3 Soil Guideline Values (2009)

The EA are publishing a series of SGV reports for a selection of common contaminants relevant to the assessment of land contamination.

SGV's are generic assessment criteria based on CLEA standard land-uses and can be used to simplify the assessment of human health risks from long-term exposure to

chemical contamination in soil. They do not cover short-term exposure (i.e. construction and maintenance workers), acute exposure or other risks such as fire, suffocation or explosion, as might arise from an accumulation of gases such as methane and carbon dioxide, or either odour or aesthetic issues.

SGV's represent 'trigger values', indicators that soil concentrations above the SGV level may pose a possibility of *significant harm* to human health. The converse, where soil concentrations are less than the SGV, is that the long-term human health risks are considered to be tolerable or minimal.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

1.4 Ongoing development of CLEA based guidance

The EA is involved in a programme of publishing SGV's and related toxicity data (the TOX reports). As at July 2009 ten SGV's and matching TOX reports had been published. Soil Assessment Criteria (SAC's) may be derived using toxicity data from the updated TOX reports, where these are published, or from the original TOX reports. SGV reports also take account of recent updates for plant uptake and other factors.

-
- GAC's developed by CLEA guidance and given in this report will need to be assessed against updated TOX reports and SGV's when these are published.
 - SGV reports may give values that differ from the GAC's used in this report.
 - These variations may materially alter the remediation requirement for the site, requiring either an increase or decrease in the extent, type and cost of remediation.
-

1.5 Phytotoxicity

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

ICRCL 70/90: *Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing.*

1.6 Other Generic Assessment Criteria

If an SGV is not available for a substance identified in the soil then the range of Generic Assessment Criteria published from a collaborative research by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH) are used for example. In the case of Lead, Category 4 screening levels (C4SLs) have replaced the AtRisk Soil SSV.

1.6.1 EIC/AGS/CL: AIRE

The report represents the collaborative effort of risk assessors from 26 EIC and AGS member companies to produce generic assessment criteria (GAC) for soils for human health risk assessment. The project involved the collation and review of physico-chemical data, toxicological data and information on background

exposure for 44 contaminants sometimes encountered on land affected by contamination in the UK and the derivation of GAC for 351 of these using the CLEA model (v1.06). The GAC are intended to complement soil guideline values (SGV) produced by the Environment Agency of England and Wales and the 2nd edition GAC produced by LQM and CIEH (Nathanail et al, 2009). All three sets of assessment criteria have been derived in general accordance with the Environment Agency of England and Wales Contaminated Land Exposure Assessment (CLEA) guidance and thus the combined efforts of these three groups have resulted in a useful set of screening criteria for the assessment of risks to human health from soil contamination for more than 120 potentially contaminative substances.

1.6.2 Category 4 screening levels (C4SLs) (2014)

A new statutory DEFRA guidance recently (i.e. August 2014) published some GACs with a more pragmatic (but still strongly precautionary) approach in their derivation called the Category 4 screening levels (C4SLs). These values provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. They are intended as generic screening values, (ii) they describe a level of risk that whilst above 'minimal' is still 'low' and (iii) they provide a 'higher simple test' for deciding that land is suitable for use and definitely not contaminated. These values were derived for four generic land uses: residential, commercial, allotments, and public open space.

1.6.3 LQM/CIEH Suitable 4 Use Level (S4UL) (2015)

The new S4UL's ((Nathanail *et al*, 2015), was developed for around 85 substances and are intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants. The S4ULs were:

- based on Health Criteria Values, updated to reflect changes since 2009
- derived for the standard CLEA land uses and the two public open space scenarios developed by Defra SP1010
- developed for ca 85 substances (those previously covered by the LQM/CIEH GAC and the SGV substances);
- Compliant with SR2 and the long standing principle of 'suitable for use' and reflecting changes to exposure parameters produced by Defra SP1010.

For derivation of these Generic Assessment Criteria reference must be made to: Nathanail, P., McCaffrey, C., Ashmore, M., Cheng, Y., Gillet, A., Ogden, R., Scott, D. *The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (3rd edition)*. **Land Quality Press**. 2015.

1.7 Standard Land-use Scenarios

The standard land-use scenarios used to develop conceptual exposure models are presented in the following sections:

1.7.1 Residential

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure duration is six years.
 - Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
 - Building type is a two-storey small terraced house.
-

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur.

1.7.2 Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption.

Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure duration is six years.
 - Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
 - There is no building.
-

1.7.3 Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

-
- Critical receptor is a working female adult (aged 16 to 65 years old).
 - Exposure duration is a working lifetime of 49 years.
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
 - Building type is a three-storey office (pre 1970).
-

1.7.4 Public Open Space within Residential Area

The generic scenario refers to any grassed area 0.05 ha and that is close to Housing.

- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil
- Predominantly used by children for playing and may be used for activities such as a football kick about
- Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
- older children as the critical receptor on basis that they will use site most frequently (Age class 4-9)
- ingestion rate 75 mg.day^{-1}

1.7.5 Public Open Space Park

This generic scenario refers to any public park that is more than 0.5ha in area:

- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% cover)
- Female child age classes 1-6
- Soil ingestion rate of 50 mg.day^{-1}
- Occupancy period outdoors = 2 hours.day^{-1}
- Exposure frequency of $170 \text{ days.year}^{-1}$ for age classes 2-18 and 85
- days.year^{-1} for age class 1
- Outdoor exposure pathways only (no tracking back).

1.8 Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of an SGV/GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaking to develop site specific values for relevant soil contaminants.

- Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.
- Developing more accurate parameters using site data.

1.9 Current Criteria

Table 1 presents the current Generic Assessment Criteria and reference should be made to the original publications if needed.

1.10 Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) and Category 4 screening levels (C4SLs) (2014) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

The DEFRA discussion paper Assessing risks from land contamination – a proportionate approach ('the way forward') (CLAN06/2006) aimed to increase understanding of the role that statistics can play in quantifying the uncertainty attached to the estimates of the mean concentration of contaminants in soil. In direct response CL:AIRE/CIEH published a joint report, *Guidance in comparing soil contamination data with a critical concentration* (CL:AIRE/CIEH 2008). A software implementation of the statistical techniques given in the report was published by ESI International (2008).

Treatment of Hot-Spots

- A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
 - Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.
-

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5																6
Type	Contaminants	Species	Year	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Metals	Antimony		2010						550						7500							EIC/AGS/CL:AIRE	EIC/AGS/CL:AIRE	2010
	Arsenic		2014			37			40			49		640			79		168		C4SL	DEFRA	2014	
			2015			37			40			40		640			79		170		S4UL	LQM/CIEH	2015	
	Beryllium		2015			1.7			1.7			35		12			2.2		63		S4UL	LQM/CIEH	2015	
	Boron		2015			290			11000			45		240000			21000		46000		S4UL	LQM/CIEH	2015	
	Cadmium		2015			11			85			1.9		190			120		532		S4UL	LQM/CIEH	2015	
			2014			26			149			4.9		410			220		880		C4SL	DEFRA	2014	
	Chromium	III	2015			910			910			18000		8600			1500		33000		S4UL	LQM/CIEH	2015	
		VI	2014			21			21			170		49			23		250		C4SL	DEFRA	2014	
		VI	2015			6			6			1.8		33			7.7		220		S4UL	LQM/CIEH	2015	
	Copper		2015			2400			7100			520		68000			12000		44000		S4UL	LQM/CIEH	2015	
	Lead					200			310			80		2330			630		1300		C4SL	DEFRA	2014	
	Mercury	Elemental	2012			1.0			1.0			26		26							SGV	DEFRA	2012	
			2015			1.2			1.2			21		58			16		30		S4UL	LQM/CIEH	2015	
		Inorganic	2012			170			170			80		36000							SGV	DEFRA	2012	
			2015			40			56			19		1100			120		240		S4UL	LQM/CIEH	2015	
		Methyl	2012			11			11			8		410							SGV	DEFRA	2012	
			2015			11			15			6		320			40		68		S4UL	LQM/CIEH	2015	
	Nickel		2012			130			130			230		1800							SGV	DEFRA	2012	
			2015			130			180			53		980			230		800		S4UL	LQM/CIEH	2015	
	Selenium		2012			350			350			120		13000							SGV	DEFRA	2012	
			2015			250			430			88		12000			1100		1800		S4UL	LQM/CIEH	2015	
	Vanadium		2015			410			1200			91		9000			2000		5000		S4UL	LQM/CIEH	2015	
	Zinc		2015			3700			40000			620		730000			81000		170000		S4UL	LQM/CIEH	2015	
BTEX & MTBE	Benzene		2012			0.33			0.33			0.07		95							SGV	DEFRA	2012	
			2014			0.87			3.3			0.18		98			140		230		C4SL	DEFRA	2014	
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2012			610			610			120		4400							SGV	DEFRA	2012	
			2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Ethylbenzene		2012			350			350			90		2800							SGV	DEFRA	2012	
			2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2012			250			250			160		2600							SGV	DEFRA	2012	
			2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015
		m-xylene	2012			240			240			180		3500							SGV	DEFRA	2012	
			2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015
		p-xylene	2012			230			230			160		3200							SGV	DEFRA	2012	
			2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015

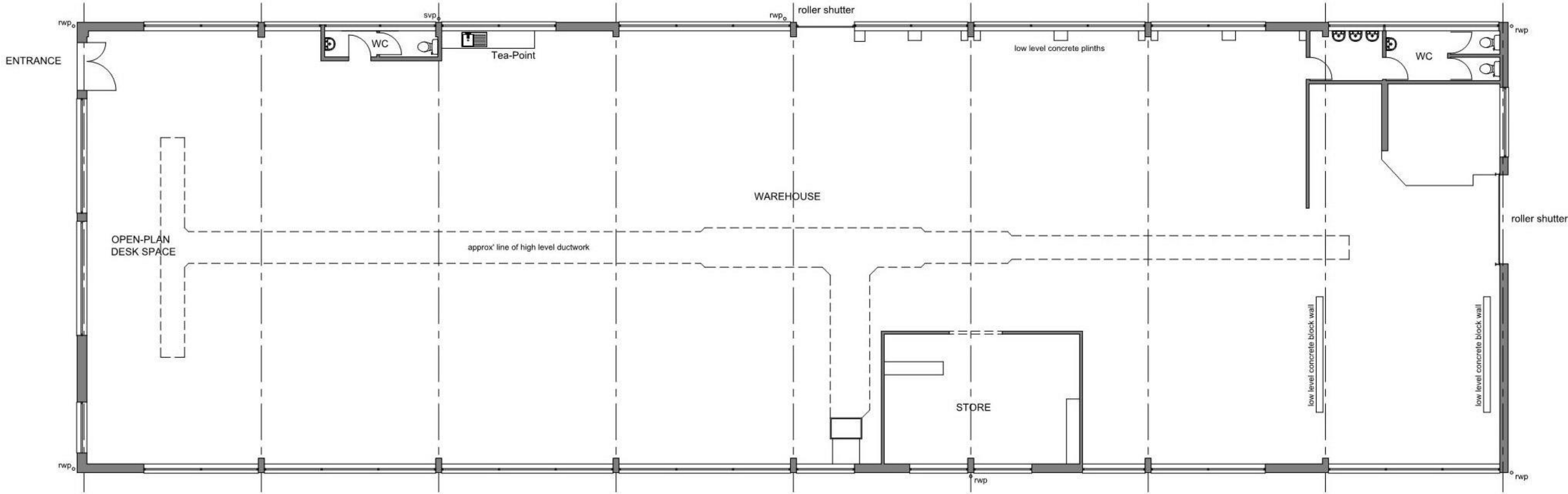
Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5																6
Type	Contaminants	Species	Year	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH's) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	540000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10		21	C4SL	DEFRA	2014	
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	250	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
	Trichloromethane		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (chloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
	Explosives	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH
RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)			2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)			2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015
Pesticides	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
	Atrazine		2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos		2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan		2015	7.4	18	41	160	280	410	1.2	2.9	6.8	5600	7400	8400	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan		2015	7	17	39	190	320	440	1.1	2.7	6.4	6300	7800	8700	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes		2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes		2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes		2015																					

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5																6
Type	Contaminants	Species	Year	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600			
	1,2,3,4,-Tetrachlorobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	640	770	830	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Pentachlrobenzene		2015	1.8	3.3	4.9	4.1	5.7	6.7	0.47	1.1	2.5	110	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015																					
Phenols & Chlorophenols	Phenols		2012			420			420			280			3200							SGV	DEFRA	2012
			2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
Others	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8			8			8			240							SGV	DEFRA	2012

NOTE

Priority	Guideline (mg kg ⁻¹)
1	Site Specific Assessment Criteria (SSAC) (Soils Limited)
2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)
3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)
4	2015: Suitable 4 Use Level (S4UL) (Nathanail <i>et al</i> , 2015)
For Generic Risk Assessment, the values in Bold have priority	
Table reviewed February 2018	

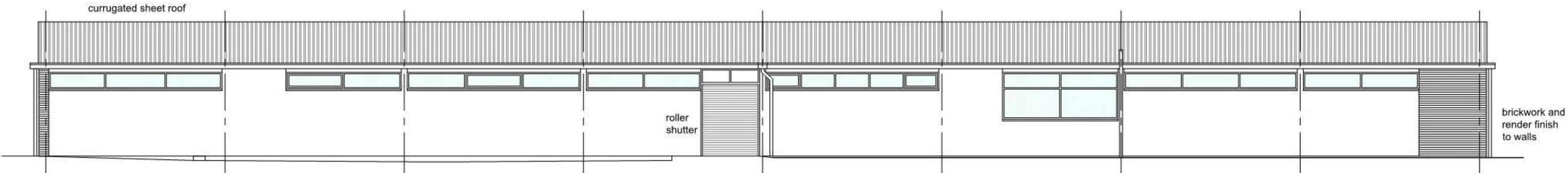
Appendix D Information Provided by the Client



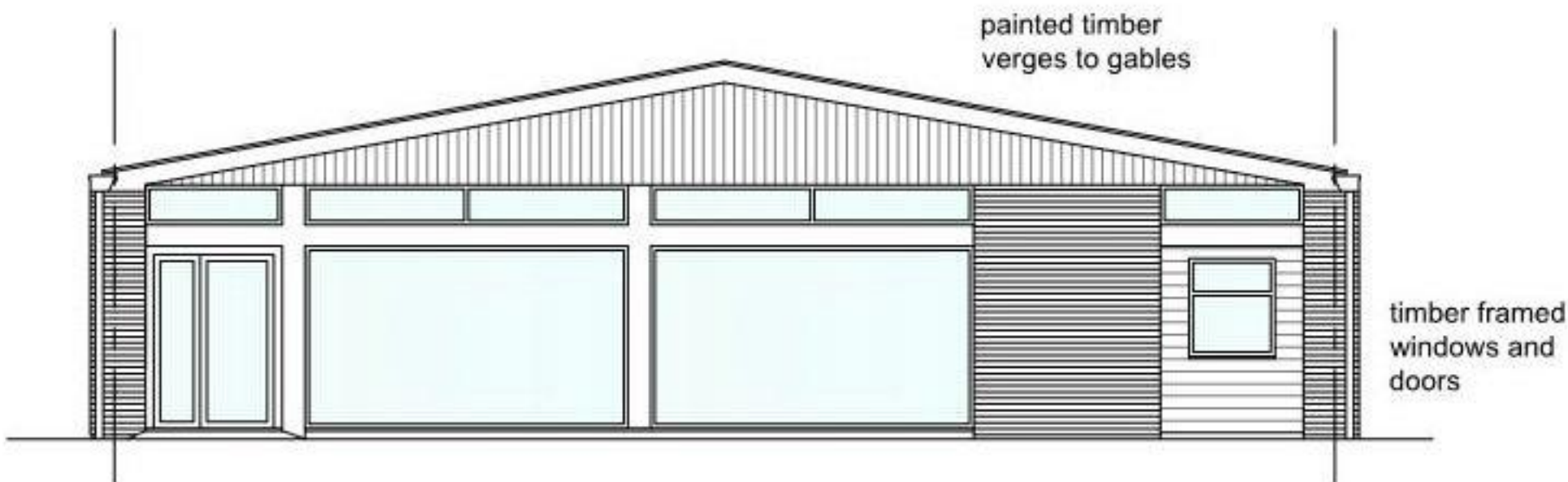
Floor Plan



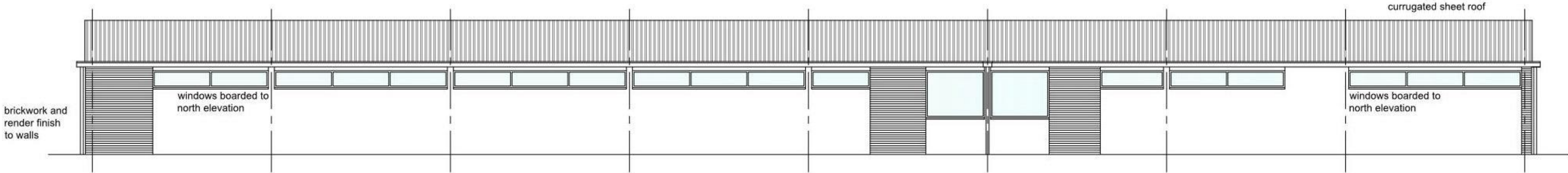
Site Location Plan 1:1250



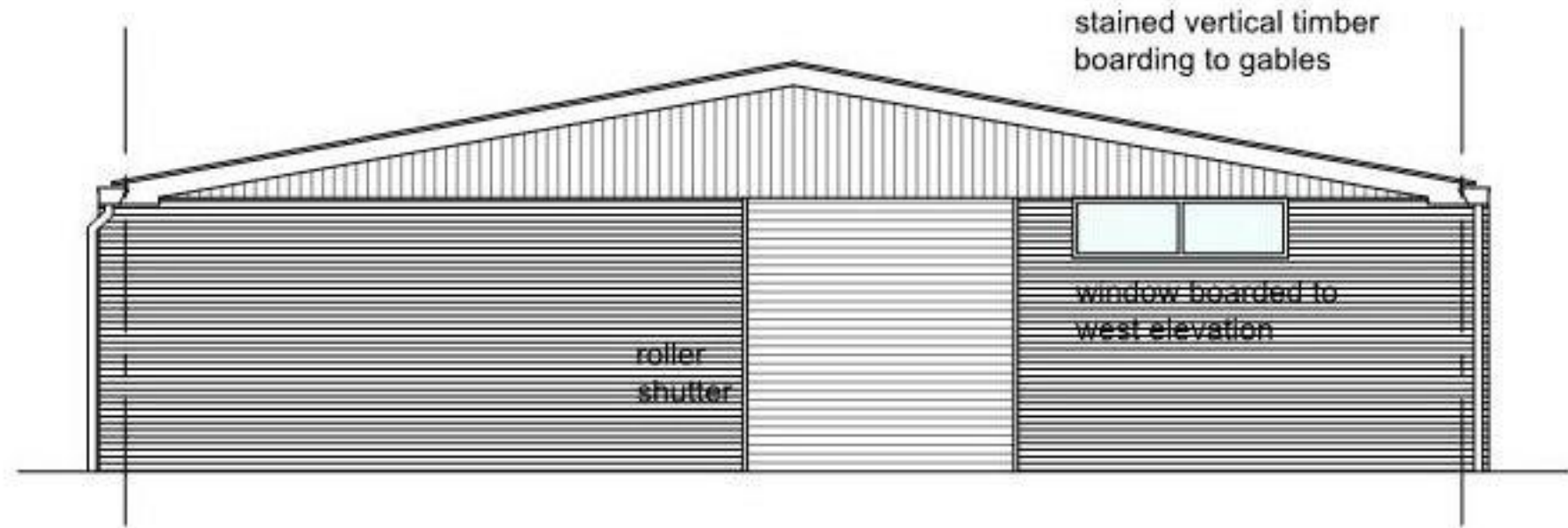
South Elevation



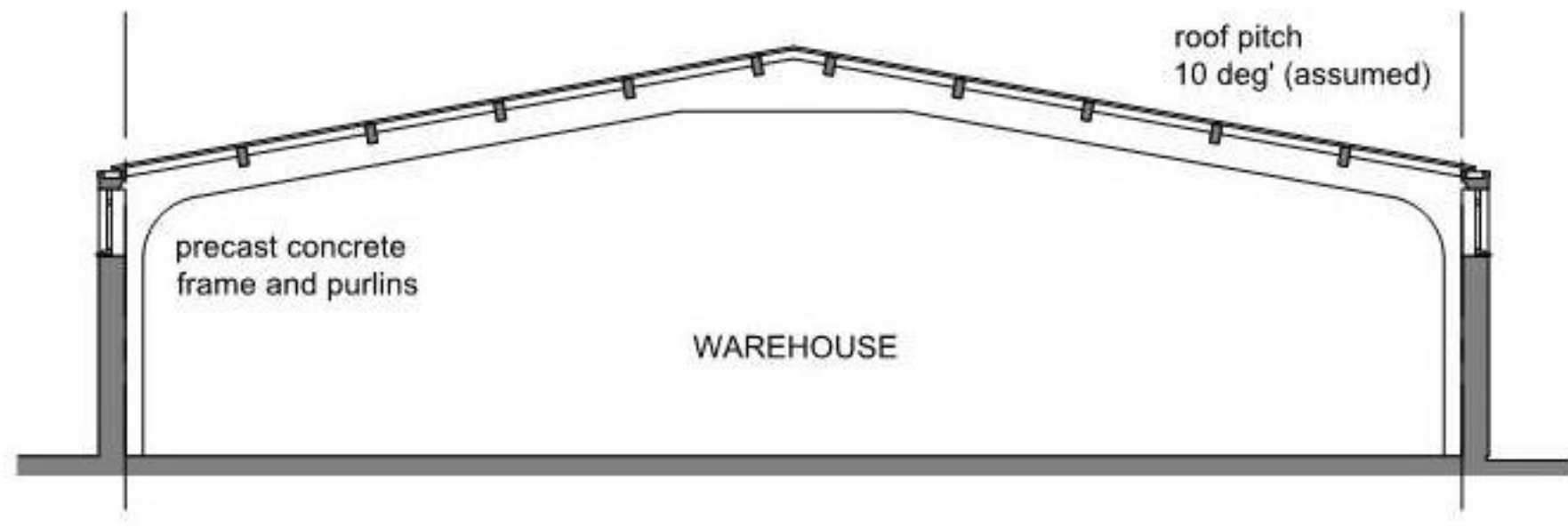
East Elevation



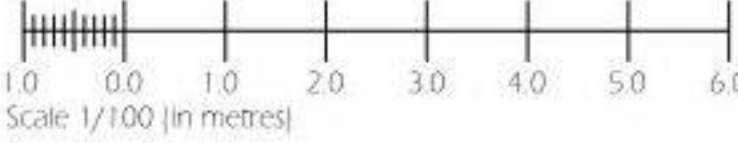
North Elevation



West Elevation



Cross Section



Notes
Report any discrepancies to the author.
Do not scale from this drawing.
This drawing is copyrighted to Temple Ford Design LTD.
Full topographical site survey required.
Full survey of existing mechanical and electrical installations required.

Revision Notes:		
Rev:	Date:	Description:

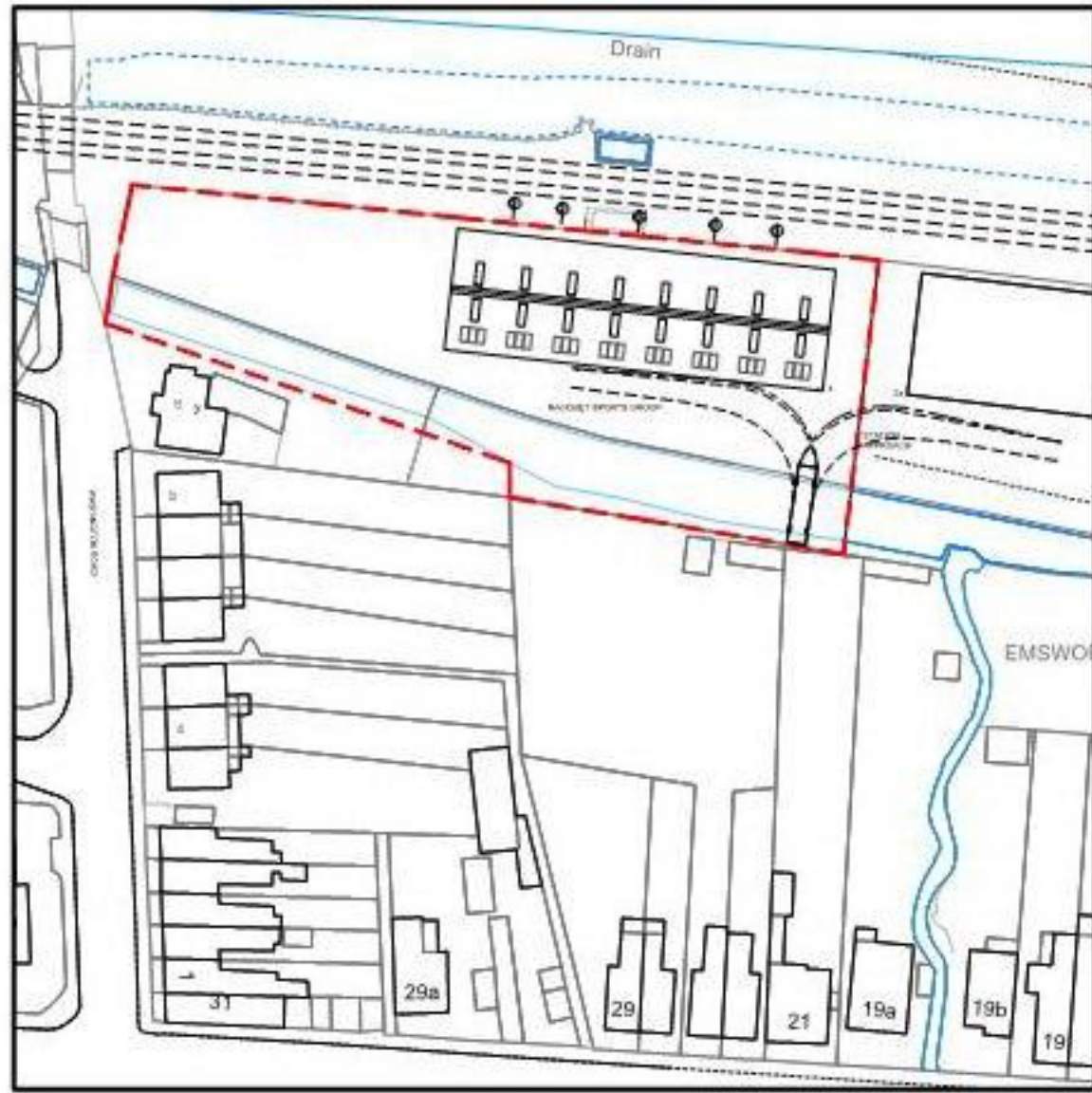
Date: Sept 2018		
Scale @ A1: 1:100 / 1:1250		
Status: Preliminary	Drawn: mp	Checked: dm

Project: Proposed Extension The Racquet Depot, Emsworth
Drawing Title: Plans and Elevations As Existing

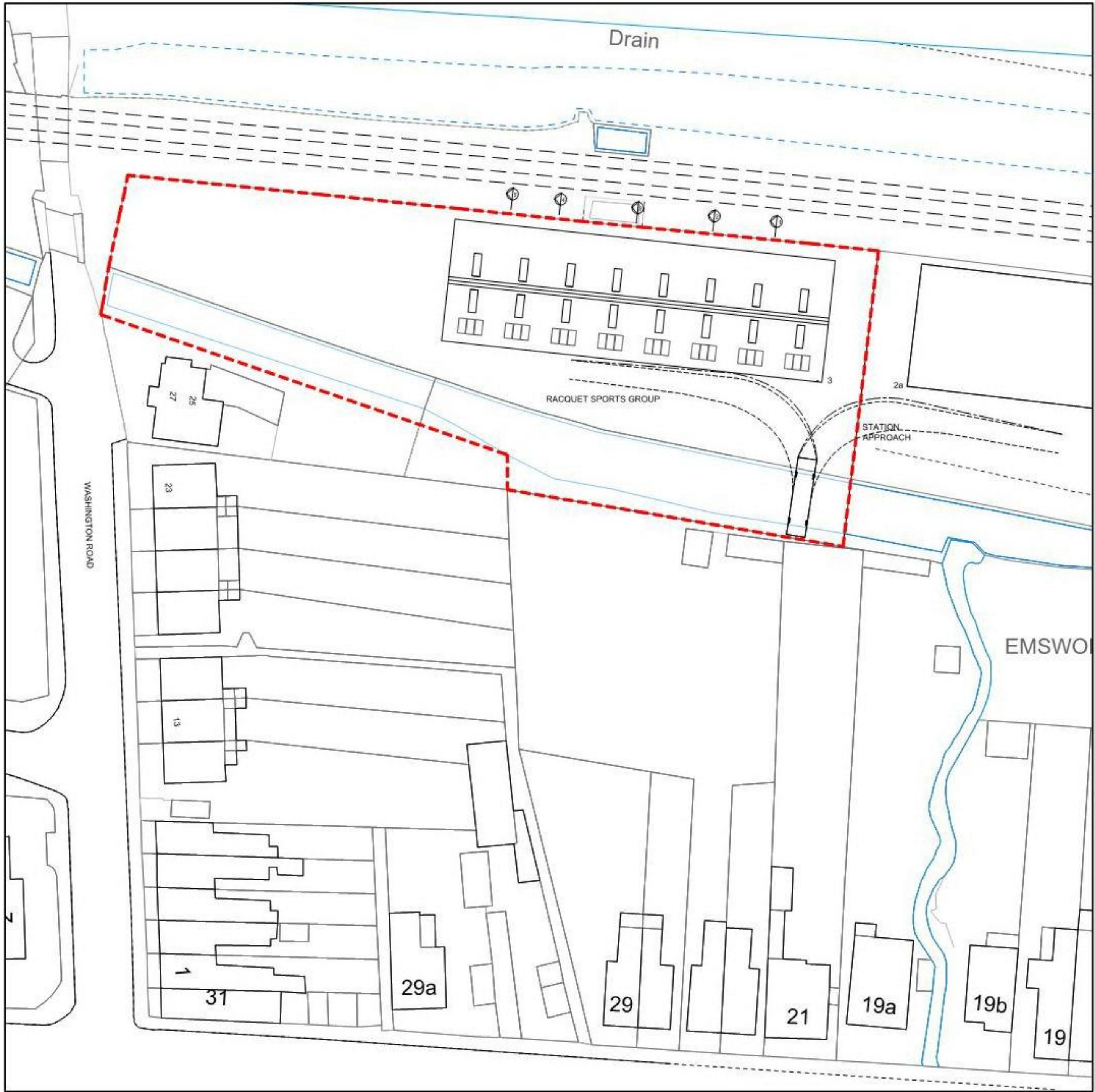
Client: Racquet Sports Group		
Project: 1727	Dwg No: 002	Rev:

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architects

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SITE LOCATION PLAN @ 1/1250
STREETWISE LICENCE NO.: 100047474
Scale 1/1250 (in metres)



SITE BLOCK PLAN @ 1/500
Scale 1/500 (in metres)

Revision Notes:		
Rev:	Date:	Description:

Date: Feb. 2019		
Scale @ A2: 1/1250 & 1/500		
Drawing Status: Planning	Drawn: MS	Checked: MP

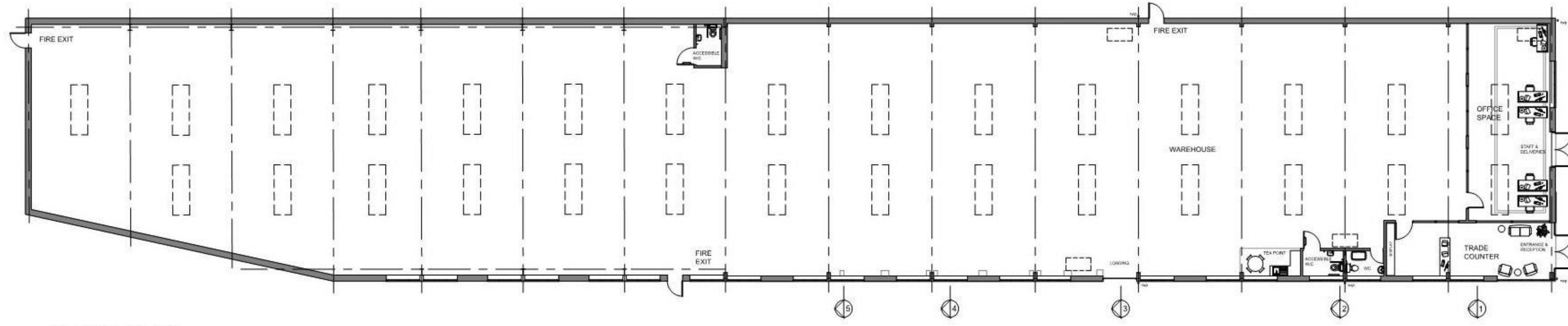
Project: Site Re-Development & Extension
Drawing Title: Proposed Location & Block Plans

Client: Raquet Sports Group		
Project: 1727	Dwg No: D00	Rev: .

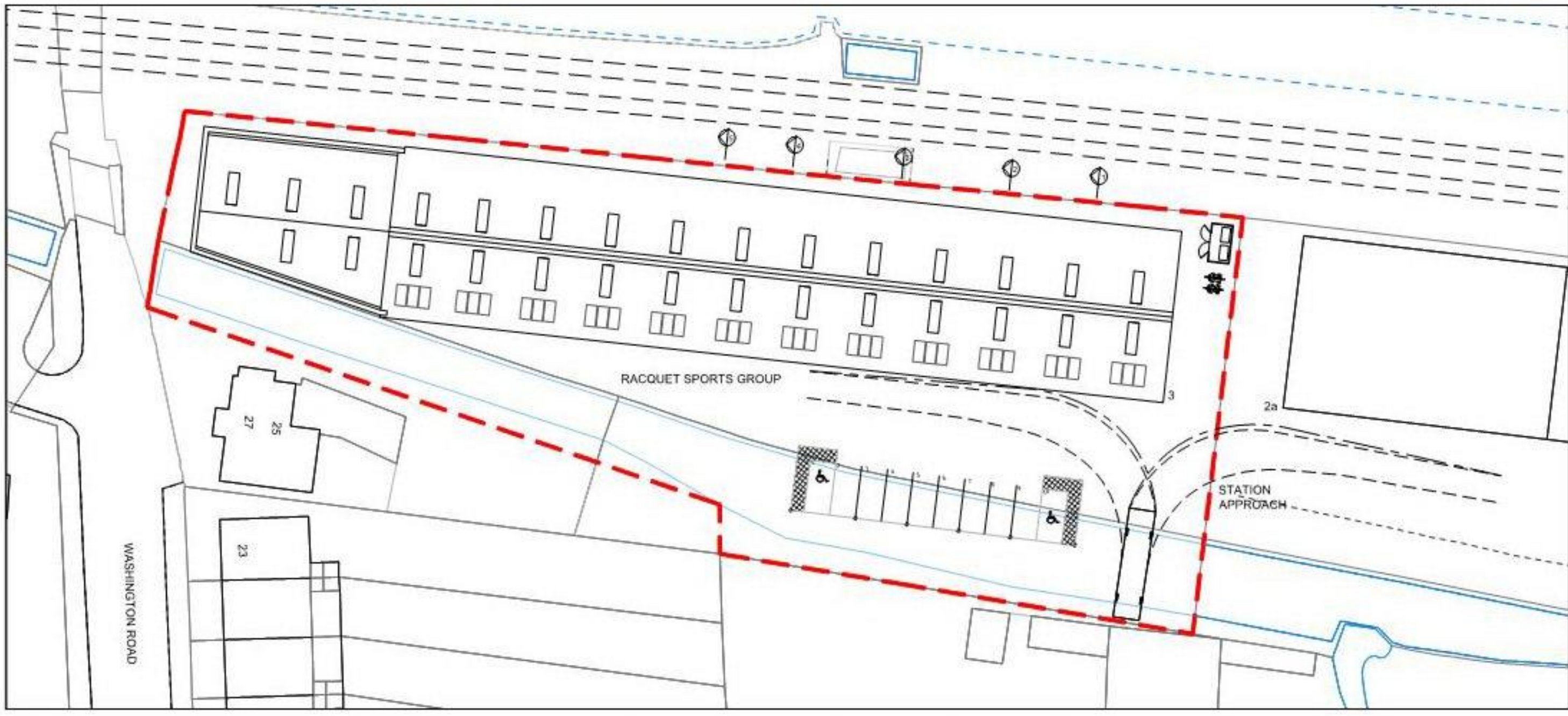
Temple Ford Design Ltd architects



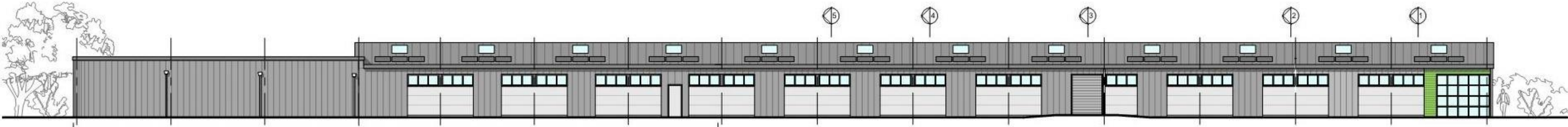
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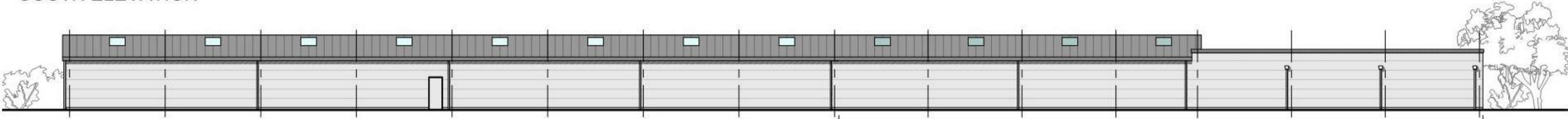
FLOOR PLAN
Gross Internal Area: Existing Warehouse 725m²
Proposed Extension = 575m² approx.



PROPOSED SITE PLAN 1:500
Scale 1/500 (in metres)

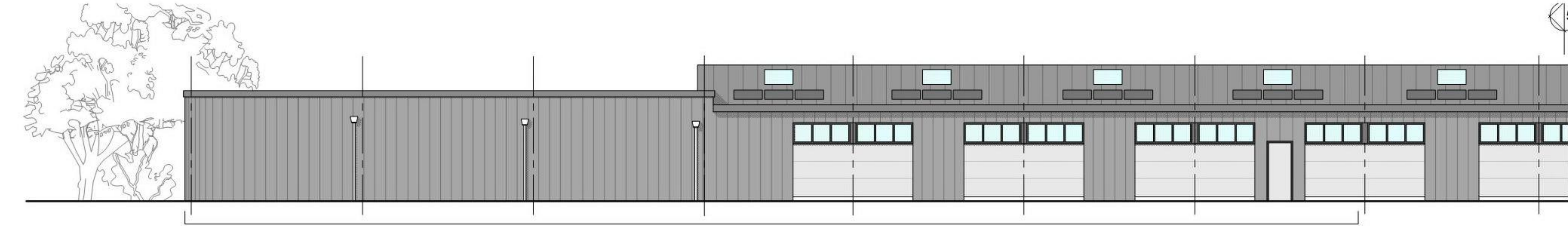


SOUTH ELEVATION



NORTH ELEVATION

PROPOSED ELEVATIONS 1:200
Scale 1/200 (in metres)



SOUTH ELEVATION

PROPOSED EXTENSION



NORTH ELEVATION

EXTENSION ELEVATIONS 1:100
Scale 1/100 (in metres)

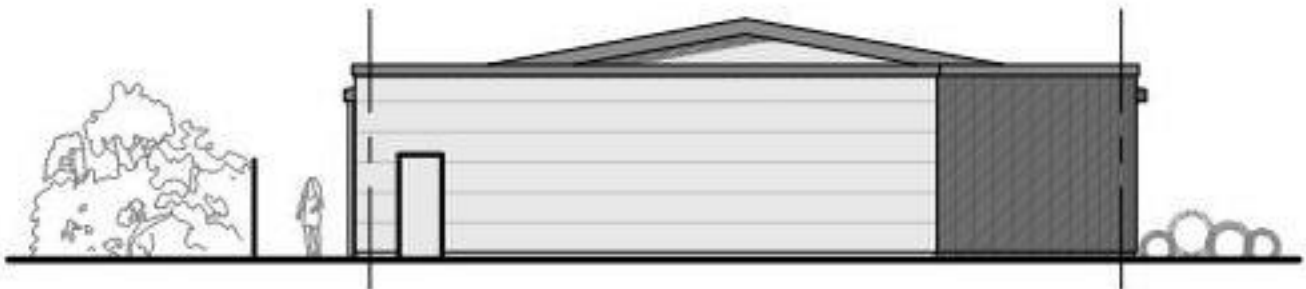
PROPOSED EXTENSION

EXTERNAL MATERIAL AND COLOURS

ELEMENT	MATERIAL	COLOUR
WALLS	TRAPEZOIDAL INSULATED VERTICAL PANELS MICRO-RIB INSULATED HORIZONTAL PANELS	GREY GREY & GREEN
ROOF	TRAPEZOIDAL INSULATED ROOF PANELS	GREY
WINDOWS & DOORS	DOUBLE-GLAZED ALUMINIUM	GREY
FASCIAS & SOFFITS	PRESSED METAL	GREY
RAINWATER GOODS	PPC ALUMINIUM	BLACK



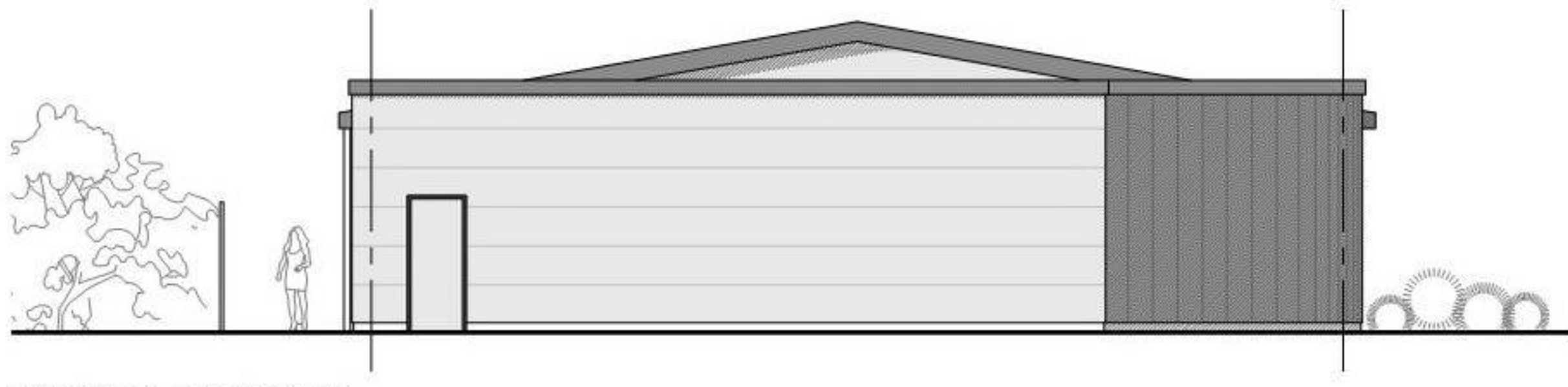
WEST ELEVATION



EAST ELEVATION



WEST ELEVATION



EAST ELEVATION

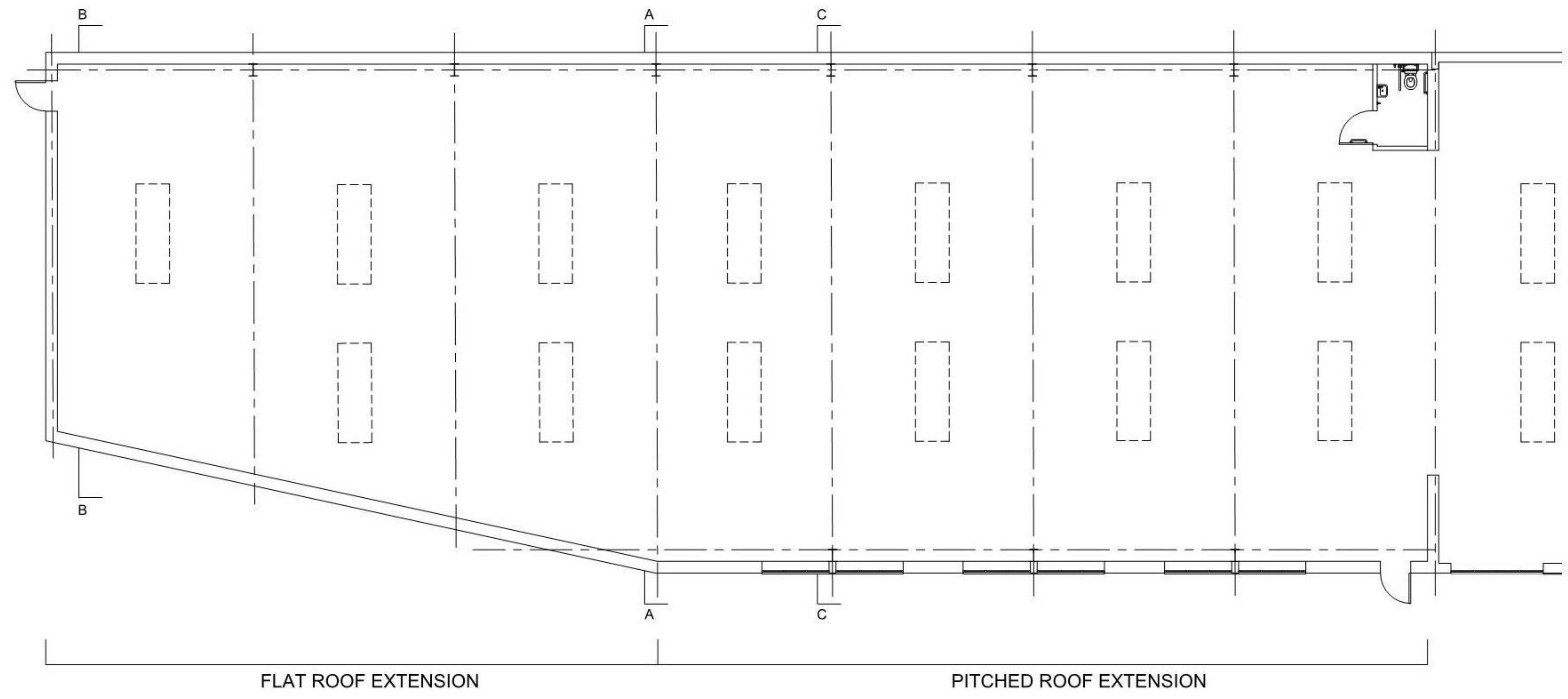
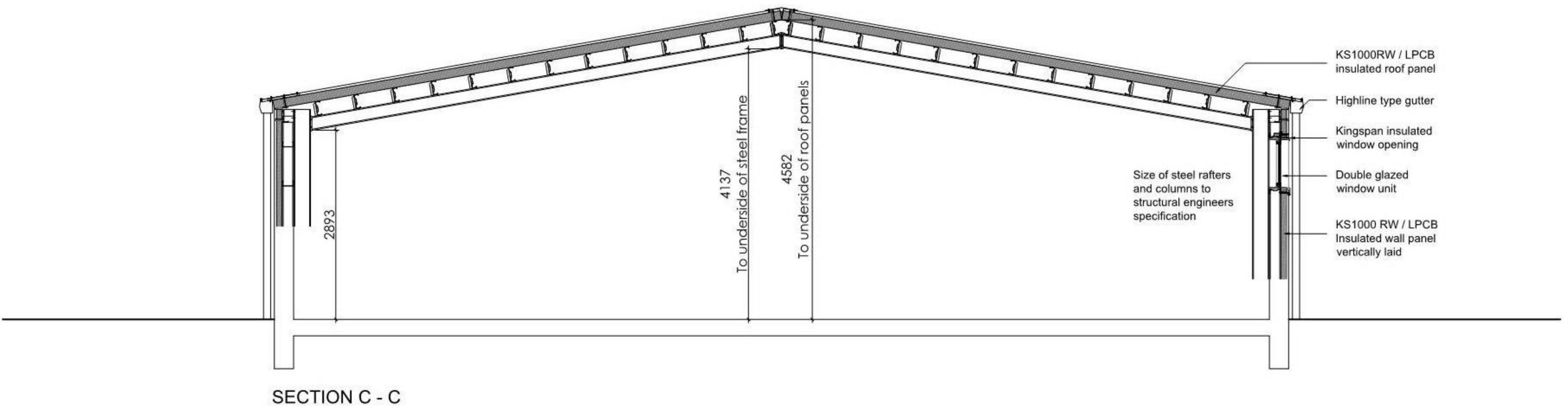
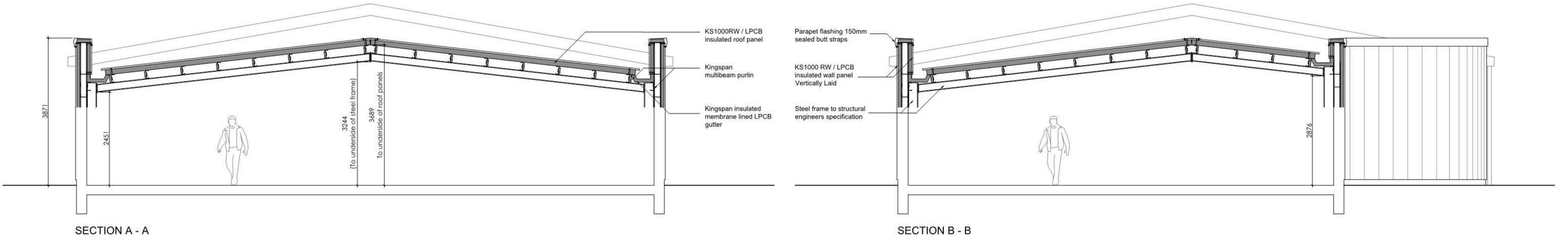
Notes
Report any discrepancies to the author.
Full survey of existing mechanical and electrical installations required.
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Revision Notes:		
Rev:	Date:	Description:
A	05/02/19	Client amendments
B	22/02/19	Client amendments

Date:	Dec. 2018	
Scale @ A1:	1/100 & 1/200	
Status:	Drawn:	Checked:
Planning	MS	MP

Project:	Site Re-development & Extension	
Drawing Title:	Proposed Warehouse Extension	

Client:	Racquet Sports Group	
Project:	Dwg No:	Rev:
1727	D03	B



Notes

Report any discrepancies to the author.

Full survey of existing mechanical and electrical installations required.

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Revision Notes:

Rev:	Date:	Description:
1	2019	Initial design

Date: Feb. 2019

Scale @ A1: 1/50 & 1/100

Status: Planning

Drawn: MS

Checked: MP

Project: Site Re-development & Extension

Drawing Title: Sections Through Extension

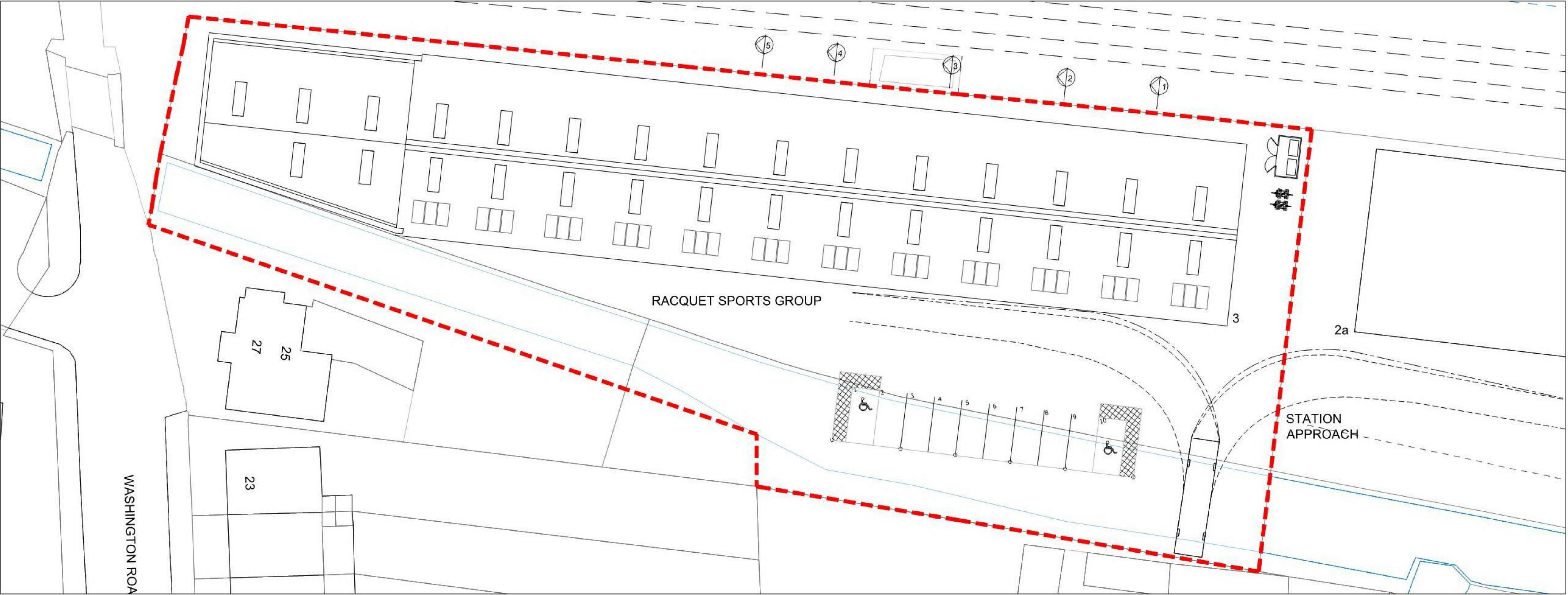
Client: Racquet Sports Group

Project:	Dwg No:	Rev:
1727	D04	.

Temple Ford Design Ltd architects

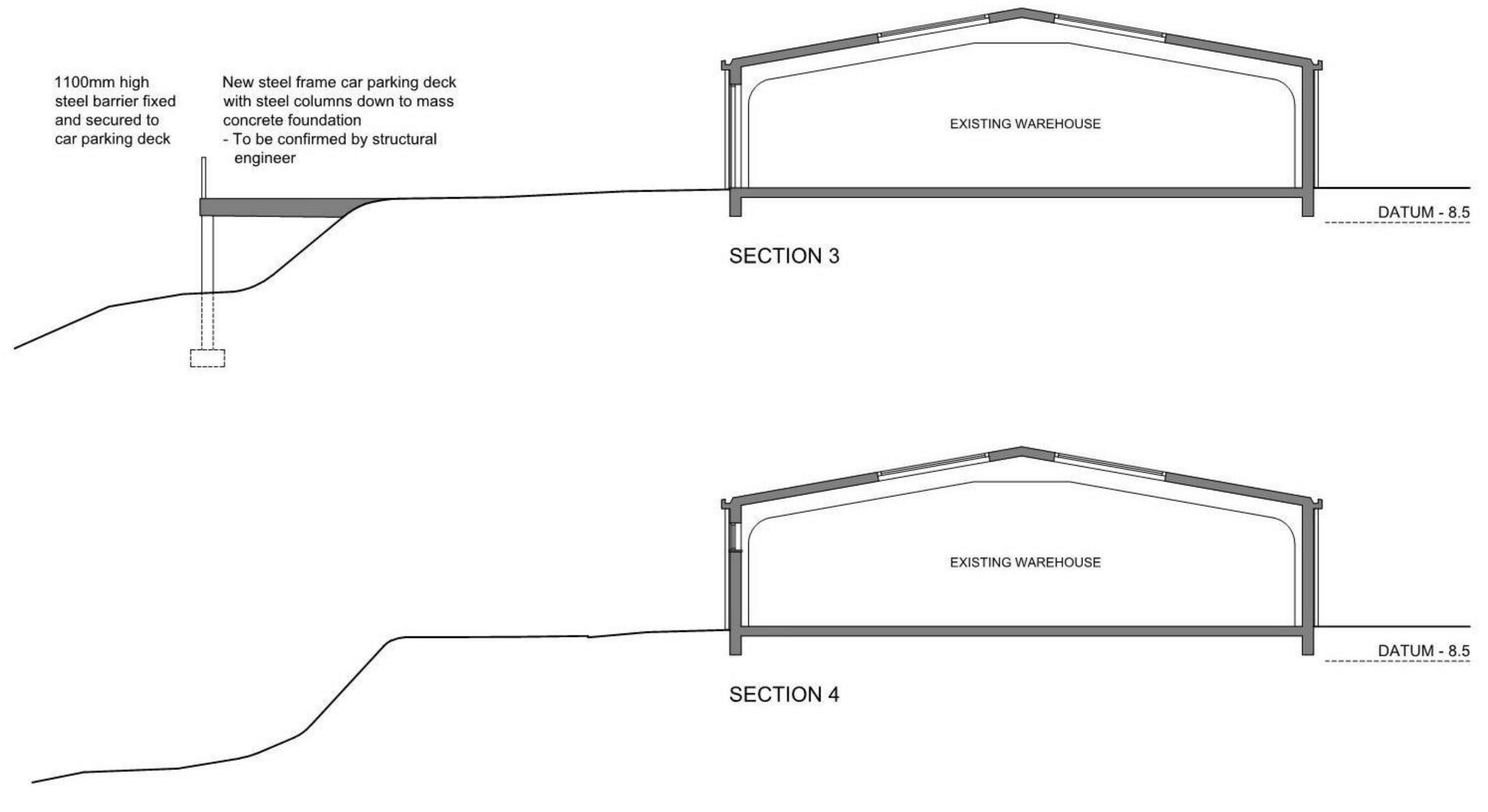
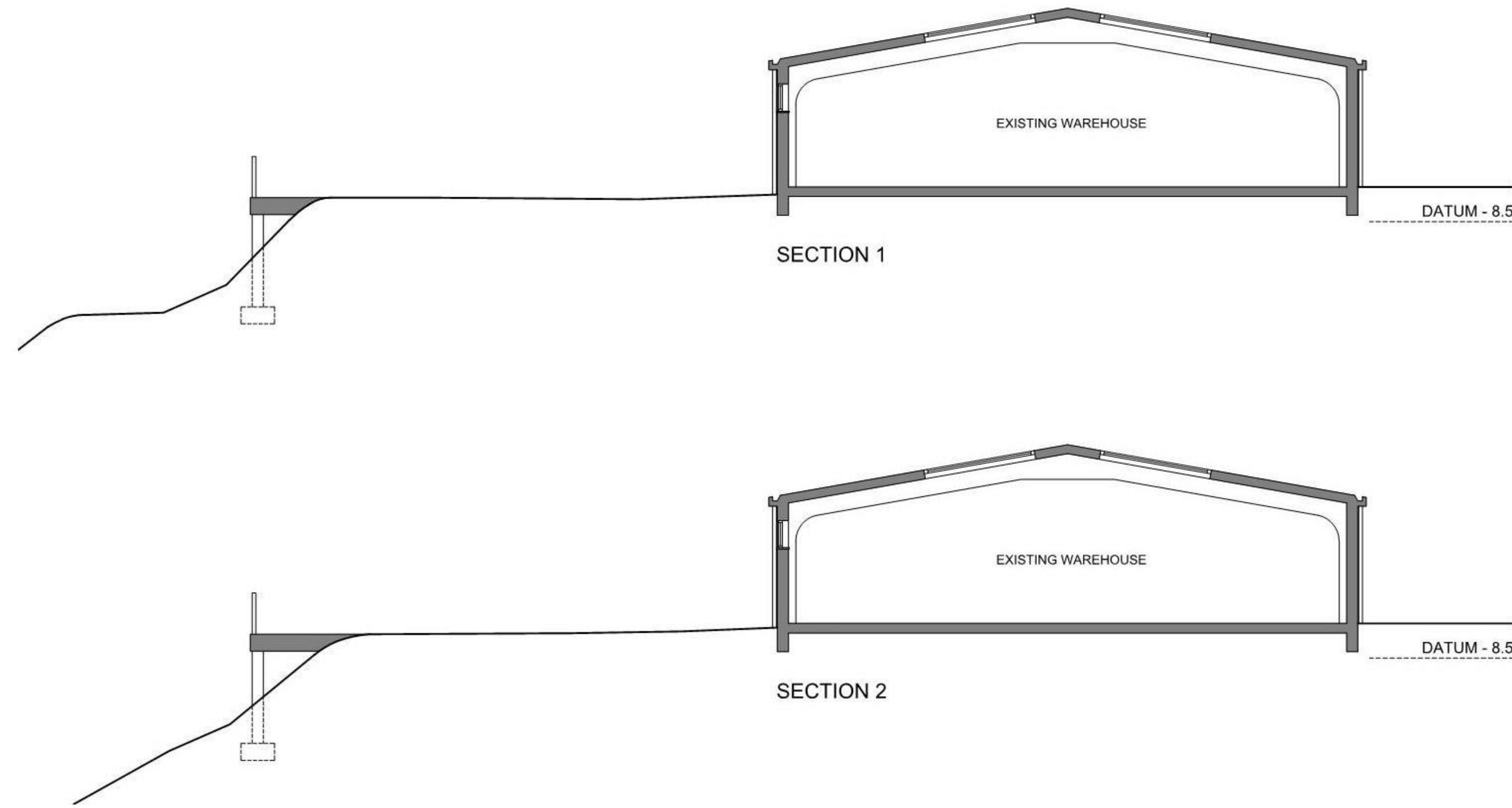
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Site Plan

Scale 1/200 (in metres)



Notes

Report any discrepancies to the author.

Full survey of existing mechanical and electrical installations required.

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Revision Notes:		
Rev:	Date:	Description:

Date:	Dec. 2018	
Scale @ A1:	1/100 & 1/200	
Status:	Drawn:	Checked:
Planning	MS	MP

Project:	Site Re-development & Extension	
Drawing Title:	Proposed Sections & Site Plan	

Client:	Racquet Sports Group	
Project:	Dwg No:	Rev:
1727	D05	.

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DATE FEB. 20, 2019

DESIGN AND ACCESS STATEMENT FOR AN EXTENSION TO EXISTING WAREHOUSE

**ADDRESS: RACQUET SPORTS GROUP, UNIT 3 STATION APPROACH, EMSWORTH, HAMPSHIRE,
PO10 7PW**



Figures 1 & 2 Existing Warehouse front & rear

Client and Brief

The existing property is a detached single storey warehouse that was built in the mid-20th Century. The accommodation comprises the main entrance area to the front elevation which opens onto the office area. Beyond that is the open plan storage area of the warehouse as well as 2x w/c's, one near the entrance and one to the rear. There is a further two entrances into the warehouse, a roller shutter door to the side elevation which is currently used for deliveries, and one larger roller shutter door to the rear.

The warehouse has a corrugated sheet finish to the main roof, a combination of red facing brickwork and render to all the external walls. The existing windows and doors are a mixture of timber and uPVC throughout. The existing warehouse structure is formed by a pre-cast concrete frame and concrete purlins, all of which is intended to be retained.

The owners of the property have appointed Temple Ford Design Ltd to prepare existing and proposed drawings for a planning application.

Planning History

There is currently a planning application under review for the refurbishment of the existing warehouse. The summary of the proposed changes in relation to that application are as follows:

The proposed changes are to comprise the replacement of all of the existing cladding, to both the roof and the walls, with new insulated cladding panels. In the roof will be a series of rooflights to both the south and north elevation. Photovoltaic panels will also be installed on the south elevation to capitalise on harnessing renewable solar energy. All of the existing windows and doors are to be replaced with new aluminium double glazed units. All of the existing concrete frame and purlins are intended to be retained, along with the smaller roller shutter door to the south elevation. The position of the existing entrance is to remain and lead into the new trade counter area which is defined by a clear glass partition part overlooking each of the storage and office areas within the warehouse. The office area position is to remain with the addition of a new frosted glass partition facing the storage area. The existing toilets are to be retained with one becoming an accessible w/c.

Summary of proposed changes

The proposed changes are to comprise a new extension as a continuation from the existing warehouse with the addition of a flat roof extension with surrounding parapet wall at the end. The structure of both the pitched and flat roof sections will consist of a steel frame with the roof and walls to be clad in insulated cladding panels and the doors and windows will be aluminium double glazed. In the roof will be a series of rooflights and photovoltaic panels. The flat roof extension will also have a parapet wall, the construction of which will match the rest of the extension.

A new parking platform will also be constructed near the entrance to the site and trade counter to provide sufficient parking for both employee's and visitors. A biodiversity survey will also be carried out when it is required.

Context

Station Approach/Sultan Road is located on the northern outskirts of Emsworth, found between Portsmouth and Chichester. The Racquet Sports Group site backs directly onto the train tracks that lead to Emsworth train station a little down the road. The nearby buildings approaching the site mainly comprise single and double storey office & warehouse buildings. As the site is at the end of the road there are no directly adjacent neighbours and no overlooking issues.

Areas

Gross internal area of existing warehouse = 725 square metres

Gross internal area of proposed extension = 575 square metres

Concept

The proposal has been carefully considered and designed to provide the client with a modern, well insulated warehouse which gives them enough working & storage space for their current requirements and future aspirations.

The proposed extension is a continuation in form of the existing warehouse with a flat roof section which is subservient in form and scale. There will be no overlooking issues and it cannot be seen from the main road. The design is in context with the type and style of the surrounding properties with the proposed materials intended to blend with the existing architectural language.

The extension will provide secure, sustainable and resilient design, improved accommodation and no loss of amenity to adjoining properties. The applicant kindly requests approval of the proposal.

Existing Plans and Elevations

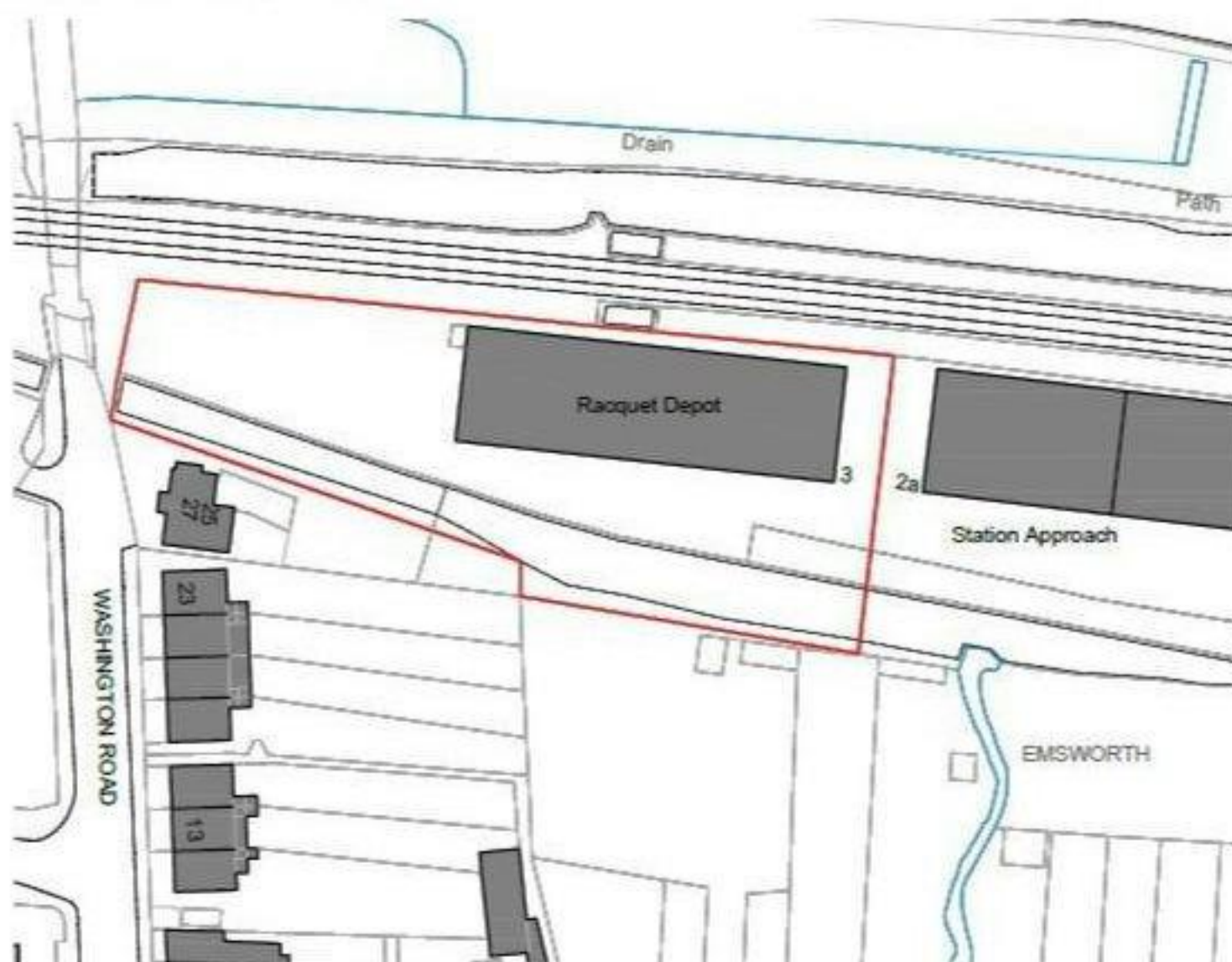


Figure 3 Existing Site Plan

Racquet Sports Group, Emsworth

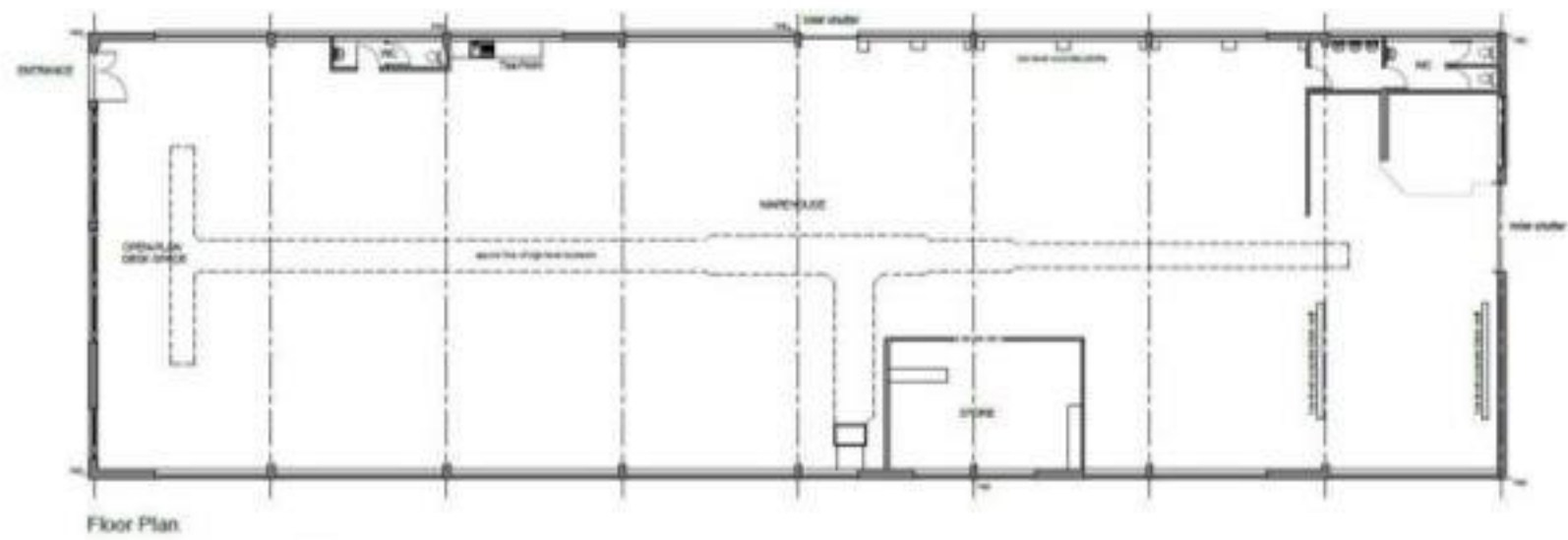


Figure 4 Existing Floor Plan



Figure 5 Existing Elevations

Proposed Plans and Elevations

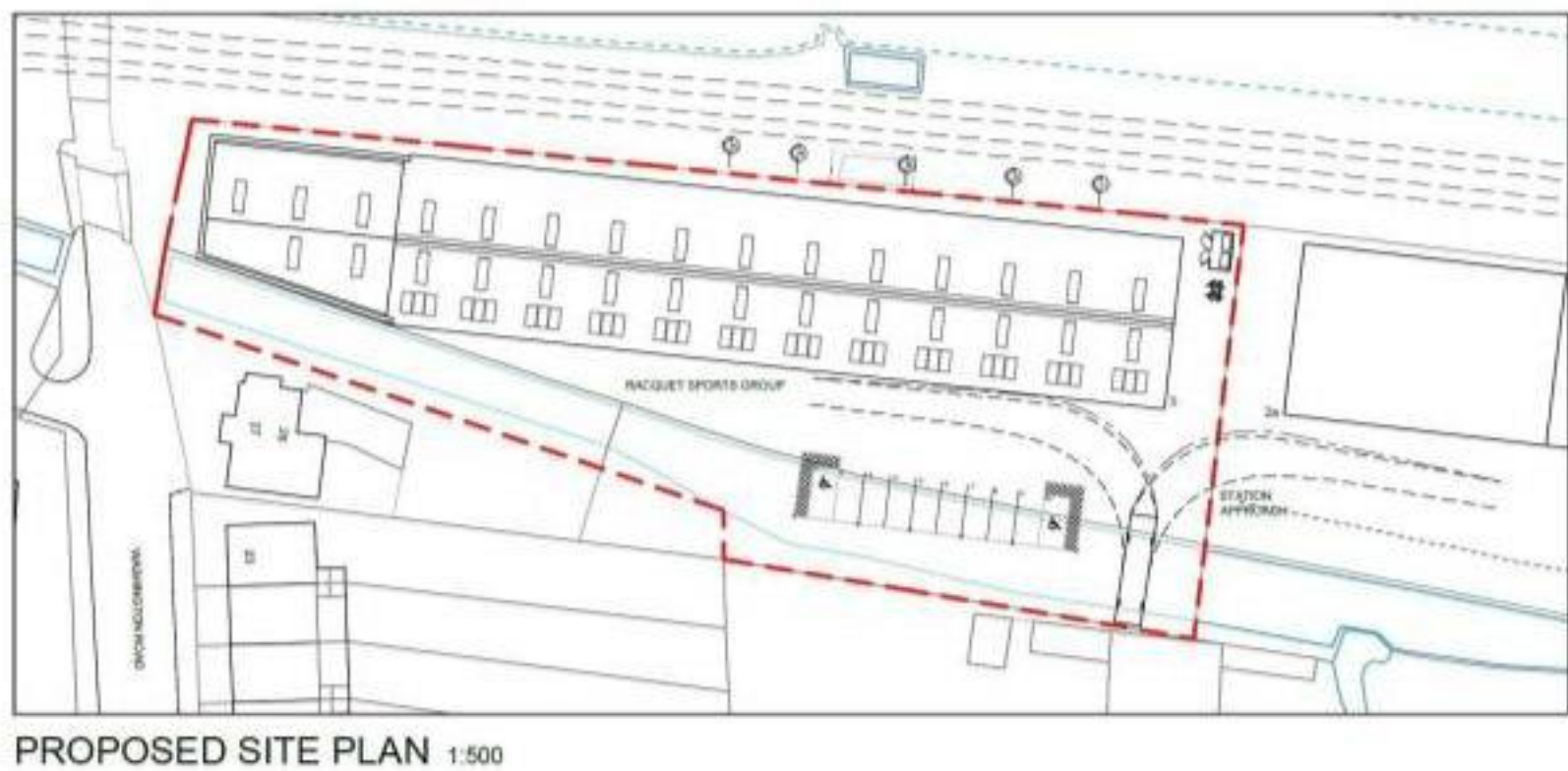


Figure 6 Proposed Site Plan

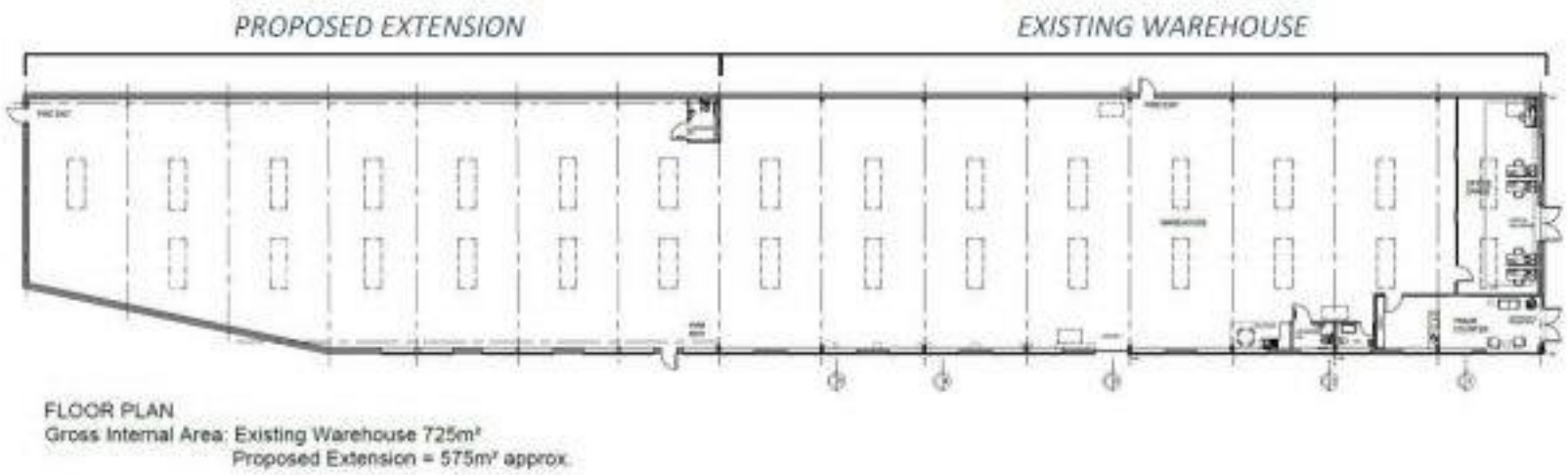
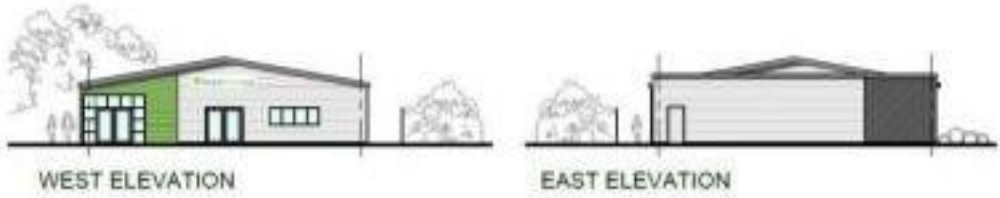


Figure 7 Proposed Floor Plan



Figure 8 Proposed Elevations



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