Geotechnical
Ground Investigation Report

Site
59 Elm Avenue
Ruislip
HA4 8PE

Client
Silver Circle Property Ltd

Report Reference
GT-2022-000020

Prepared by
STM Environmental Consultants Ltd

Date
03/05/2022

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1 DOCUMENT CONTROL

GEOTECHNICAL GROUND INVESTIGATION REPORT

Site Address:	59 Elm Avenue Ruislip HA4 8PE
Site Coordinates:	510807, 187544
Prepared for:	Silver Circle Property Ltd
Report Reference:	GT-2022-000020
Version No:	1.0
Date:	03/05/2022
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2 DISCLAIMERS

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd (STM) and can only be used and relied upon by Silver Circle Property Ltd (Client).

STM has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report. Furthermore, STM accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report. Any party other than the Client using or placing reliance upon any information contained in this report, do so at their own risk.

Due to budgetary and physical constraints, sampling and in-situ testing was not possible over the entire site during the ground investigation. Therefore, we can offer no guarantee as to the validity of the data in any areas other than those investigated. While this Report may offer comments and opinions on the nature of the strata, both between the excavations and below the maximum depth achieved by the investigation, these are for guidance only and no liability can be accepted for their accuracy.

It should also be noted that some of the findings presented in this report are based on information obtained from third parties (i.e. laboratory). Whilst we assume that all information presented is accurate, we can offer no guarantee as to the validity.

The undertaking of an aboricultural/tree survey was not part of the scope of works. Therefore, the opinions provided in relation to tree heights and species are provided for information only and should not be relied upon. It is recommended that a tree identification survey is undertaken by a suitably qualified Aboriculturist if accurate information is required.

We recommend careful observations during construction to verify our interpretations. Should variation from our interpretations be noted, we recommend that a competent Geotechnical Engineer be engaged to advise and to evaluate what, if any, revisions should be made to our recommendations.

3 EXECUTIVE SUMMARY

SECTION	SUMMARY
Site Location and Description	The site is located at 59 Elm Avenue Ruislip HA4 8PE. It is approximately centred at grid reference 510807, 187544 and has an area of approximately 541m^2.
Proposed Development	The development proposal is for the demolition of existing dwelling and erection of a 3-storey residential building housing 6no. flats.
Published Geology and Hydrogeology	According to mapping information provided by the BGS, the underlying bedrock geology pertains to the Lambeth Group (Clay, Silt and Sand) and/or London Clay Formation (Clay and Silt). No superficial deposits are indicated. According to the BGS, groundwater is likely to be more than 5 m below the ground surface throughout the year.
Summary of Ground Investigation	The ground investigation works were carried out on the 14th of March 2022. 1no. windowless sample boreholes was excavated to a maximum depth of 6mbgl using a dynamic windowless sampler rig. In-situ Standard Penetration Tests (SPT) were carried out at 1m intervals. 6 disturbed soil samples were collected at depths ranging from 1 – 6mbgl and submitted to a UKAS/MCERTS accredited laboratory for pH, Water Soluble Sulphate, and Plasticity Index testing.
Summary of Findings	The investigation encountered ground conditions consistent with the published geological records of the area. Made Ground was encountered to a maximum depth of 0.15mbgl, underlain by silty CLAY to 6mbgl, the maximum depth of the borehole. The in-situ SPT testing carried out within the CLAY gave N Values that ranged from a minimum of 5 at 1and 2mbgl to a maximum of >50 at 6mbgl indicating that its consistency can be described as ranging from soft to hard. The tested CLAY samples were found to have Modified Plasticity Index values ranging between 18% and 36%, indicating that the Clay has intermediate to high plasticity and medium volume change potential. The results of the Sulphate tests ranged from 10 mg/l SO_4 to 72 mg/l SO_4, associated with alkaline soil conditions, indicating that the tested soils fall into Class DS-1 of the Building Research Establishments (BRE) classification system Special Digest Part 1:2005 “Concrete in aggressive ground”.

SECTION	SUMMARY
	A tree survey provided by the Client identified 2no. Bay Laurel trees that are within the potential zone of influence of the proposed development. Root activity was not encountered within any of the borehole. Groundwater was not encountered within any of the borehole during the investigation.
Conclusions and Recommendations	A maximum safe allowable bearing capacity in the order of 50kPa was inferred in the soft CLAY encountered at 1 to 2mbgl while that the Firm CLAY at 3mbgl yielded a value of 120kPa. This is considered unlikely to be sufficient to support the proposed structure without unacceptable settlement occurring and as a result, shallow foundations (i.e. strip, trench fill, pad, raft) are considered unlikely to be appropriate for the proposed development. This conclusion will need to be reassessed by the Structural Engineer once the anticipated loads are known. Pile foundations are recommended. They should be extended such that they are firmly embedded within suitably competent ground, such as the hard CLAY encountered at 6mbgl. Although groundwater was not encountered as part of the investigation, some seepages could occur requiring pumping to be undertaken. No particular difficulties are envisaged in removing such water by conventional internal pumping methods from open sumps. The results of the Water-Soluble Sulphate tests indicate that conditions in which the deterioration of buried concrete due to sulphate or acid attack may occur are unlikely to exist at the site. The final design of buried concrete should therefore be in accordance with Class DS-1 of the Building Research Establishments (BRE) classification system Special Digest Part 1:2005 “Concrete in aggressive ground” and ACEC Site Class AC-1.

4 INTRODUCTION

4.1 Commissioning

STM Environmental Consultants Limited were commissioned by Silver Circle Property Ltd (Client) to undertake a ground investigation at 59 Elm Avenue Ruislip HA4 8PE (the Site).

4.2 Development Proposal

It is understood that the development proposal is for the demolition of existing dwelling and erection of a 3-storey residential building housing 6no. flats.

4.3 Report Objectives

The purpose of the investigation was to provide an interpretive report on current ground conditions to assist with the design of foundations for structures associated with a planned redevelopment at the Site.

This report can be read in conjunction with Surface Water Drainage Strategy Report (Ref: SWDS-2022-000007) also produced for the site by STM Environmental Consultants in April 2022.

5 SITE DESCRIPTION

5.1 Site Location and Current Use

The site is located at 59 Elm Avenue Ruislip HA4 8PE. It is approximately centred at grid reference 510807, 187544 and has an area of approximately 541m^2.

The site lies within the jurisdiction of Hillingdon London Borough Council in terms of the planning process. It is currently used as a bungalow. Maps showing the location of the site are available in Figure 1 below.

5.2 Published Geology and Hydrogeology

5.2.1 Geology

According to mapping information provided by the BGS, the underlying bedrock geology pertains to the Lambeth Group (Clay, Silt and Sand) and/or London Clay Formation (Clay and Silt). No superficial deposits are indicated.

5.2.2 Hydrogeology

The Environment Agency classifies the bedrock aquifer as Secondary A. The site does not lie within any groundwater source protection zones.

According to the BGS, groundwater is likely to be more than 5 m below the ground surface throughout the year.

5.3 Topography

The site is relatively flat. Based on LiDAR imagery the ground levels are estimated as 54mAOD.

Figure 1 – Maps showing location of site

STM environmental

0 37.5 75 150 Meters

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STM environmental

0 37.5 75 150 Meters

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6 SUMMARY OF GROUND INVESTIGATION WORKS

The ground investigation works were carried out on the 14th of March 2022 and were generally in accordance with the following standards where relevant:

- BS5930:2015 Code of Practice for Ground Investigation.
- BS EN 1997-2 Ground investigation and testing
- BS EN ISO 14688 Geotechnical investigation and testing – Identification and classification of soil
- BS EN ISO 14689 Geotechnical investigation and testing – Identification and classification of rock
- BS EN ISO 22476 Geotechnical investigation and testing - Field testing

6.1 Avoidance of Buried Services and Utilities

The Client was unable to supply service and utility plans prior to undertaking the works. The free Linesearchb4Udig service was used, however, only limited information was provided. All exploratory locations were cleared for buried services using a CATSCAN device and hand pits were excavated to a depth of 1.0mbgl at each exploratory hole location prior to commencing drilling.

6.2 Boreholes

1no. borehole was excavated at the site for the purpose of undertaking geotechnical soil sampling and in-situ testing. The borehole was advanced to a maximum depth of 6mbgl using a dynamic windowless sampling rig. A summary of the boreholes undertaken is provided in Table 1 below.

Table 1: Summary of boreholes

Borehole ID	Easting*	Northing*	Level at surface (mAOD)	Level at Base (mAOD)	Depth (m)
BH01	510934	187603	54	48	6

*Note: coordinates and levels are approximate based on OS mapping and LIDAR data

A map showing the locations of the boreholes is available in Appendix 1.

6.3 In-situ Testing

6.3.1 Standard Penetration Tests

In-situ Standard Penetration Tests (SPT) were undertaken at the base of the initial hand dug hole and at 1.00m intervals as the boreholes were advanced.

The tests were carried out in accordance with BS EN ISO 22476-3 and consisted of driving a 50 mm split spoon sampler into the soil with a 64 kg weight having a free fall of 760 mm. The blows required to drive the split – barrel sampler a distance of 305 mm, after an initial penetration of 152 mm, is referred to as the SPT – N value. They were undertaken at the base of the initial hand dug hole and at 1.00m intervals as the boreholes were advanced.

6.4 Geotechnical Sampling and Laboratory Testing

Disturbed windowless samples were recovered for geotechnical analysis at 1.0m intervals or from each change of strata from each borehole.

The samples were tightly sealed in plastic sample tubs, jars or polyethylene bags and then transported to the laboratory for analysis.

A programme of geotechnical laboratory testing agreed with the Client and was carried out by Socotec, a MCERTS/UKAS accredited laboratory. The requested testing consisted of the following:

- pH (3no.)
- Sulphate Water Soluble (3no.)
- Plasticity Index (3no.)

7 GROUND INVESTIGATION FINDINGS

7.1 Ground Conditions

7.1.1 Geology Encountered

Made Ground was encountered to a maximum depth of 0.15mbgl. The Made Ground was underlain by silty CLAY to 6mbgl, the maximum depth of the borehole.

The borehole logs from the site investigation are available in Appendix 3. Photographs of the soils extracted from the boreholes are presented in Appendix 5.

7.1.2 Groundwater

Groundwater was not encountered within any of the boreholes during the investigation.

The installation of a monitoring well and subsequent groundwater level monitoring was not undertaken as part of the works.

7.2 Trees

The undertaking of an arboriculture/tree survey was not part of the scope of works. Therefore, the opinions provided in this section in relation to tree heights and species are provided for information only and should not be relied upon.

Numerous trees (including Bay Laurel, Sycamore and Magnolia) were noted to be within the potential zone of influence of the proposed development. The Client provided a topographical survey undertaken by KND Surveys LTD which included some information on trees. Based on this, the distance from the proposed development to the nearest trees are shown in the table below.

It should be noted that the survey information provided is not as detailed as a tree survey. As such, it is recommended that a tree identification survey is undertaken by a suitably qualified Arboriculturist.

Tree Type	Approx. Distance from Development	Height	Water Demand
Bay Laurel	11	7	Moderate
Bay Laurel	14	3	Moderate
Sycamore	22	17	Moderate
Cypress	9	7	High

7.2.1 Root Activity

Root activity was not recorded within any of the boreholes.

7.3 Results of Standard Penetration Tests

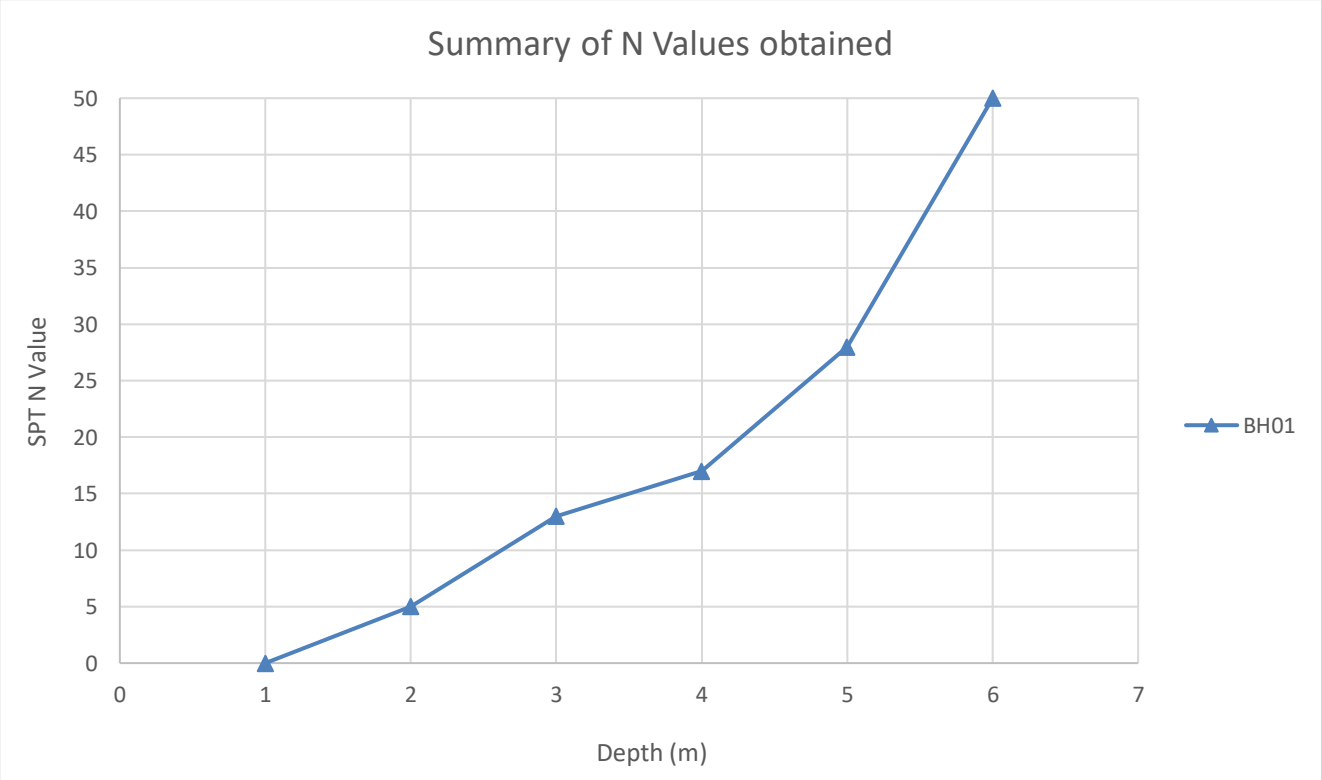
The results of the in-situ Standard Penetration Tests (SPT) are outlined on the borehole logs in Appendix 3 and in tabular form in Appendix 6.

A statistical summary of the results is presented in Table 2 below.

Table 2: Statistical Summary of N Values

Depth (mbgl)	N Value
1	5
2	5
3	13
4	17
5	28
6	>50

Figure 2: SPT N values



7.4 Laboratory Test Results

Copies of all laboratory test certificates are available in Appendix 4.

7.4.1 Plasticity Index Analysis

Atterberg Limit tests were carried out on 3no. samples retrieved from borehole BH01 at depths between 2 and 6mbgl. The results of the index testing are summarised in Table 3 below.

Table 3: Summary of Classification Test Results

Borehole ID	Depth (mbgl)	Sample Description	Plasticity Index (PI) (%)	Modified Plasticity Index (MPI) (%)	Classification	Volume Change Potential
BH01	2	CLAY with SILT, SAND + GRAVEL	20	18	CI	Medium
BH01	4	CLAY	36	36	CH	Medium
BH01	6	CLAY + SILT	23	23	CI	Medium

The samples tested produced results from Clay of intermediate plasticity at 2 and 6mbgl to Clay of high plasticity at 4mbgl.

The samples were found to have Modified Plasticity Index values ranging between 18 % at 2mbgl to 36 % at 4mbgl indicating that the volume change potential of the Clay is Medium.

7.4.2 pH and Sulphate Analyses

pH and Water-Soluble Sulphate content analyses were carried out on 3no. soil samples. The results are available in Appendix 4 and are summarised in Table 4 below.

Table 4: Summary of pH Test Results

Borehole ID	BH01	BH01	BH01
Sample Depth (m)	1	3	5
pH	8.3	8.8	8.7
Sulphate Results (mg/l)	72	24	10

The pH values were variable and ranged from 8.3 to 8.8 indicating that alkaline soil conditions exist at the site.

The results of the Sulphate tests ranged from 10 mg/l SO4 to 72 mg/l SO4.

8 DISCUSSION AND CONCLUSIONS

8.1 Ground Model

Based on the results of ground investigation to date the simplified ground model for preliminary design is given in Table 5 below.

Table 5: Simplified Ground Model

Stratum	Maximum Observed Extent (mbgl)	Inferred Geological Member
Made Ground	0 – 0.15	-
Silty CLAY	0.15 – 6	London Clay

8.2 Allowable Bearing Capacity of the Soils

The investigation encountered ground conditions that were generally consistent with the published geological records of the area.

The in-situ SPT testing carried out within the CLAY gave N Values that ranged from a minimum of 5 at 1and 2mbgl to a maximum of >50 at 6mbgl indicating that its consistency can be described as ranging from soft to hard.

The inferred allowable bearing capacities by depth are summarised in Table 6 below. It should be noted that for prudence, the inferred bearing capacities have been restricted to a maximum of 300kPa for the purposes of minimising unacceptable settlement.

Table 6: Inferred Allowable Bearing Capacities

Depth (mbgl)	Strata Description	Minimum N Value	Presumptive Bearing Capacity (kPa) [a]	Allowable Bearing Capacity (kPa)
1	Soft CLAY	5	<75	50[b]
2				
3	Stiff CLAY	13	150 - 300	120[b]
4		17		155[b]
5	Very Stiff CLAY	28	300 - 600	255[b]
6	Hard CLAY	>50		300[b]

a. For preliminary design purposes, BS 8004:2015 Code of practice for foundations gives typical values of allowable bearing capacity which should result in an adequate factor of safety against shear failure without accounting for the settlement criteria. Acceptable settlement is often taken to lie within the range of 10-25mm, but is structure dependent. Anticipated settlement can be calculated using elastic methods and will vary according to foundation shape and soil stiffness.
b. Stroud and Butler's (1975) graph which shows Cu=4.5N for PI>30%, and increasing to Cu=8N for low plasticity clays (PI=15%). Allowable Bearing Capacity is assumed to be equal to 2 * Cu.

8.3 Influence of Trees on Required Foundation Depth

The NHBC recommends that except where founded on rock, any strip foundations should have a minimum depth of 450mm, measured from finished ground level, to their underside to avoid the action of frost. The depth of the foundation will however need to be varied depending on whether the building is likely to be in the zone of influence of trees and the volume change potential of the bearing strata.

In this case the site contains both Clay soils and is in the zone of influence of trees meaning that special precautions will need to be taken to protect against subsidence and/or heave.

The NHBC foundation depth calculator was used to determine the minimum foundation required for the development. The nearest trees are noted to be Bay Laurels, Cypress Leyland and Sycamore which are considered to have a moderate to high water demand. The Clay was found to have a maximum Modified Plasticity Index of 36% indicating a medium volume change potential. The slope of the site was considered to be less than 1 in 7. The results of the calculation, which are available in Appendix 8, indicate that a minimum required foundation depth of 1.43mbgl.

8.4 Foundation Suitability Assessment

The information presented in this section is concerned with the potential applicability of a variety of foundation types for the proposed development. It largely based on technical guidance issued by the NHBC (to which the user is referred for further clarification). Materials and workmanship should meet the requirements set out in this guidance.

The advice of a specialist Structural Engineer (and a specialist piling contractor if relevant) should be sought before proceeding with any foundation design. Structural calculations should be provided by the appointed Structural Engineer, confirming that the foundation design is suitable for bearing onto the ground, and that the ground bearing capacity safely supports the structure without unacceptable settlement before commencing any development.

It is proposed to construct a 3-storey residential building housing 6no. flats. The precise details of the anticipated foundation design were not available at the time of writing. Consequently, the observations presented below are relatively generic.

8.4.1 Conventional Shallow Foundations

Conventional shallow foundations (i.e. strip, trench fill, pad foundations formed at 2.5mbgl or less) are typically used where the loads imposed by a structure are low relative to the bearing capacity of the surface soils. The surface soil should have sufficient bearing capacity, and underlying weaker strata should not result in undue settlement.

Conventional strip foundations may be constructed practically and economically to a maximum depth of 2.5m. Trench fill foundations are likely to be most economic at depths below 1.5m but can be economic to depths up to 2.5m. Any foundation greater than 2.5mbgl would need to be designed by a suitable expert (i.e. a Structural Engineer) taking account of the likely movement of the soil on the foundations and substructure.

As discussed in section 8.3, due to the need to protect against shrinkage and/or heave, the minimum required foundation depth required for the proposed development was calculated as 1.43mbgl.

With regard to the bearing capacity of the soils, based on a 1m footing, a maximum safe allowable bearing capacity in the order of 50kPa was inferred in the soft CLAY encountered at 1 and 2mbgl. This is considered unlikely to be sufficient to support the proposed structure without unacceptable settlement occurring.

On this basis, shallow foundations are therefore considered unlikely to be appropriate for the proposed development. This conclusion will need to be reassessed by the Structural Engineer once the anticipated loads are known.

8.4.2 Raft Foundations

A raft foundation consists of a reinforced concrete slab, whose thickness and stiffness are designed to spread the applied loads over a large area in order to reduce the effects of differential foundation movements as a result of variable soil conditions or variations in loading. They are usually designed for sites with lightly loaded structures on soils with poor bearing capacity or where variations in soil conditions necessitate a considerable spread of the load, or for heavy loads (in place of isolated footing), where differential settlements are significant.

Due to the fact that the ground conditions are susceptible to heave or shrinkage (i.e. Clay soils and trees are present) and a minimum foundation depth in excess of 1.25m is required, rafts are considered unlikely to be appropriate for the proposed development.

8.4.3 Piled Foundations

Pile foundations are recommended for the proposed development. Depending on the anticipated loads, the piles should be extended such that they are firmly embedded within suitably competent ground, such as the hard CLAY which was encountered at 6mbgl.

Piles should be capped with an appropriate ground beam system. There should be adequate connections between the beam and the pile to ensure that the loads are transmitted effectively or that the beams are adequately restrained to the pile to resist uplift.

As it is beyond the scope of works to provide a full and detailed pile design, the advice of a specialist structural engineer and piling contractor should be sought in this respect.

8.5 Excavations

Shallow excavations (<1.5mbgl) for foundations and services are likely to require nominal side support in the short term. Temporary trench support, or battering of excavation sides, is likely to be required for all excavations that are to be left open for any length of time or where man entry is required. Normal safety precautions should be taken if excavations are to be entered.

Deeper excavations (i.e. > 1.50mbgl) may become unstable requiring temporary support (i.e. props) or shoring up in order to comply with current statutory safety regulations and to maintain the stability of the excavation sides.

In line with BS:6031 (2009), a risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015).

8.6 Groundwater Control

Although groundwater was not encountered as part of the investigation, some seepages could occur requiring pumping to be undertaken. No particular difficulties are envisaged in removing such water by conventional internal pumping methods from open sumps.

Any water pumped from excavations is likely to need to be passed via settlement tanks before being discharged to the sewer; discharge consents will also be required.

8.7 Chemical Attack on Buried Concrete

The soil samples tested were found to have water soluble sulphate contents ranging from 10 mg/l SO4 to 72 mg/l SO4, associated with alkaline pH values. The characteristic value (i.e. average of the highest two values) was calculated to be 48 mg/l indicating that the tested soils fall into Class DS-1 of the Building Research Establishments classification system Special Digest Part 1:2005 “Concrete in aggressive ground” (BRESD).

In these conditions, it is considered that deterioration of buried concrete due to sulphate or acid attack is not likely to occur. The final design of buried concrete according to Tables C1 and C2 of BRESD should be in accordance with Class DS-1 conditions and Aggressive Chemical Environment for Concrete ACEC Site Class AC-1.

9 INFORMATION GAPS AND UNCERTAINTIES

A number of assumptions have been made regarding the nature of the strata present at the site and its properties. It is possible that there may be areas of the site that have different characteristics to those observed during the ground investigation and outlined in this report. Should ground conditions differing significantly from those described in our report be encountered during foundation excavation, then the authors should be contacted immediately so that the details of this report can be updated accordingly.

10 ABBREVIATIONS

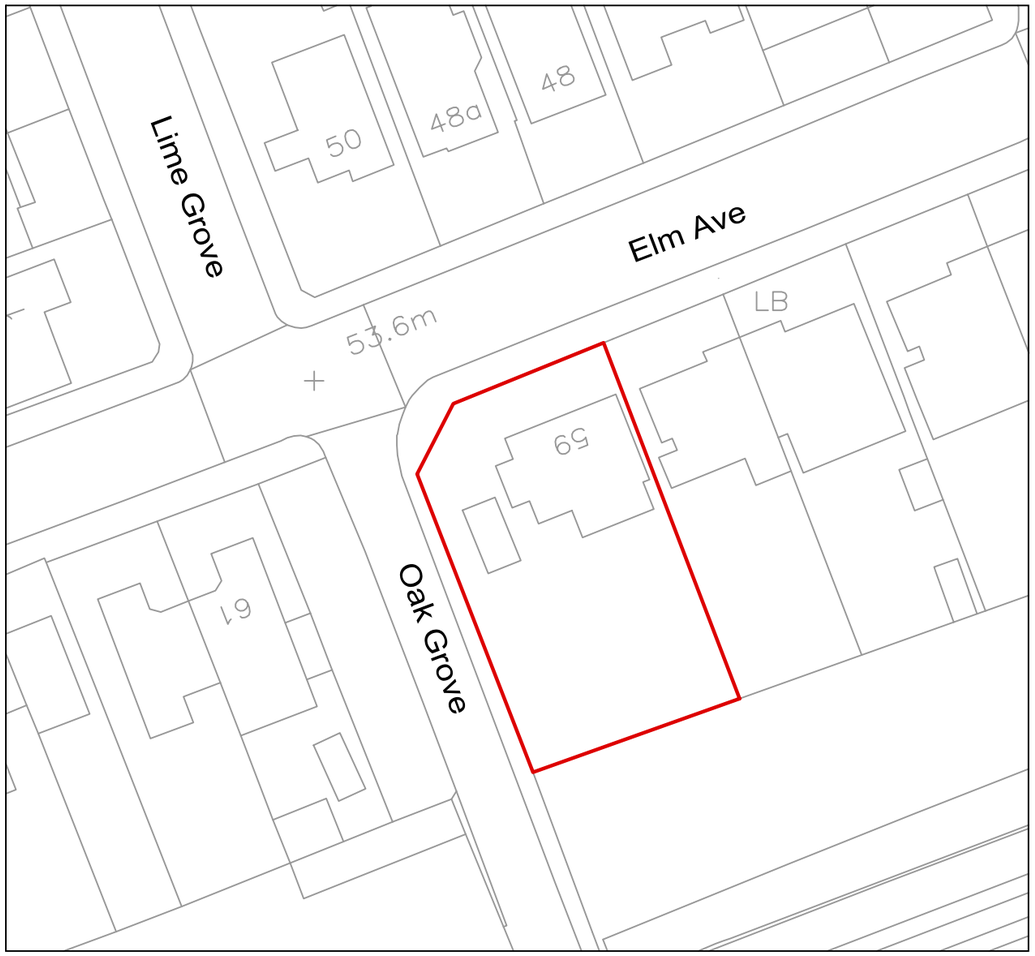
ABBREVIATION	DESCRIPTION
mbgl	metres below ground level
OS	Ordnance Survey
NPPF	National Planning Policy Framework
PI	Plasticity Index
MPI	Modified Plasticity Index
VCP	Volume Change Potential

11 REFERENCES

1. NHBC Standards 2018
2. BS 8004: (1986): Code of practice for foundations
3. Craig, R. F. (1986), Soil Mechanics, 4th ed., ISBN 0-412-38430-2
   Terzaghi, K. (1943): Theoretical soil mechanics, John Wiley and sons, New York

12 APPENDICES

12.1 Appendix 1 - Development Proposals and Tree Survey



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NORTH

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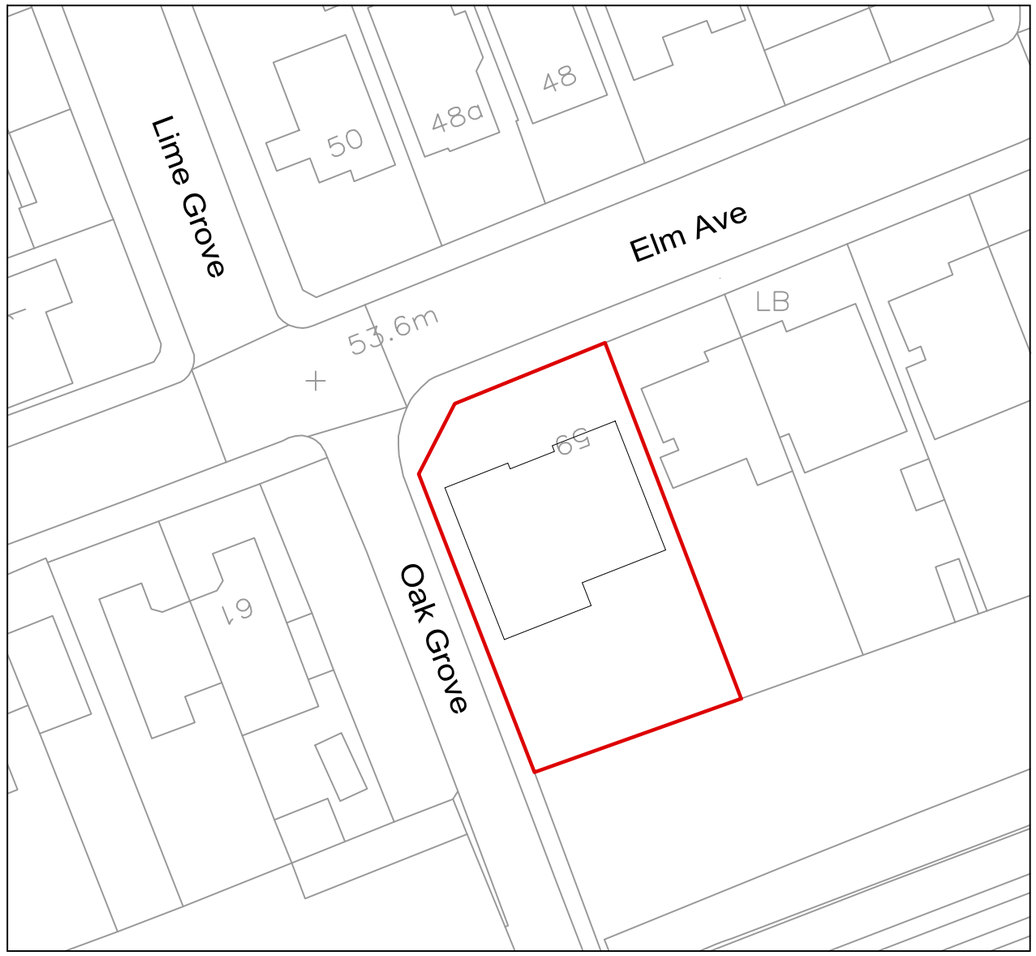

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NORTH

Proposed Site Plan Scale 1:500

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Revision	Date	Description

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
all dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be verified by the appointed contractor on site prior to engaging in works. any discrepancies must be reported to the architect/surveyor/engineer or responsible person/s immediately.
the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
the client/building owner must obtain any necessary party wall agreements, prior to engaging in the works on site.

3. this drawing is to be read in conjunction with all relevant architect's, service engineer's and drawings and specifications.

Paper Size: A3

Scale: 1:500

Revision: 1st

Nov-21

Drawn By/Checked By: ----

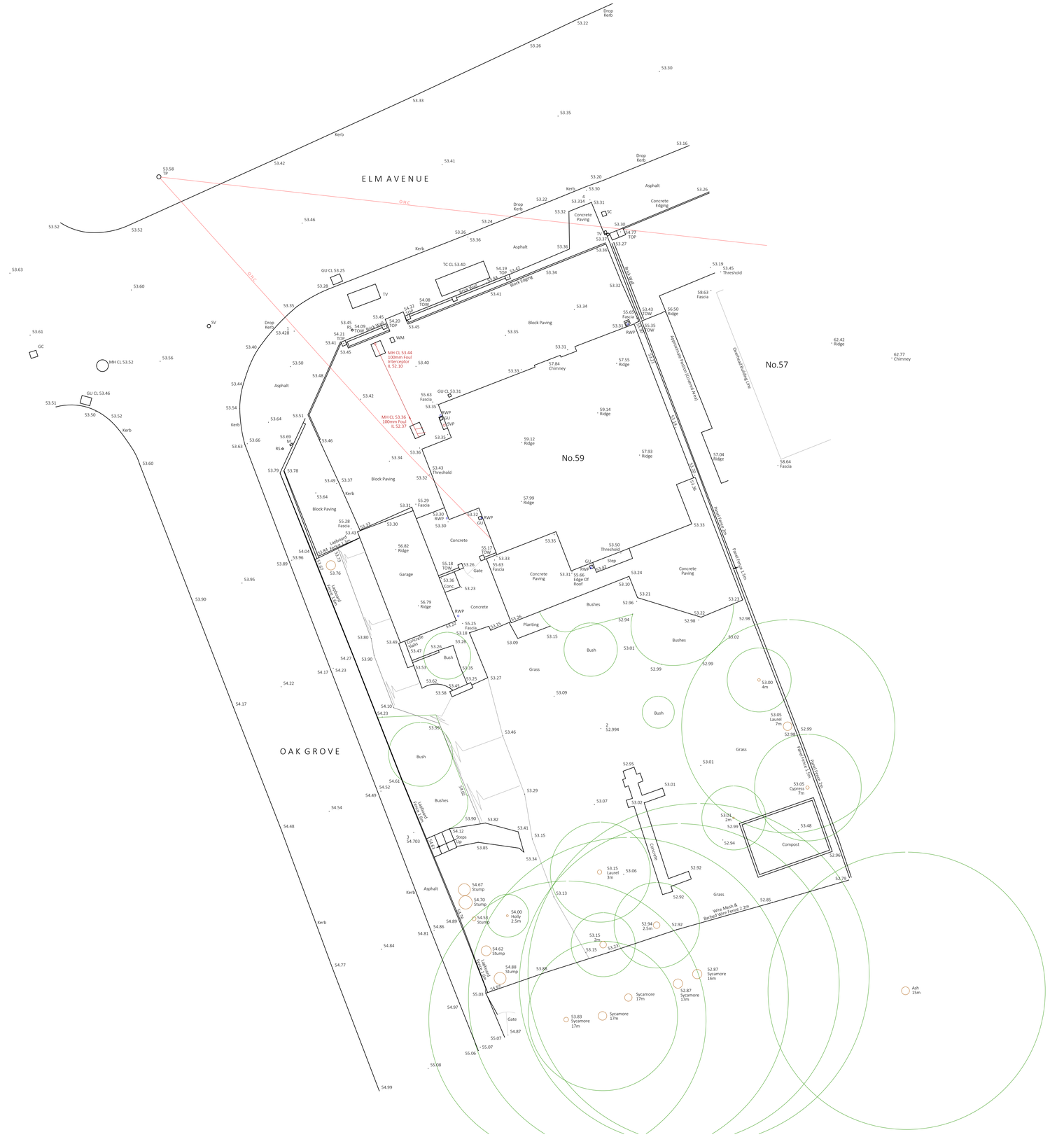
B-12 Development ®

Architectural consultancy

Site Address: 59 Elm Ave, Ruslip, HA4 8PE

Existing & Proposed Site Plan

Drawing Number: EA59-AP3-1002



Revision	Date	Description

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standard specifications.
all dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be verified by the appointed contractor on site prior to engaging in works. any discrepancies must be reported to the architect/surveyor/engineer or responsible person/s immediately.
the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
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2. this drawing is to be read in conjunction with all relevant architect's, service engineer's and drawings and specifications.

Paper Size: A1

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0 1 2 3 4 5 10m

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Revision: 1st
Sep-20
Drawn By/Checked By: ----

B-12 Development

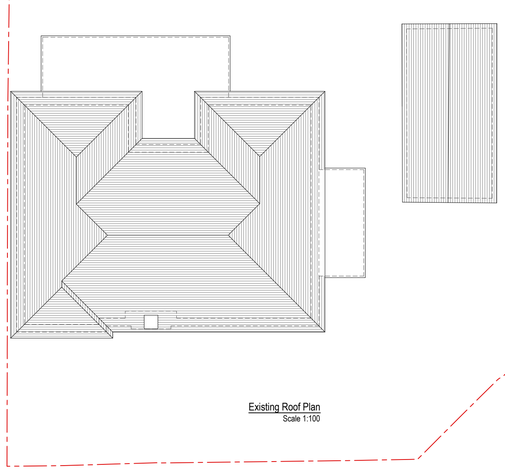
Architectural consultancy

Site Address: 59 Elm Ave Ruislip HA4 8PE

Level Survey

Drawing Number: SURVEY

Existing Ground Floor Plan
Scale 1:100



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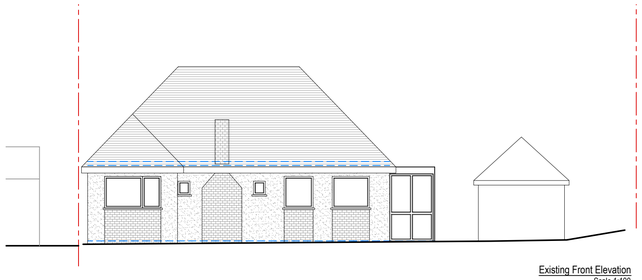
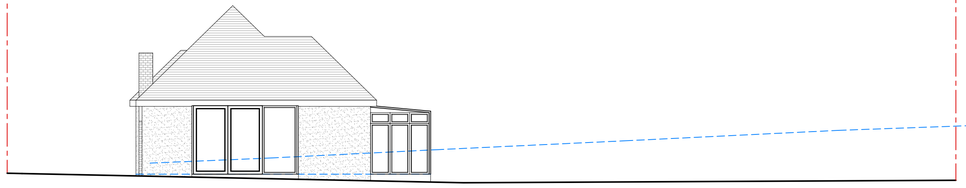


Existing Front Elevation
Scale 1:100

Existing Rear Elevation
Scale 1:100



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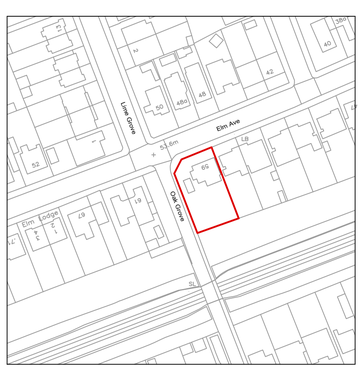

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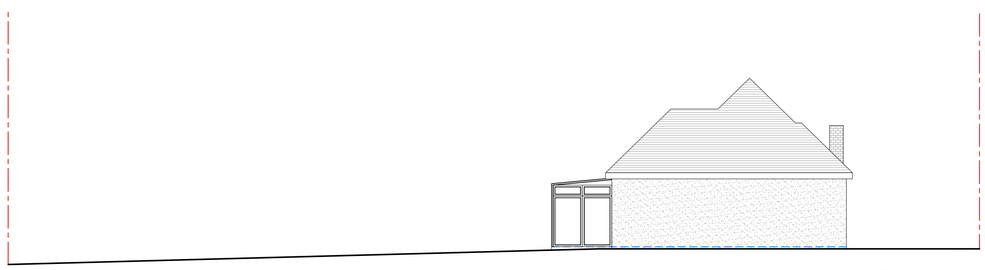

Existing Rear Elevation
Scale 1:100

Revision	Date	Description

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
all dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be verified by the appointed contractor on site prior to engaging in works. any discrepancies must be reported to the architect/surveyor/engineer or responsible persons immediately.
the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
the client/building owner must obtain any necessary party wall agreements, prior to engaging in the works on site.

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Paper Size: A1

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0 1 2 3 4 5 10m

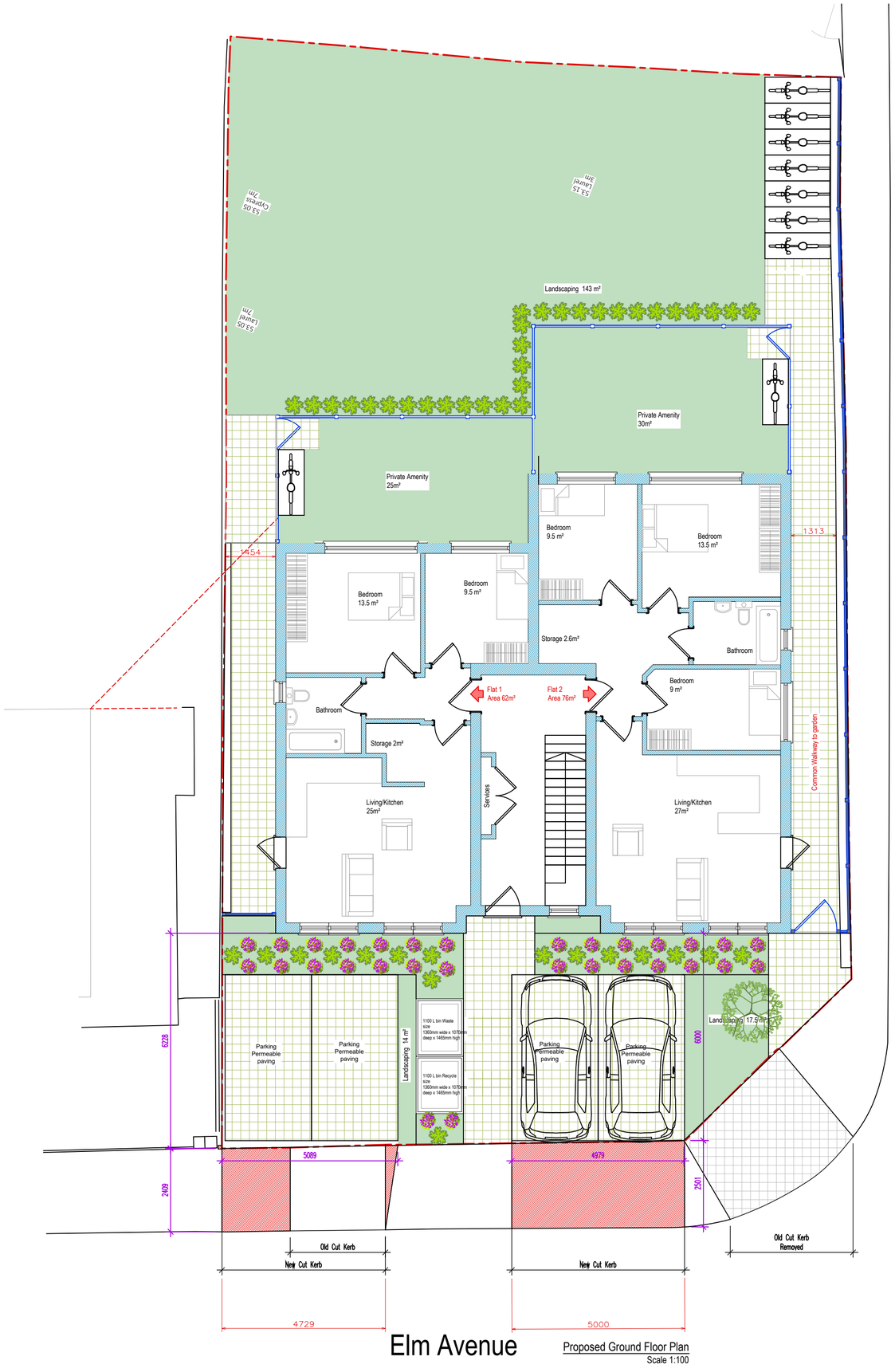
Scale: 1:100
Revision: 1st
Nov-21
Drawn By/Checked By: -----

B-12 Development
Architectural consultancy

Site Address: 59 Elm Ave, Ruislip, HA4 8PE

Existing Plans & Elevations

Drawing Number: EA59-AP3-1001



Proposed Ground Floor Plan
Scale 1:100

Revision	Date	Description
A	09.01.22	Internal Flat layout amended

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
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Paper Size
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0 1 2 3 4 5 10m

Scale
1:100

Revision
A

Nov-21

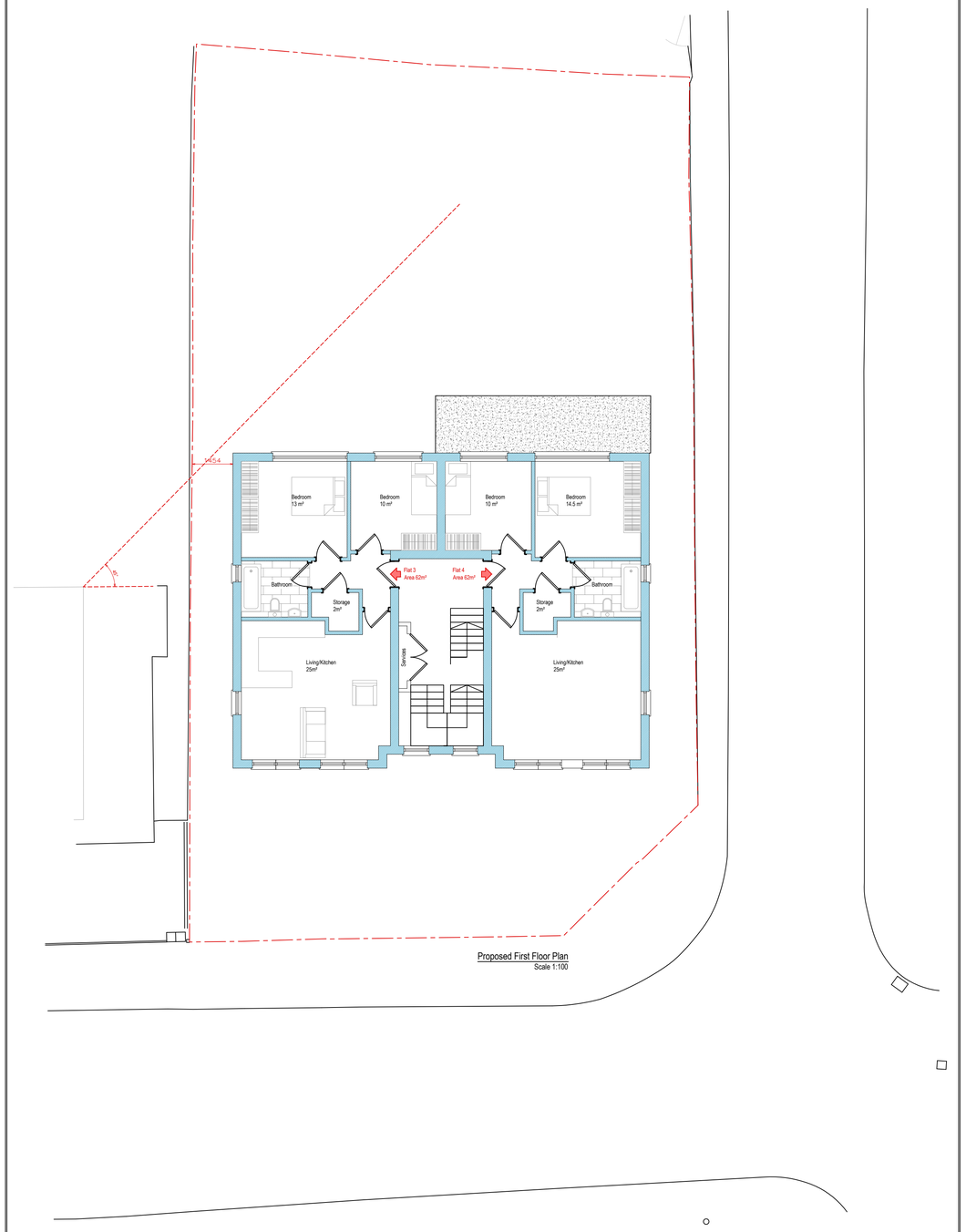
Drawn By/Checked By

B-12 Development
Architectural consultancy

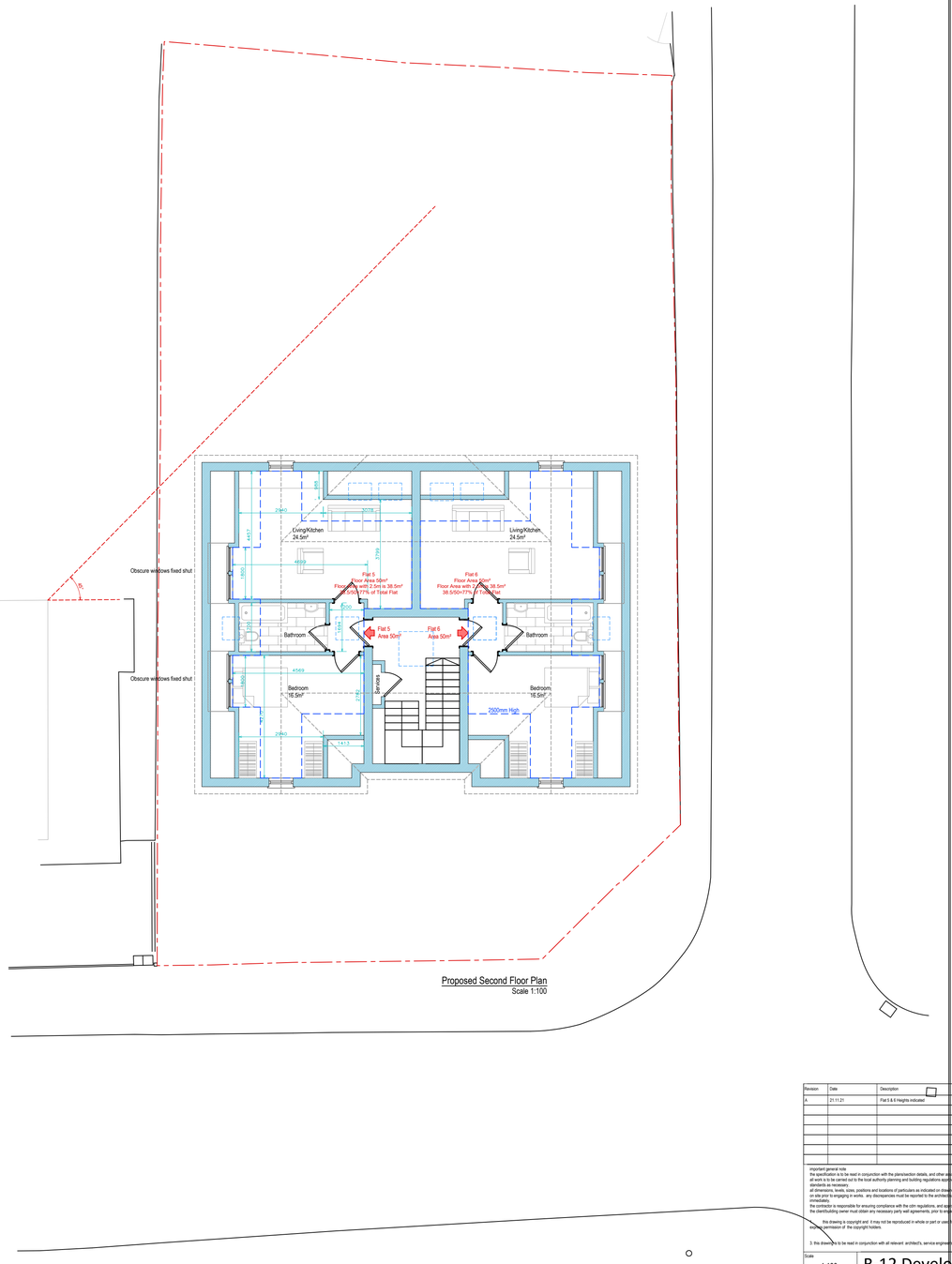
Site Address
59 Elm Ave
Ruslip
HA4 8PE

Block Plan Showing
Vehicular Crossover

Drawing Number
EA59-AP3-1009



Proposed First Floor Plan
Scale 1:100



Proposed Second Floor Plan
Scale 1:100

Revision	Date	Description
A	21.11.21	Flat 5 & 6 Heights indicated

Paper Size: A1

Scale: 1:100

0 1 2 3 4 5 10m

B-12 Development

Architectural consultancy

Revision: A

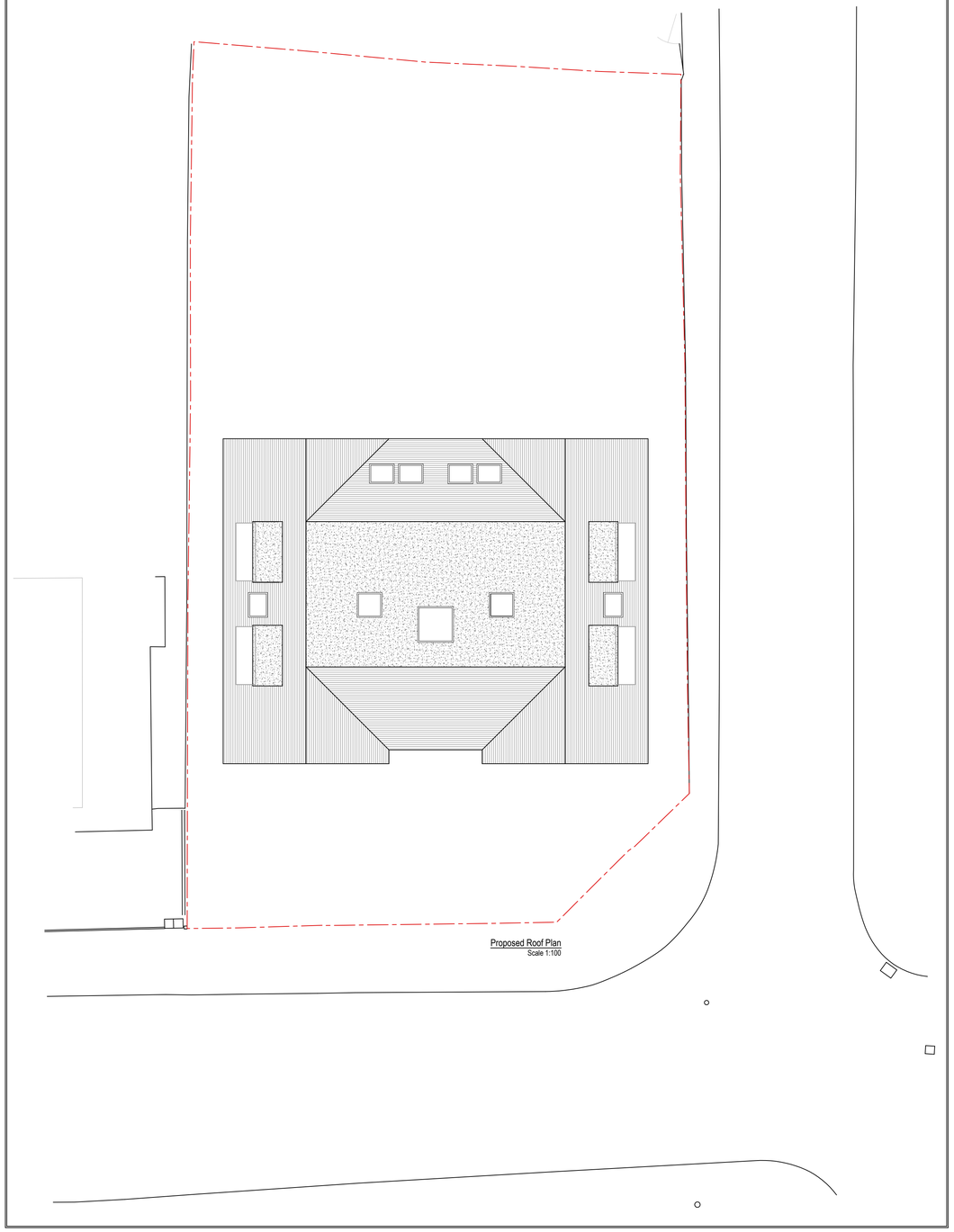
Date: Nov-21

Drawn By/Checked By: ----

Site Address: 59 Elm Ave, Ruslip, HA4 8PE

Proposed FF & SF Plan

Drawing Number: EA59-AP3-1004



Proposed Roof Plan
Scale 1:100

Revision	Date	Description
A	25.11.21	Dormer Revised

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be executed as set out to the local authority planning and building regulations approval, and the codes of practice and british standards as received.
all dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be verified by the appointed contractor on site prior to engaging in works. any discrepancies must be reported to the architect/surveyor/engineer or responsible person/s immediately.
the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
the client/building owner must obtain any necessary party wall agreements, prior to engaging in the works on site.

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0 1 2 3 4 5 10m

Scale: 1:100
Revision: A
Nov-21
Drawn By/Checked By: ----

B-12 Development

Architectural consultancy

Site Address:
59 Elm Ave
Ruislip
HA4 8PE

Proposed Roof Plan

Drawing Number: EA59-AP3-1005

Proposed Front Elevation
Scale 1:100

Proposed Side Elevation
Scale 1:100

Proposed Rear Elevation
Scale 1:100

Proposed Side Elevation
Scale 1:100

Revision	Date	Description
A	25.11.21	Elevations Revised

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all works are to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as received.
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0 1 2 3 4 5 10m

Scale
1:100

Revision
A

Nov-21

Drawn By/Checked By

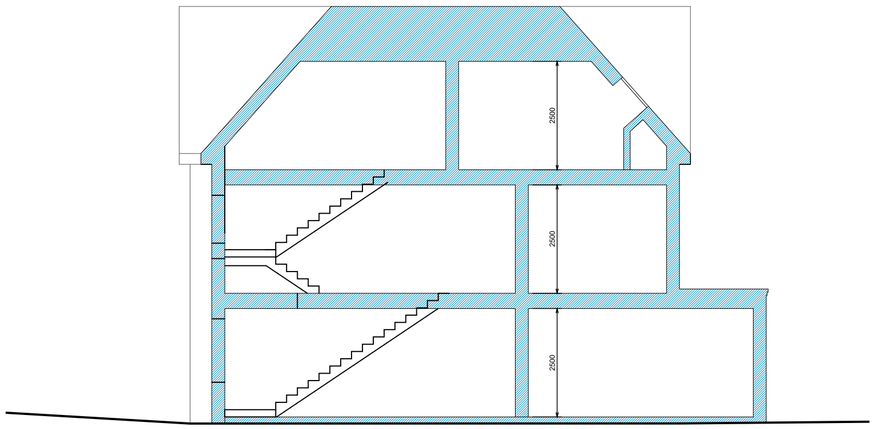
B-12 Development

Architectural consultancy

Site Address
59 Elm Ave
Ruislip
HA4 8PE

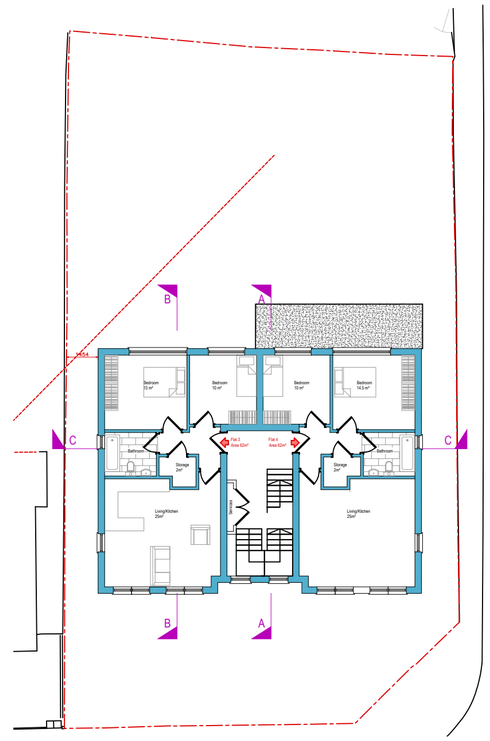
Proposed Elevations

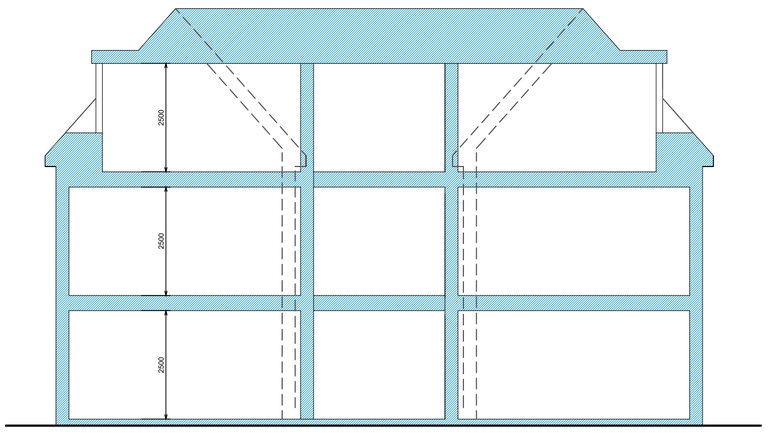
Drawing Number
EA59-AP3-1006



Proposed Section A-A
Scale 1:100

Proposed Section B-B
Scale 1:100





Proposed Section C-C
Scale 1:100

Revision	Date	Description
B	25.11.21	Section C-C Revised

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
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0 1 2 3 4 5 10m

Scale
1:100

Revision
A

Nov-21

Drawn By/Checked By

B-12 Development

Architectural consultancy

Site Address
59 Elm Ave
Ruslip
HA4 8PE

Proposed Sections

Drawing Number
EA59-AP3-1007

Proposed Front Elevation
Scale 1:100

Revision	Date	Description

important general note
the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
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Paper Size
A4

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0 1 2 3 4 5 10m

Scale
1:100

Revision
1st

Nov-21

Drawn By/Checked By

B-12 Development ®

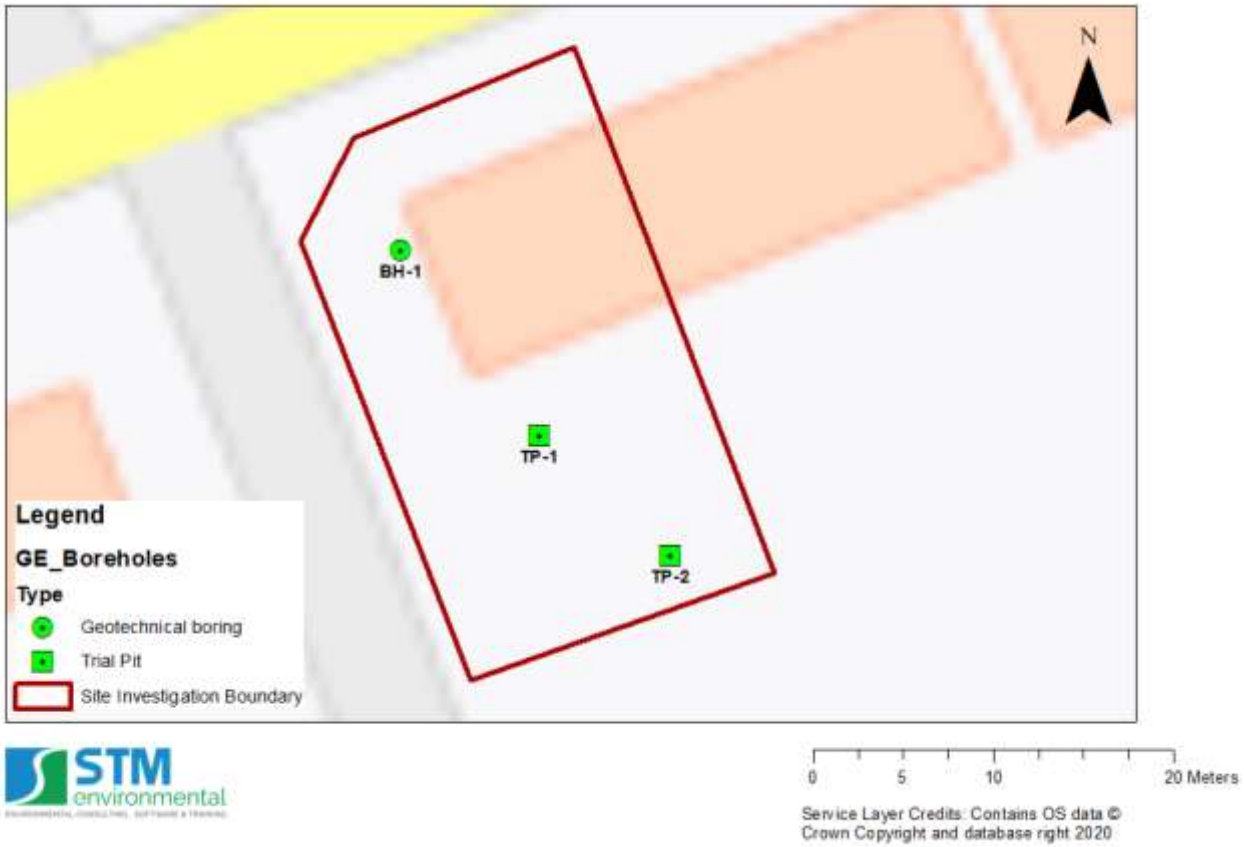
Architectural consultancy

Site Address
59 Elm Ave
Ruslip
HA4 8PE

Proposed Elevation
With Lift Overrun

Drawing Number
EA59-AP3-1010

12.2 Appendix 2 - Borehole Location Plan



12.3 Appendix 3 - Borehole Logs

Borehole Log

STM environmental			Borehole No. **BH01** Sheet 1 of 1
Project Name: 59 Elm Avenue, Ruislip	Project No. 59 Elm Avenue, Ruislip	Co-ords: 510934.00 - 187603.00	Hole Type WLS
Location: 59 Elm Avenue, Ruislip		Level: 54.00	Scale 1:50
Client: B12 Development Ltd		Dates: 14/03/2022 - 14/03/2022	Logged By MF/HM

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15	53.85		Made Ground - Paving slab over paving sand and type 1 gravel
					0.40	53.60		Soft brown silty CLAY Soft to firm light brown silty CLAY
		1.00 1.00	D	N=5 (1,1/1,1,1,2)				
		2.00 2.00	D	N=5 (1,1/1,1,1,2)				
					2.80	51.20		Firm to very stiff light brown and blueish grey mottled dark red silty CLAY
		3.00 3.00	D	N=13 (1,2/2,2,6,3)				
		4.00 4.00	D	N=17 (1,2/3,4,5,5)				
		5.00 5.00	D	N=28 (2,4/6,6,7,9)				
		6.00 6.00	D	N=50 (3,8/9,10,14,17)	6.00	48.00		End of borehole at 6.00 m

Remarks

Borehole advanced to a maximum depth of 6mbgl. No water encountered. Elevation levels and borehole location grid references are approximated based on satellite imagery (not measured).

AGS

12.4 Appendix 4 – Laboratory Certification and Results

Environmental
Chemistry

Certificate of Analysis

Client: STM ENVIRONMENTAL

Project: 22031455

Quote: BEC210720760

Project Ref: STM

Site: 59 Elm Avenue

Contact: Lab Info

Address: Unit 6, Crane Mews
32 Gould Road
Twickenham
London
TW2 6RS

E-Mail: labinfo@stmenvironmental.co.uk

Phone: 07554 195 695

No. Samples Received: 3

Date Received: 18/03/2022

Analysis Date: 30/03/2022

Date Issued: 30/03/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager

Amy Tave

01283 54447

Authorised by the Operations Manager
Becky Batham

Client: STM ENVIRONMENTAL
Project Name: STM
Project No: 22031455
Date Issued: 30/03/2022

Samples Analysed

Sample Reference	Text ID	Sample Date	Sample Type
BH01/1-0-ES-1.00	22031455-001	14/03/2022 00:00:00	SOLID
BH01/3-0-ES-3.00	22031455-002	14/03/2022 00:00:00	SOLID
BH01/5-0-ES-5.00	22031455-003	14/03/2022 00:00:00	SOLID

Client: STM ENVIRONMENTAL
Project Name: 59 Elm Avenue
Project No: 22031455
Date Issued: 30/03/2022

1252

Analysis Results

					Sample ID	001	002	003
					Customer ID	BH01/1-0-ES-1.00	BH01/3-0-ES-3.00	BH01/5-0-ES-5.00
					Sample Type	SOLID	SOLID	SOLID
					Sampling Date	14/03/2022	14/03/2022	14/03/2022
Analysis	**Method Code**	**MDL**	**Units**	**Accred.**				
pH (2.5:1 extraction)	PHSOIL	1	pH units	U		8.3	8.8	8.7
Water Soluble Sulphate as SO4 2:1 Ext	ICPWSS	10	mg/l	U		72	24	<10
Total Moisture at 105°C	TMSS	0.1	%	U		19.4	20.7	18.0
Total Moisture at 35°C	CLANDPREP	0.1	%	N		18.0	19.3	20.2
Description of Solid Material	CLANDPREP		-	N		CLAY	CLAY	CLAY

Client: STM ENVIRONMENTAL
Project Name: 59 Elm Avenue
Project No: 22031455
Date Issued: 30/03/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time

Analysis Method

Analysis	Analysis Type	Analysis Method
CLANDPREP	PHYS	As Received
ICPWSS	METALS	Air Dried & Ground
PHSOIL	INORGANIC	As Received
TMSS	PHYS	As Received

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are a follows:

Letter	Note
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing . Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

Client:	STM ENVIRONMENTAL
Project Name:	59 Elm Avenue
Project No:	22031455
Date Issued:	30/03/2022

HWOL Acronym Key

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° C.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis

SOCOTEC UK Limited
Unit 11
Cowley Mill Trading Estate
Longbridge Way
Uxbridge
Middlesex
UB8 2YG
Telephone: +44(0) 1895 235235
manprit.ahlawat@socotec.com

SOCOTEC

UKAS TESTING
0001

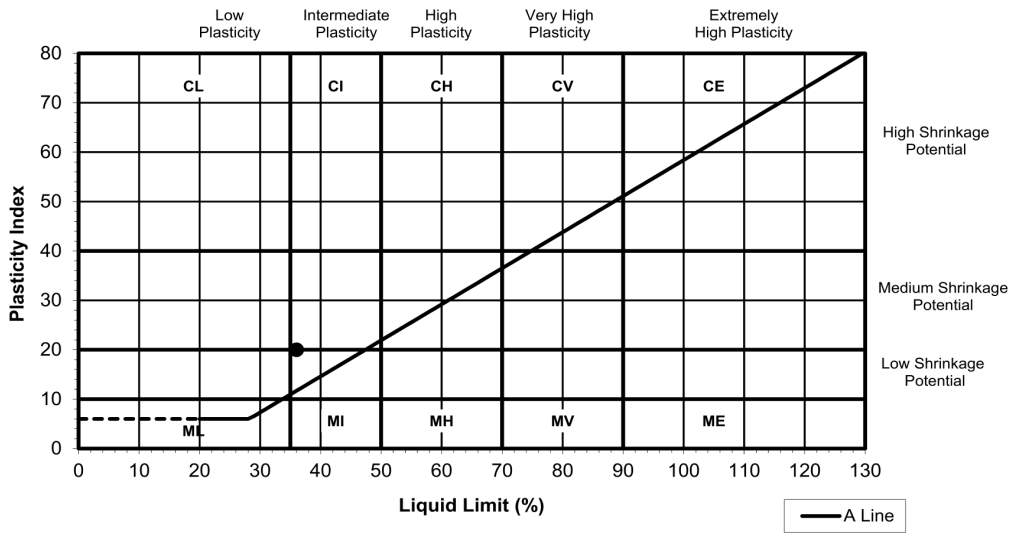
TEST REPORT

Liquid and Plastic Limit and Plasticity Index

Report No:	**UXB0541814/357/M2**	**Report Date:**	**28 March 2022**
		Our Contract Ref:	51068356
Client:	STM ENVIRONMENTAL LTD		
Address:	Unit 6 Crane Mews 32 Gould Road Twickenham TW2 6RS GB	Sample No.	26611357
		Client Sample Ref:	2
		Date Sampled:	14 Mar 2022
		Date Received:	15 Mar 2022
Client Contact:	Not Advised	Date Tested:	24 Mar 2022
Site:	**59 Elm Avenue**	Material Supplier:	Site
Location:	BH01/2	Material Source:	Site
Description:	Clay with Silt, Sand + Gravel	Sampling Certificate:	Received
Material Specification:	Not given	Samples Submitted by:	SOCOTEC Uxbridge
Sample Type:	Bulk Bags	Sampled by:	Client
Depth (m):	1.00 - 2.00	Tested By:	SOCOTEC Uxbridge
Method of Preparation:	BS 1377-1:1990 7.4.3 & BS1377-2:1990 4.2.4		

Results :

As Received Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
27	36	16	20	94



Sample Preparation: **Washed over 425um BS test sieve**

Certified that the laboratory testing was carried out in accordance with BS1377-2:1990 Method 3.2, 4.4 and 5

Signed: MAhlawat

Manprit Ahlawat - QA & Technical Support
for and on behalf of SOCOTEC UK Limited

Form S1 v9 7/06

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Cowley Mill Trading Estate
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Uxbridge
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UB8 2YG
Telephone: +44(0) 1895 235235
manprit.ahlawat@socotec.com

SOCOTEC

UKAS TESTING
0001

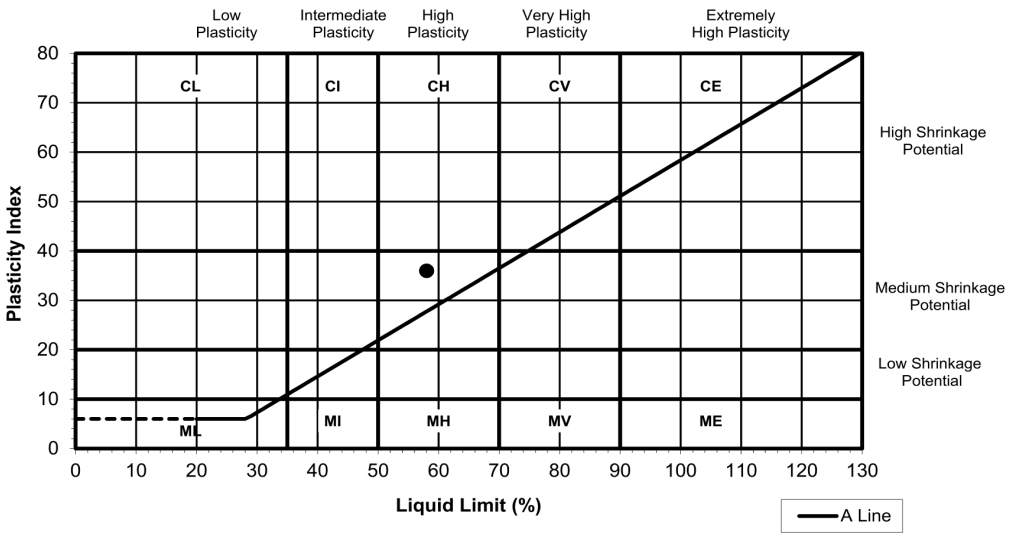
TEST REPORT

Liquid and Plastic Limit and Plasticity Index

Report No:	**UXB0541814/359/M2**	**Report Date:**	**28 March 2022**
		Our Contract Ref:	51068356
Client:	STM ENVIRONMENTAL LTD		
Address:	Unit 6 Crane Mews 32 Gould Road Twickenham TW2 6RS GB	Sample No.	26611359
		Client Sample Ref:	4
		Date Sampled:	15 Mar 2022
		Date Received:	15 Mar 2022
Client Contact:	Not Advised	Date Tested:	22 Mar 2022
Site:	**59 Elm Avenue**	Material Supplier:	Site
Location:	BH01/4	Material Source:	Site
Description:	Clay	Sampling Certificate:	Received
Material Specification:	Not given	Samples Submitted by:	SOCOTEC Uxbridge
Sample Type:	Bulk Bags	Sampled by:	Client
Depth (m):	3.00 - 4.00	Tested By:	SOCOTEC Uxbridge
Method of Preparation:	BS 1377-1:1990 7.4.3 & BS1377-2:1990 4.2.3		

Results :

As Received Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
26	58	22	36	100



Sample Preparation: **As Received, coarse particles removed by hand prior to test**

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SOCOTEC

UKAS TESTING
0001

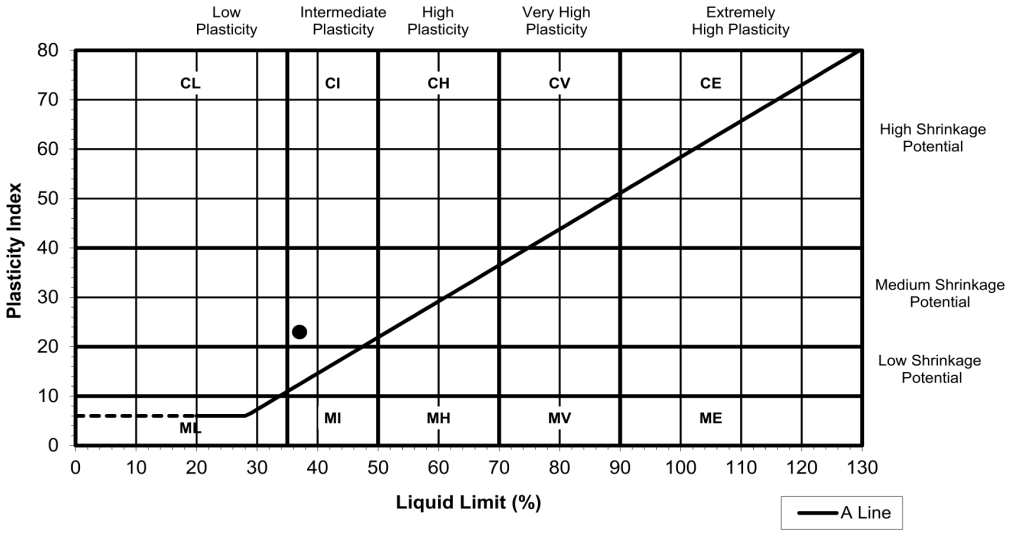
TEST REPORT

Liquid and Plastic Limit and Plasticity Index

Report No:	**UXB0541814/361/M2**	**Report Date:**	**28 March 2022**
		Our Contract Ref:	51068356
Client:	STM ENVIRONMENTAL LTD		
Address:	Unit 6 Crane Mews 32 Gould Road Twickenham TW2 6RS GB	Sample No.	26611361
		Client Sample Ref:	6
		Date Sampled:	15 Mar 2022
		Date Received:	15 Mar 2022
Client Contact:	Not Advised	Date Tested:	22 Mar 2022
Site:	**59 Elm Avenue**	Material Supplier:	Site
Location:	BH01/6	Material Source:	Site
Description:	Clay + Silt	Sampling Certificate:	Received
Material Specification:	Not given	Samples Submitted by:	SOCOTEC Uxbridge
Sample Type:	Bulk Bags	Sampled by:	Client
Depth (m):	5.00 - 6.00	Tested By:	SOCOTEC Uxbridge
Method of Preparation:	BS 1377-1:1990 7.4.3 & BS1377-2:1990 4.2.3		

Results :

As Received Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
14	37	14	23	100



Sample Preparation: **As Received, coarse particles removed by hand prior to test**

Form S1 v9 7/06

12.5 Appendix 5 – Site Photographs

Photograph of windowless sampler rig in operation at location BH01

6m of core extracted from location BH01

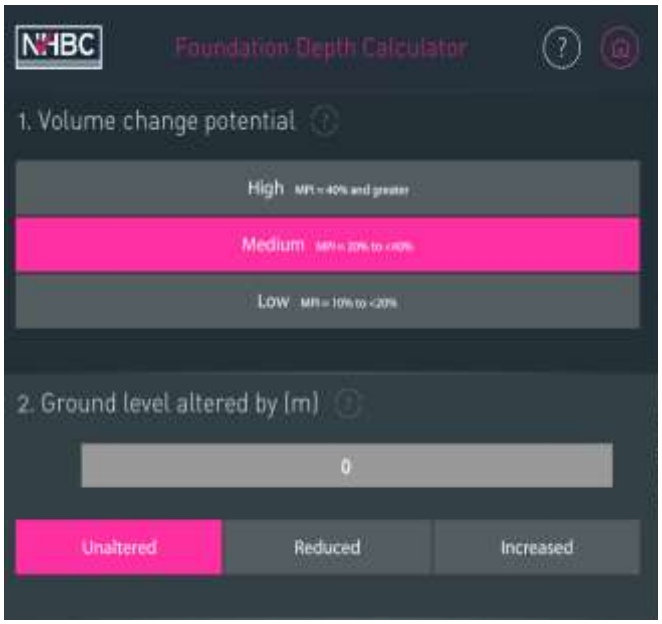
View of trees present at the Site

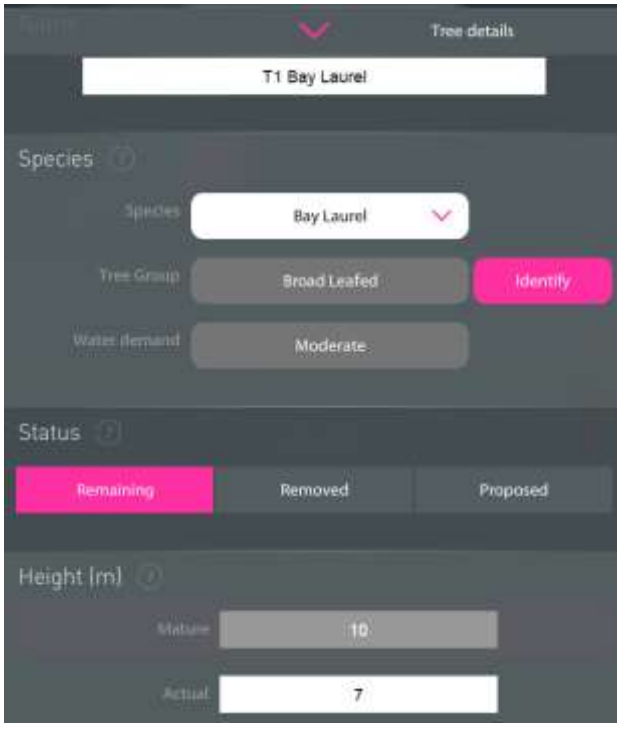
View of trees present at the Site

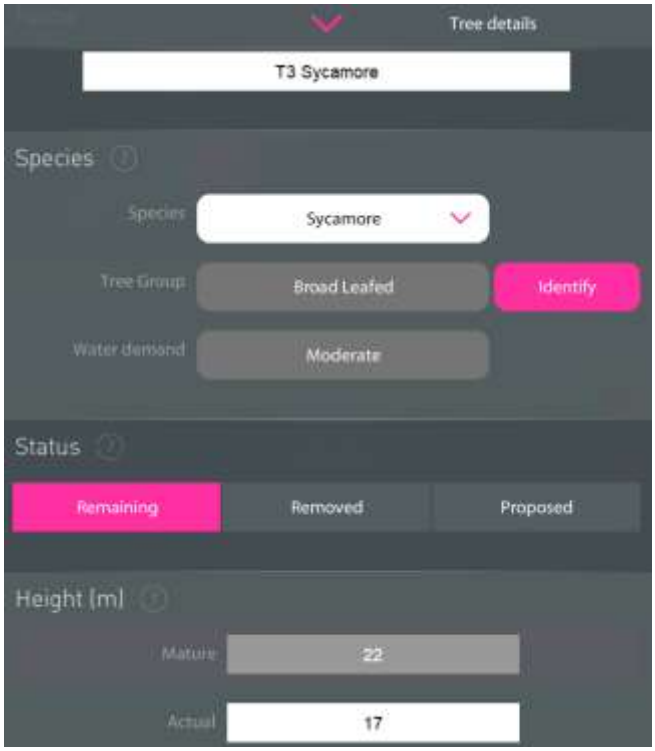
12.6 Appendix 6 – Results of Standard Penetration Testing

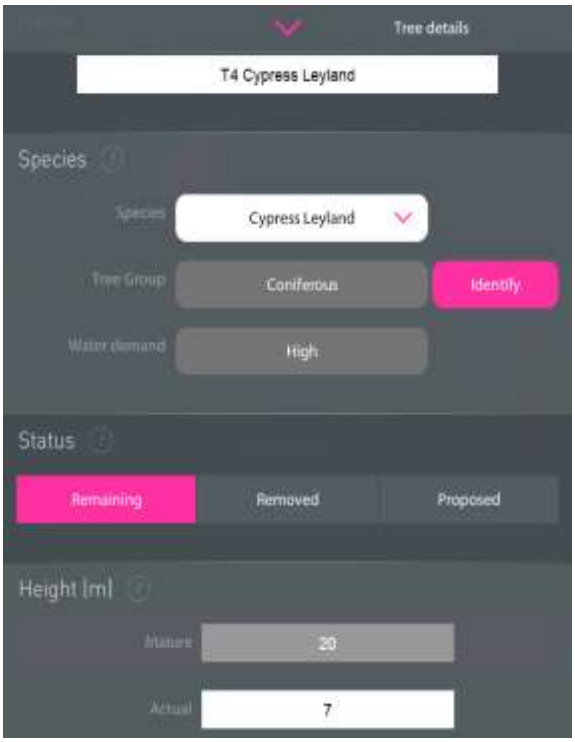
Location ID	Depth Top (m)	Blows Seating 1	Blows Seating 2	Blows Main 1	Blows Main 2	Blows Main 3	Blows Main 4	N Value
BH01	1	1	1	1	1	1	2	**5**
	2	1	1	1	1	1	2	**5**
	3	1	2	2	2	6	3	**13**
	4	1	2	3	4	5	5	**17**
	5	2	4	6	6	7	9	**28**
	6	3	8	9	10	14	17	**>50**

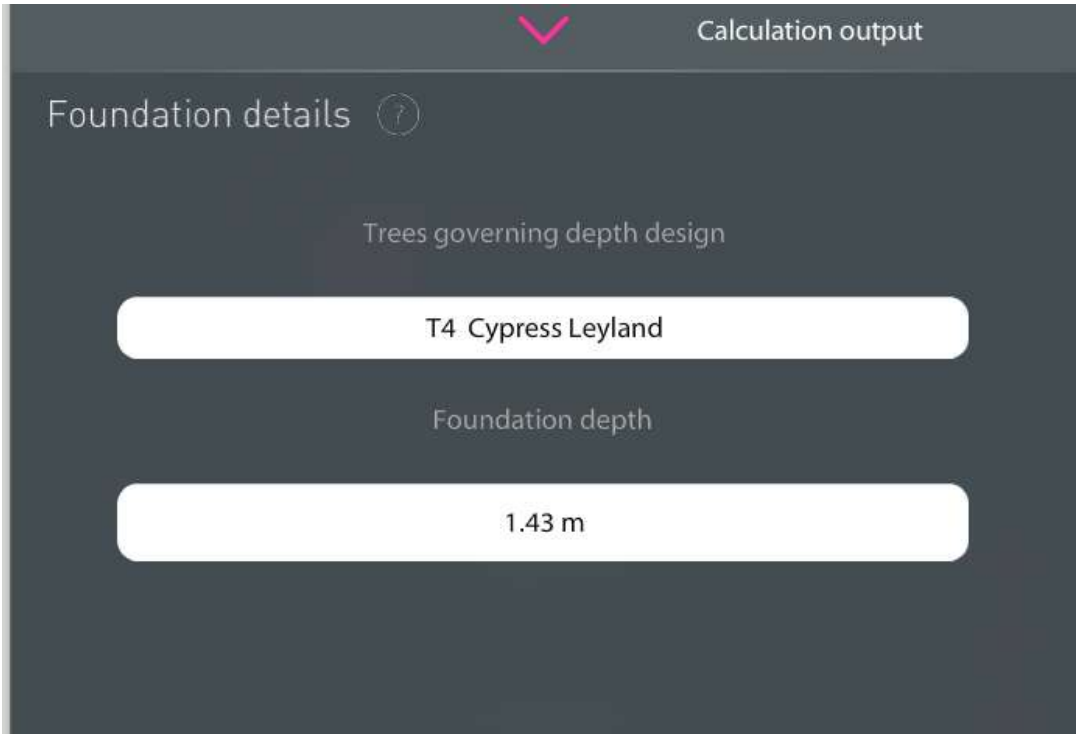
12.7 Appendix 7 – Foundation Depth Calculator Results






Tree details
T3 Sycamore
Species
Species
Sycamore
Tree Group
Broad Leafed
Identify
Water demand
Moderate
Status
Remaining
Removed
Proposed
Height [m]
Mature
22
Actual
17


Tree details
T4 Cypress Leyland
Species
Species
Cypress Leyland
Tree Group
Coniferous
Identify
Water demand
High
Status
Remaining
Removed
Proposed
Height [m]
Mature
20
Actual
7


Calculation output
Foundation details
Trees governing depth design
T4 Cypress Leyland
Foundation depth
1.43 m