

# **Total Design Consultancy Services LLP**

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**3 Bowmans Close, Welwyn, Herts, AL6 9QE**

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**Tel. 07831 268468**

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**TORMEAD, 27 DENE ROAD  
NORTHWOOD**

**BASEMENT IMPACT  
ASSESSMENT**

**DATE: OCT 24**

**CLIENT: GAVACAN HOMES LTD**

**JOB NO:608**

# 1. Background

The proposed development comprises a new block flats over 4 floors, including a basement, ground floor, first floor and second floor with associated surface car parking. The scheme is an extension of an existing block of flats.

The site currently consists of an existing property known as "Tormead, 27 Dene Road, Northwood", the site has a cross fall of approximately .2m and a fall from the front boundary to the rear garden of 6m, the site comprises various mature trees including cypress, yew and fruit trees. (Planning scheme see appendix c)

## 2. Ground Model

A desk top study of the site revealed that the site has been occupied by the existing residential property for the entirety of its developed history.

Referring to geological records and site investigation encountered at No.27 Dene Road, Northwood the site geological conditions can be summarised as follows:-

- Shallow top soil / made ground
- Overlying
- London Clay formation

During the fieldwork ground water was encountered at a depth of 9.2m some 5m below any proposed excavation depth. (see Appendix A for borehole record)

### 3. Flood Risk Assessment

Referring to Enviroment Agency Database the site lies in floor zone 1, an area with a very low probability of flooding. (see appendix B for records)

The floor risk detailed assessment for 1:100+ year storm event, indicates the site is outside any area for flooding.



## **4. Proposed Basement Construction**

In view of the depth of the basement construction and the associated depth of basement excavations, precautions will be required in order to safe guard the existing propertie as outlined below:-

- Existing Block of flats to No.27 dene Road, Northwood is a existing building of 1980 construction

Trial pits were undertaken to establish the depth of the foundations to the adjoining owners property, to the rear of the existing property a lower ground floor was proved of similar level to the new proposed lower ground floor level.

The single storey extension to the front of the existing building did not have a lower ground floor and comprise a single storey construction starting at ground floor level.

In order to construct the proposed new build basement a bored pile wall will be constructed around the proposed basement foot print to enable the basement excavation and works to progress in a safe environment, protecting the neighbouring properties from any potential settlement.

The proposed method of construction and relationship to the adjoining properties is illustrated in Appendix D of this report.

Due to the fact that ground water was encountered at a depth of 9.2m during the adjacent site investigation works, it is considered only localised pumping will be required to deal with ground water collected during times of rainfall.

## 5. Ground Water Flooding and Drainage Risks.

Due to the fact that ground water was encountered during the adjacent site investigation works at a depth of 9.2m for 5m below the level of any proposed excavations , and the desk top study highlighted the site to be contained within a flood zone 1 with no flooding risk during a 1:100+ year storm event. It is considered that the risk of the proposed development causing any flooding or drainage issues are negligible.

We trust the above is of assistance and should you require anything further please contact the writer.

Yours sincerely,



Damon K.C. Smith

**BEng(Hons) MSc CEng MIStructE**

## **APPENDIX A : SI DATA**



# HESI

Herts & Essex Site  
Investigations

Unit J8 | Peek Business Park | Woodside | Bishops Stortford | CM23 5RG

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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

## GEOTECHNICAL REPORT

Site Address:	27 Dene Road, Northwood, HA6 2BX
Report Date:	30 <sup>th</sup> May 2024
Project No.:	18939
Prepared for:	Gavacan Homes 58b & 58c, High Street, Pinner, Middlesex, HA5 5PZ



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## APPENDICES

APPENDIX 1 – Site Plan

APPENDIX 2 – Borehole Log

APPENDIX 3 – Laboratory Testing



## SUMMARY

ADDRESS: 27 Dene Road, Northwood, HA6 2BX

### SOILS PROFILE

Location	Depths (m)	Made Ground	Natural Soils
<b>BH1</b>	GL – 0.80m bgl	Crushed brick hardcore – MADE GROUND	
	0.80m bgl – 7.20m bgl		Firm – very stiff slightly silty CLAY
	7.20m bgl – 9.40m bgl		Stiff – very stiff sandy / silty CLAY
	9.40m bgl – 25.00m bgl		Stiff – very stiff silty CLAY

### ROOT SYSTEM OVERVIEW

Location	Depth Recorded (m)	Identification (If completed)
<b>BH1</b>	2.00m bgl	-

### GROUNDWATER OVERVIEW

Location	Depth Water Struck (m)	Depth of Standing Water (m)	Rate of Inflow
<b>BH1</b>	9.20m bgl	-	Slow

### SOIL ANALYSIS: Cohesive Soils

<b>Casagrande Plasticity Classification:</b>	Intermediate – Very High
<b>Plasticity Index:</b>	17 - 44 %
<b>NHBC Shrinkability Classification:</b>	Low - High
<b>Significant Desiccation:</b>	No Significant desiccation was recorded within the samples tested
<b>Sulphate Content:</b>	DS-1/AC-1s to DS-3/AC-2s

### SOIL ANALYSIS: Granular Soils

No granular soils were encountered upon the site.

## 1. Introduction

- 1.1 All site investigation works have been undertaken in accordance with BS5930:2015+A1:2020, (Code of Practice for Ground Investigations).
- 1.2 In accordance with your instructions, we visited the above site during the 9<sup>th</sup> & 10<sup>th</sup> May 2024.
- 1.3 The comments and opinions expressed are based purely on the conditions encountered and the subsequent laboratory testing. The locations of the excavations have been assessed on site.
- 1.4 Some special condition may be present on site that, to date, has not been encountered within the scope of the site investigation works and therefore will not have been considered within this report.
- 1.5 Unless otherwise stated, all groundwater recordings relate to short term observations and do not consider fluctuations in elevation due to seasonal, tidal or other effects. It is possible that fluctuations in the groundwater elevation may have an impact on the proposed design and as such, it is recommended that long term monitoring is undertaken to obtain accurate information relevant to the proposed design in terms of the ground water level.

## 2. Description of Site

- 2.1 The site is formed by a two-storey residential structure surrounded by soft & hard landscaping.
- 2.2 The site is shown within the British Geological Survey Online Geology Viewer (Scale 1:50 000, Solid & Drift), which shows that the site situated with an area of London Clay Formation - Clay, silt, and sand.

## 3. Fieldwork

- 3.1 In order to assess the site, the proposals have been made to assess the deeper soils, the following site investigation works were implemented.
  - 1 No shell & auger rig boreholes were sunk to a depth of 25m bgl.
  - Geotechnical Laboratory Testing.
- 3.2 The location of these works is indicated on the site plan-forming Appendix 1.
- 3.3 The various strata encountered were noted and are recorded on the excavation logs forming Appendix 2.
- 3.4 Full ranges of samples were recovered as noted and retained for subsequent laboratory testing.

#### 4. Laboratory Testing

- 4.1 Laboratory testing has been undertaken in accordance with BS 1377-2:2022, (Methods for Tests for Soils for Civil Engineering Purposes), the results of which are enclosed.
- 4.2 Selected samples were recovered to determine their Atterberg Limits, Triaxial Testing, Soluble Sulphate value and pH.
- 4.3 The results of this laboratory testing are enclosed and form Appendix 3.

#### 5. Fieldwork Results

- 5.1 Based on the borehole logs which can be found forming Appendix 2 a reviewed of the geology within the site is as follows :-

*Table 1 Geological Profile*

<b>Location</b>	<b>Depths (m)</b>	<b>Made Ground</b>	<b>Natural Soils</b>
<b>BH1</b>	GL – 0.80m bgl	Crushed brick hardcore – MADE GROUND	
	0.80m bgl – 7.20m bgl		Firm – very stiff slightly silty CLAY
	7.20m bgl – 9.40m bgl		Stiff – very stiff sandy / silty CLAY
	9.40m bgl – 25.00m bgl		Stiff – very stiff silty CLAY

*Table 2 Groundwater Overview*

<b>Location</b>	<b>Depth Water Struck (m)</b>	<b>Depth of Standing Water (m)</b>	<b>Rate of Inflow</b>
<b>BH1</b>	9.20m bgl	-	Slow

- 5.2 Groundwater records, unless otherwise stated, are based on short-term observations, and do not allow for or consider seasonal or other fluctuations, global warming, or periods of excessive wet or dry weather. All groundwater records are noted at the time of the drilling works and any other subsequent groundwater readings taken which, if present, are shown. Should the development be reliant on groundwater impacting on either below ground excavations, basements or short- or long-term excavations, HESI would recommend the installation of standpipes to depths relevant to any proposed excavation works and a period of either short- or long-term monitoring. This can be completed on request.

- 5.3 Roots were encountered within the boreholes based on examination of the soil samples across the site as shown below and recorded within the attached sample logs in Appendix 2.

*Table 3 Root Profile*


<b>Location</b>	<b>Depth Recorded (m)</b>	<b>Identification (If completed)</b>
<b>BH1</b>	2.00m bgl	-

## 6. Results

- 6.1 By inspection of the borehole logs and from a visual assessment of the samples recovered, a scheme of laboratory testing has been undertaken. The results are enclosed within Appendix 3 and prove the following:
- 6.2 Undrained triaxial testing was also completed on undisturbed samples recovered from the site works, which confirmed that the undrained shear strength of the subsoil is measured as between 30 & 210 kN/m<sup>2</sup>.
- 6.3 SPT N-Values have been completed within the boreholes completed at the site. It is confirmed within the borehole logs forming Appendix 2 of this report that SPT N-Values of between 10 - 69 were achieved. This would indicate an approximate allowable bearing capacity of between 100 kN/m<sup>2</sup> to 150 kN/m<sup>2</sup> would be recognized. If groundwater is present within close proximity to the proposed founding depths, any allowable bearing capacity identified as a result of calculations undertaken as a result of the site investigation should be halved.
- 6.4 Where the SPT N-Value test is completed in fine grained soils, the displacement of the pore water pressure is reduced due to permeability and as such, artificially high. As such, any SPT N-Value test completed in fine grained soils should be halved.
- 6.5 Atterberg Limits tests proved the clay soils to be of intermediate to very high plasticity, (PI= 17 - 44%), which indicates a low - high susceptibility to movement associated with moisture content change.
- 6.6 Included within the laboratory testing was sulphate analysis, which can determine the use of sulphate resisting cement within the foundation design for the development. The results are enclosed and prove the classification in accordance with ACEC to be DS- 3 /AC-2s.

I hope the foregoing is sufficient for your requirements, although please do not hesitate to contact us should require any further information regarding the above.

Yours faithfully

  
D A Hudd  
Senior Contract Engineer  
C S Gray MSc  
Principal Engineer





**HESI**

Herts & Essex Site  
Investigations

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Appendix No 1

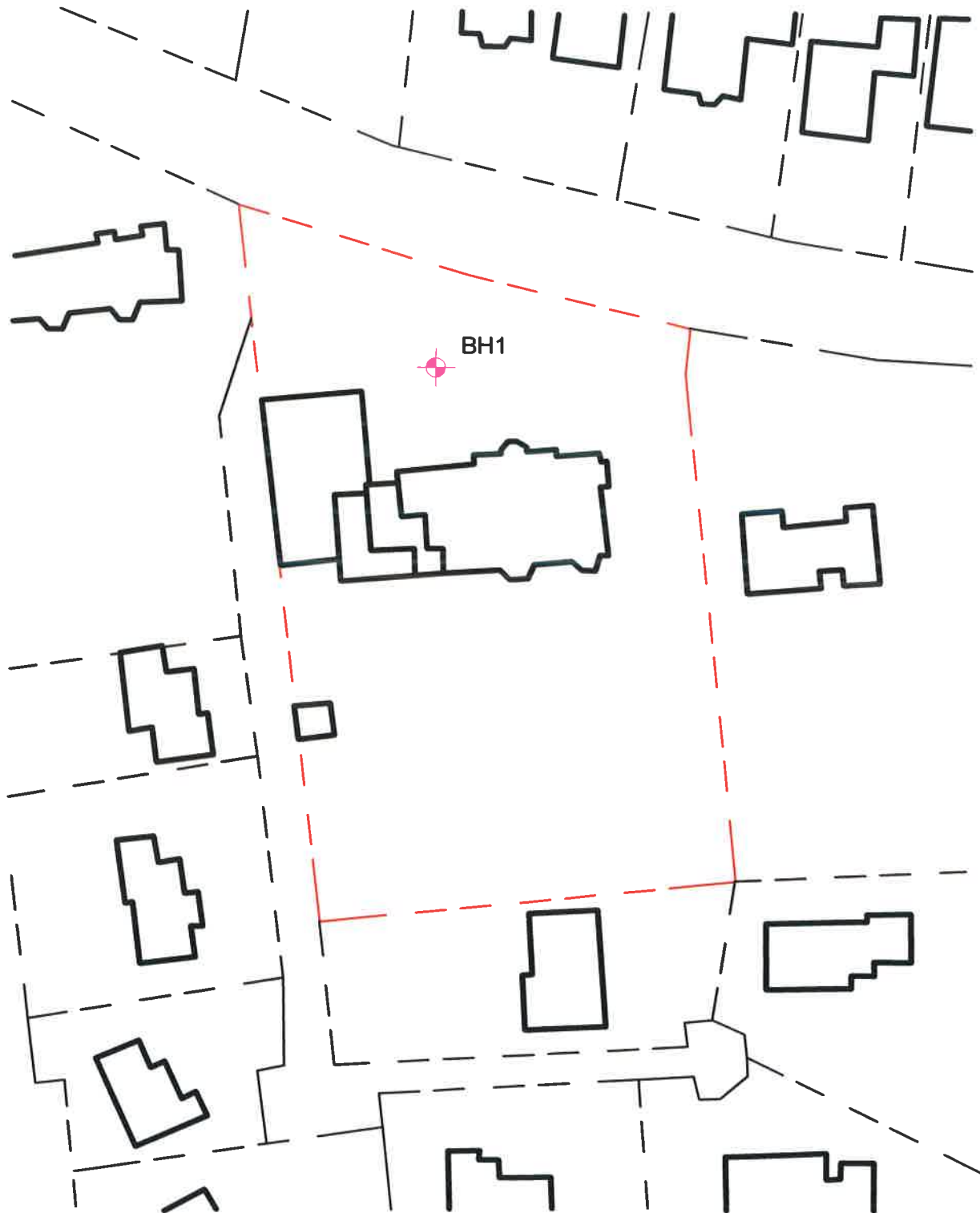
Sheet No 1

Job No 18939

Date May 2024

27 Dene Road, Northwood, HA6 2BX

## Site Plan



Not to Scale

**27 Dene Road, Northwood, HA6 2BX**
**Borehole One**


Description of Stratum	Legend	Depth (m bgl)	Strata Thickness (m)	Water Level (m bgl)	Samples			S.P.T N-Value or Vane Strength	Installations	Casing Depth, (m)
					No.	Type	Depth (m bgl)			
Crushed brick hardcore - MADE GROUND			0.80							
1.0 Soft - firm mottled brown / grey slightly silty CLAY		0.80	0.80		1 1	D U	0.90 1.00			
		1.70			2	D	1.50			
2.0 Firm - stiff brown slightly silty CLAY			2.20		1	N	2.00	10		
					3	D	2.45			
					2	U	3.00			
					4	D	3.50			
		4.50			2	N	4.00	12		
					5	D	4.45			
5.0 Stiff - very stiff mottled brown / grey slightly silty CLAY with CLAYSTONE fragments		5.60			3	U	5.00			
					6	D	5.50			
6.0 Very stiff brown slightly silty CLAY with lens of orange / brown silty CLAY					3	N	6.50	17		
		7.20			7	D	6.95			
8.0 Stiff - very stiff brown very sandy / silty CLAY					4	U	8.00			
					8	D	8.50			
		9.40		Slow ▼ 9.20						9.00
10.0 Stiff - very stiff brown silty CLAY					4	N	9.50	54		
Borehole continued to 25.00m bgl					9	D	9.95			

 Remarks : Hand dug pit to 1.00m bgl.  
 Roots present to 2.00m bgl

Scale 1 : 50

 Key : U - Undisturbed Sample  
 (100mm diameter)

 B - Bulk Sample  
 - Water Struck

 D - Disturbed Sample  
 - Water Standing

 W - Water Sample  
 T - Chemical Tub

 N - SPT N-Value  
 V - Shear Vane Test (kN/m<sup>2</sup>)

27 Dene Road, Northwood, HA6 2BX


Borehole One ..... Continued


Description of Stratum	Legend	Depth (m bgl)	Strata Thickness (m)	Water Level (m bgl)	Samples			S.P.T N-Value or Vane Strength	Installations	Casing Depth, (m)
					No.	Type	Depth (m bgl)			
Stiff - very stiff brown silty CLAY		10.20								
Stiff - very stiff mottled grey / brown silty CLAY										
					5	U	11.00			
					10	D	11.50			
					5	N	12.50	31		
					11	D	12.95			
					6	U	14.00			
					12	D	14.50			
					6	N	15.50	45		
					13	D	15.95			
					7	U	17.00			
					14	D	17.50			
					7	N	18.50	57		
					15	D	18.95			
Borehole continued to 25.00m bgl					8	U	20.00			

Remarks :

Scale 1 : 50

 Key : U - Undisturbed Sample  
 (100mm diameter)

 B - Bulk Sample  
 - Water Struck

 D - Disturbed Sample  
 - Water Standing

 W - Water Sample  
 T - Chemical Tub

 N - SPT N-Value  
 V - Shear Vane Test (kN/m<sup>2</sup>)



27 Dene Road, Northwood, HA6 2BX


Borehole One ..... Continued


Description of Stratum	Legend	Depth (m bgl)	Strata Thickness (m)	Water Level (m bgl)	Samples			S.P.T N-Value or Vane Strength	Installations	Casing Depth, (m)
					No.	Type	Depth (m bgl)			
Stiff - very stiff mottled grey / brown silty CLAY					16	D	20.45			
					8	N	21.50	69		
					17	D	21.95			
					9	U	23.00			
					18	D	23.50			
					9	N	24.50	69		
					19	D	24.95			
		25.00								
Borehole complete at 25.00m bgl										

Remarks :

Scale 1 : 50

 Key : U - Undisturbed Sample  
 (100mm diameter)

 B - Bulk Sample  
 - Water Struck

 D - Disturbed Sample  
 - Water Standing

 W - Water Sample  
 T - Chemical Tub

 N - SPT N-Value  
 V - Shear Vane Test (kN/m²)





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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

APPENDIX 3  
SHEET 1  
JOB NUMBER 18939  
DATE May-24

**LOCATION** 27 Dene Road, Northwood, HA6 2BX -

**TRIAxIAL TEST RESULTS**

Excavation Location Number	Depth m	Sample	Natural Moisture Content (%)	Bulk Density (Mg/m³)	Lateral Pressure	Deviator Stress	Apparent Cohesion	Angle of Shearing resistance	Remarks
					(kN/m²)	(kN/m²)	(kN/m²)	(degrees)	
BH1	1.00	U1	31	1.98	20	60	30	-	
BH1	3.00	U2	32	1.86	60	75	38	-	
BH1	5.00	U3	30	1.93	100	105	53	-	
BH1	8.00	U4	23	1.98	160	60	30	-	
BH1	11.00	U5	19	1.96	220	222	111	-	
BH1	14.00	U6	21	1.96	280	276	138	-	
BH1	17.00	U7	19	2.02	340	234	117	-	
BH1	20.00	U8	15	1.98	400	300	150	-	
BH1	23.00	U9	14	1.96	460	420	210	-	

**LOCATION** 27 Dene Road, Northwood, HA6 2BX -

## SULPHATE ANALYSIS

Excavation Location Number	Depth  (m)	Sample	Concentrations of Soluble Sulphate			Classification	pH
			Soil		Groundwater		
			Total SO4 (%)	SO4 in 2:1 Water:soil (g/l)			
BH1	1.00	U1		0.27		DS-1 / AC-1s	7.78
BH1	8.00	U4		1.56		DS-3 / AC-2s	8.43
BH1	14.00	U6		0.82		DS-2 / AC-1s	8.12

# **APPENDIX B : FLOOD RISK DESK TOP STUDY**

# Flood map for planning

Your reference  
<Unspecified>

Location (easting/northing)  
508776/191716

Created  
11 Oct 2024 12:27

**Your selected location is in flood zone 1, an area with a low probability of flooding.**

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

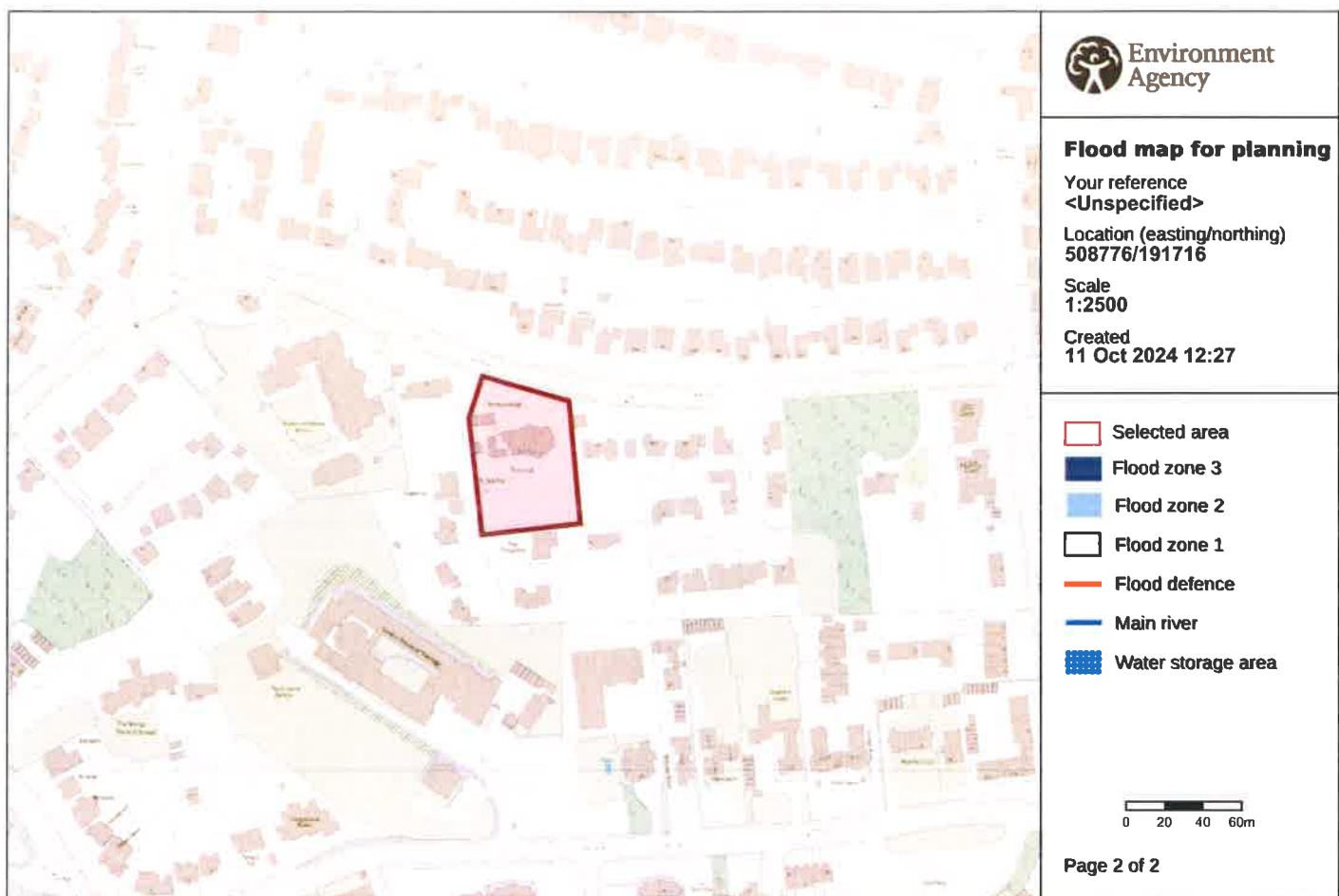
## Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2024 OS AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>

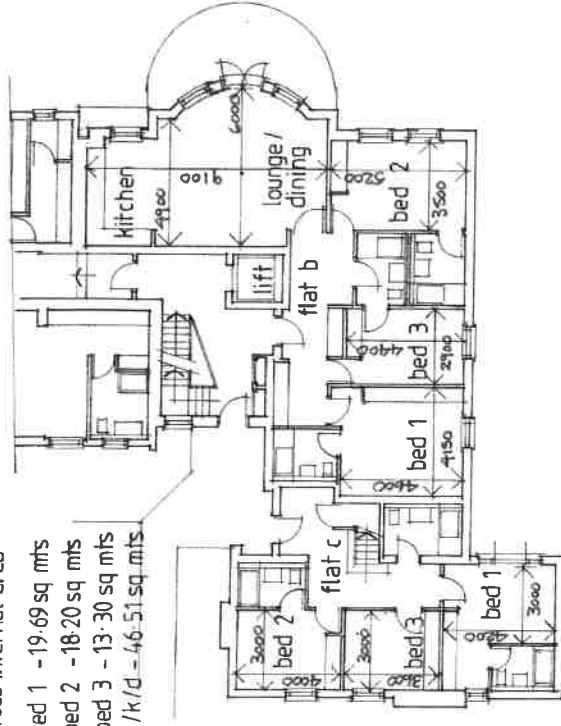


# **APPENDIX C: PROPOSED PLANNING SCHEME**



flat b - 137.07sq mts  
gross internal area

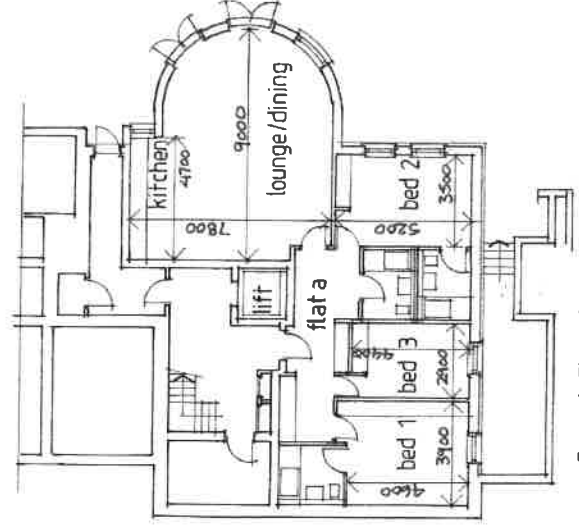
bed 1 - 19.69 sq mts  
bed 2 - 18.20 sq mts  
bed 3 - 13.30 sq mts  
l/k/d - 46.51 sq mts



Ground Floor Plan

flat c - 152.67sq mts  
gross internal area

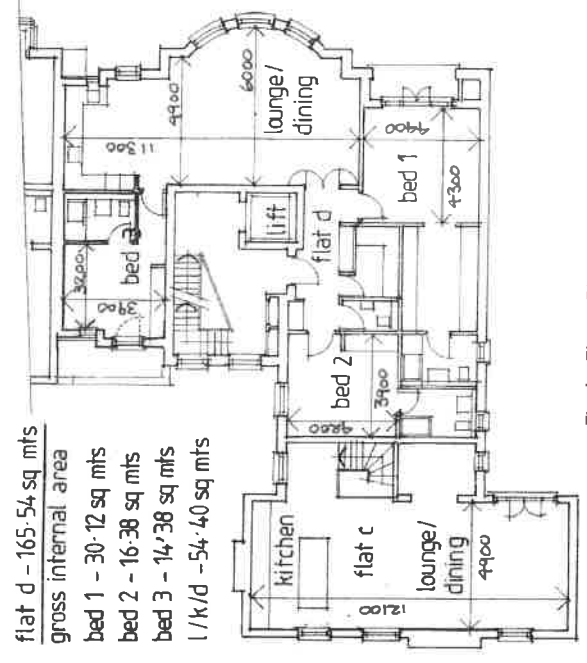
bed 1 - 15.89 sq mts  
bed 2 - 12.00 sq mts  
bed 3 - 10.80 sq mts  
l/k/d - 69.85 sq mts



Lower Ground Floor Plan

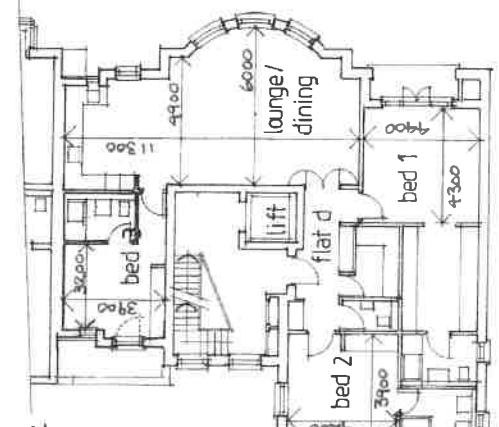
flat a - 158.60 sq mts  
gross internal area

bed 1 - 18.54 sq mts  
bed 2 - 18.20 sq mts  
bed 3 - 13.30 sq mts  
l/k/d - 60.92 sq mts

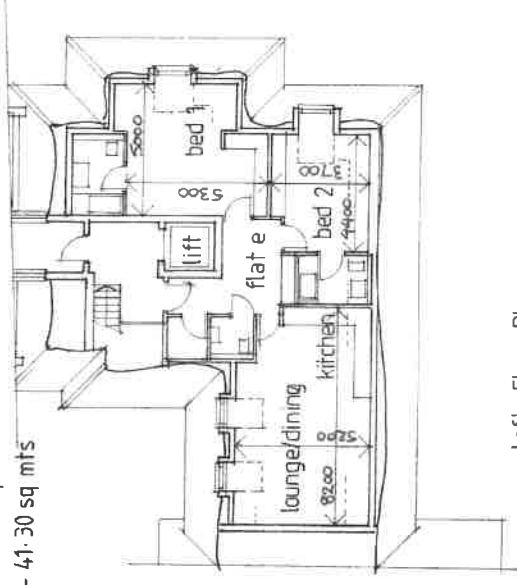


First Floor Plan

flat d - 165.54 sq mts  
gross internal area  
bed 1 - 30.12 sq mts  
bed 2 - 16.38 sq mts  
bed 3 - 14.38 sq mts  
l/k/d - 54.40 sq mts

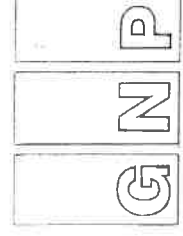


flat e - 115.45 sq mts  
gross internal area  
bed 1 - 25.36 sq mts  
bed 2 - 16.54 sq mts  
l/k/d - 41.30 sq mts



Loft Floor Plan

rev'd May 22 - g.i.a for rooms add  
rev'd Jan 22 - updated to Dec 21  
revised plans (preparing scheme)



Chartered Architects

4 Goodman Gardens.  
Woughton on the Green.  
Milton Keynes. MK6 3EF

Tel : 01908 200002

Project Title:

'Tamead'  
27 Dame Road,  
Northwood.  
HA 6 2BX

Drawing Title  
As Proposed - Floor Plans  
with room dimensions

Client  
Mr P. Sander

Scale  
1:200

Date  
May 2021

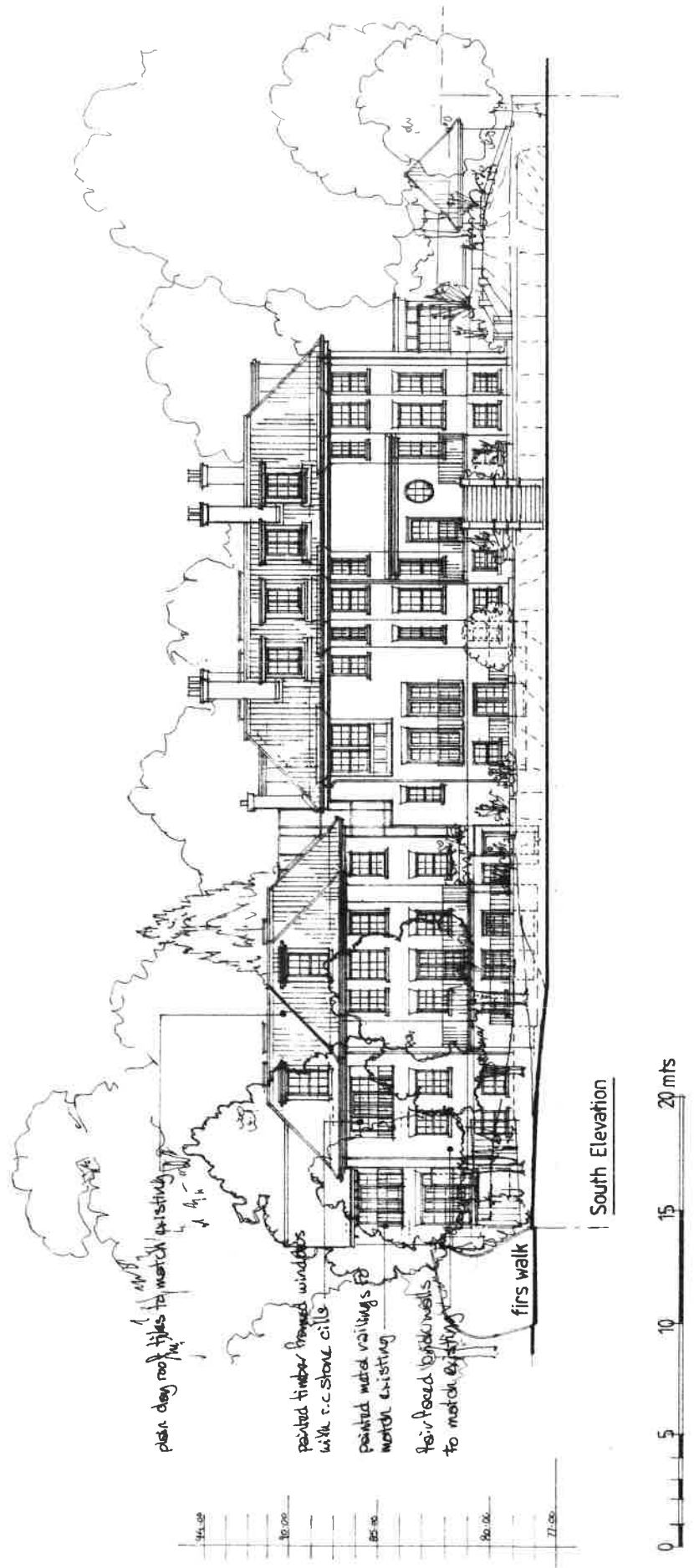
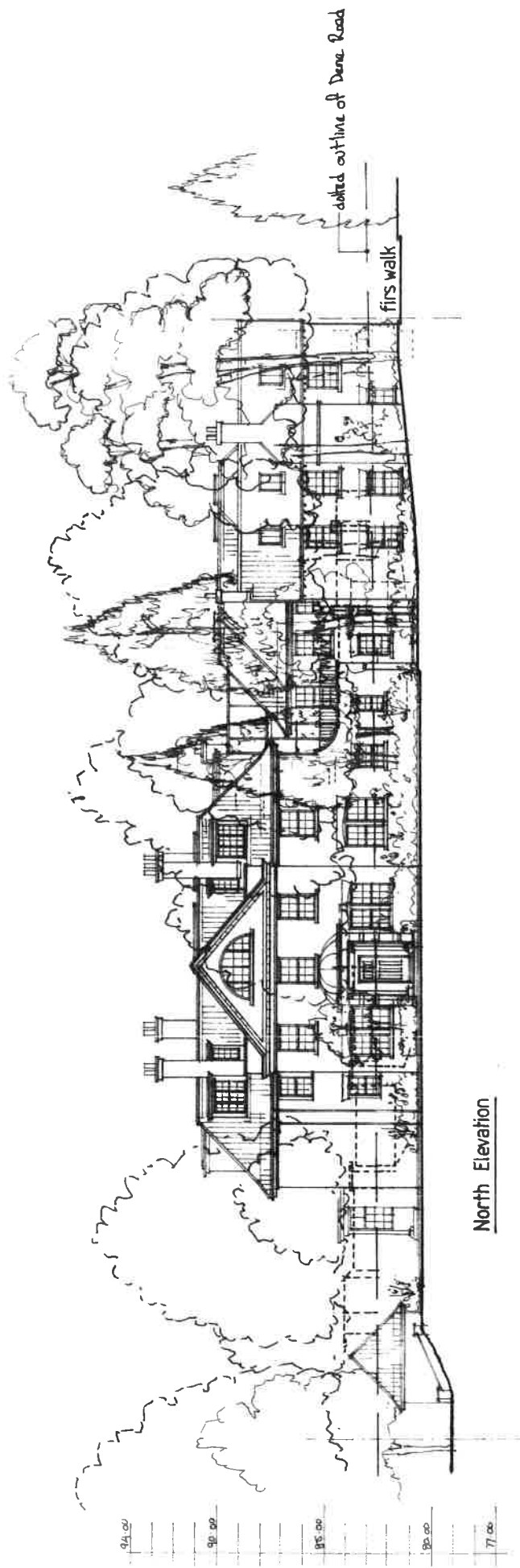
Drawn

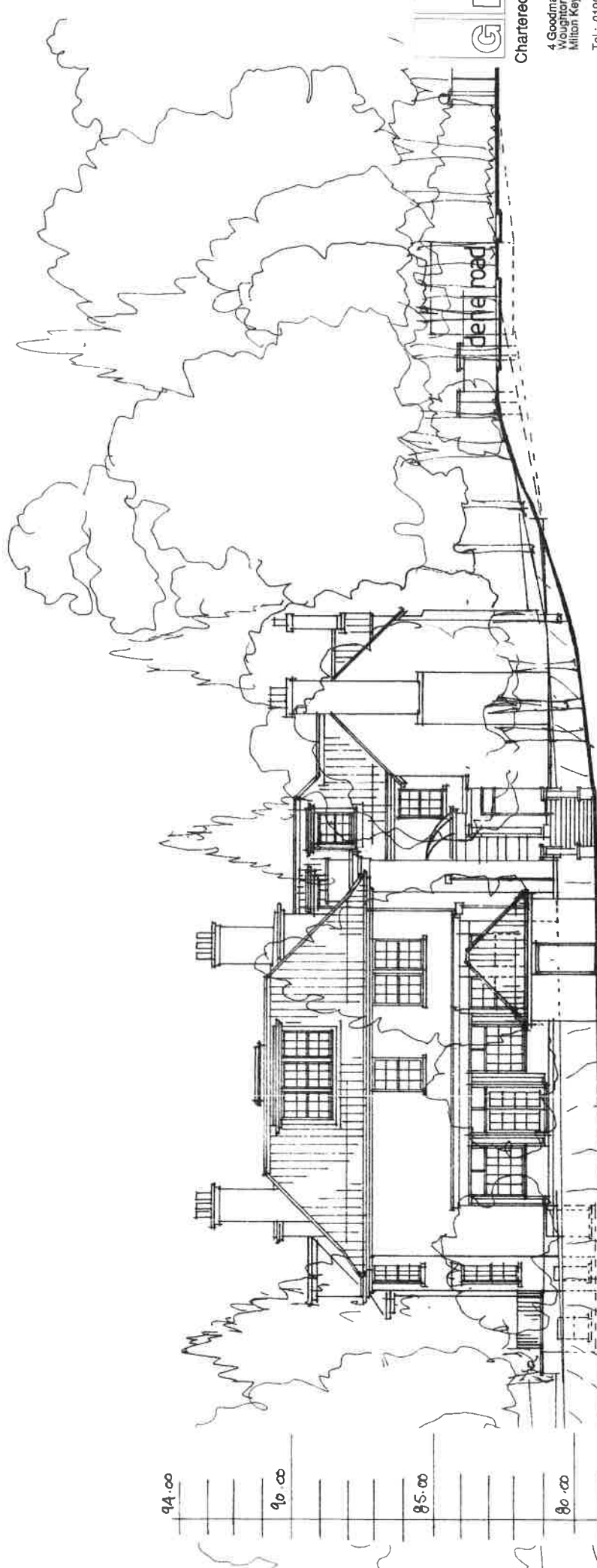
A3 original

Drawing No	Rev
635.21.61	B

This drawing is copyright







94.00  
90.00  
85.00  
80.00  
77.00

## East Elevation



G N P

Chartered Architects

4 Goodman Gardens  
Woughton on the A16  
Milton Keynes, MK5  
Tel : 01908 200002

Project Title:  
New Fields,  
"Tornsed",  
27 Dene Road,  
Northwood,  
HA6 2BX  
Drawing Title:  
As Proposed -  
East Elevation

Client:  
Mr P Sander  
Scale:  
1:100  
Date:  
June 20  
Drawing No:  
A2 original  
Rev:  
635 22 84

stod outline of  
us along denne road

94.00  
90.00  
85.00  
80.00  
77.00

pre application - june 2018  
pre application - november 2019  
pre application - may 2021

dotted outline of denne road

firs walk

North Elevation

pre application - june 2018

pre application - nov 2019  
pre application - may 2021

firs walk

South Elevation

94.00  
90.00  
85.00  
80.00  
77.00

0 5 10 15 20 mts

## **APPENDIX D : PROPOSED BASEMENT SECTIONS**



PRELIM  
ISSUE[illegible]

**TOTAL DESIGN CONSULTANCY  
SERVICES LLP**  
Tel No. 07531 238446

**GAVACAN HOMES**

[illegible]

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PALEOFOUNDA

TOWNSHIP, 27 DECEMBER  
1971-1972

Only F100

1

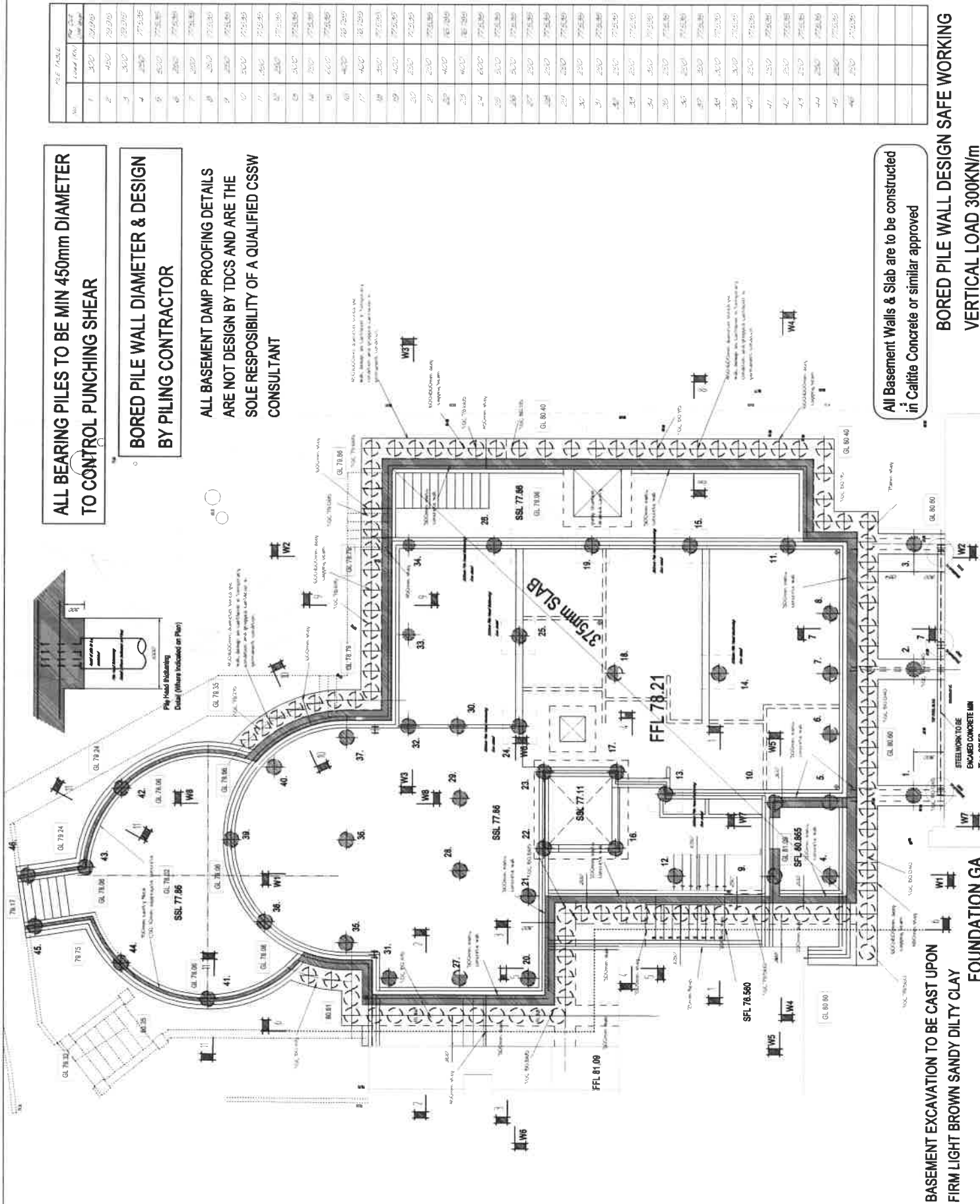
ALL BEARING PILES TO BE MIN 450mm DIAMETER  
TO CONTROL PUNCHING SHEAR

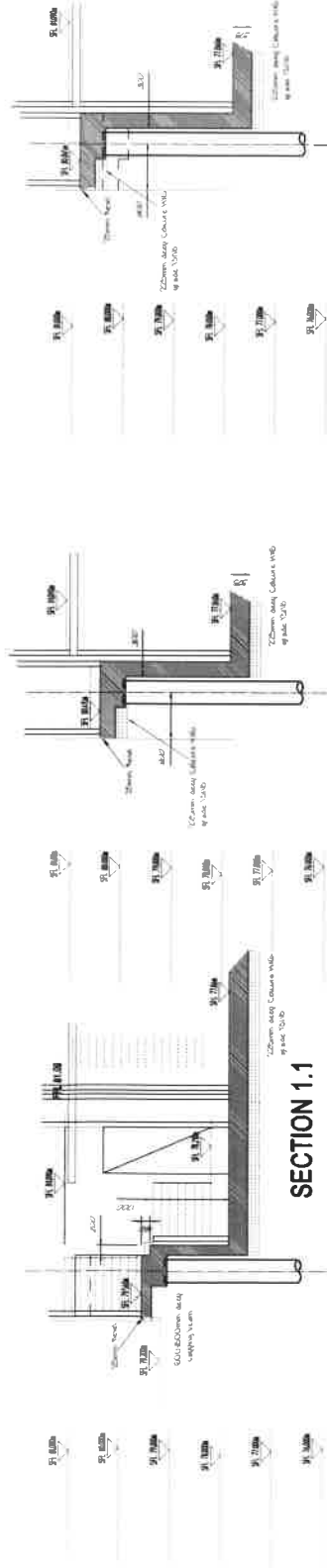
**BORED PILE WALL DIAMETER & DESIGN  
BY PILING CONTRACTOR**

ALL BASEMENT DAMP PROOFING DETAILS  
ARE NOT DESIGN BY TDCS AND ARE THE  
SOLE RESPONSIBILITY OF A QUALIFIED CSSW  
CONSULTANT

**All Basement Walls & Slab are to be constructed in Calcrete Concrete or similar approved**

**BORED PILE WALL DESIGN SAFE WORKING  
VERTICAL LOAD 300kN/m**

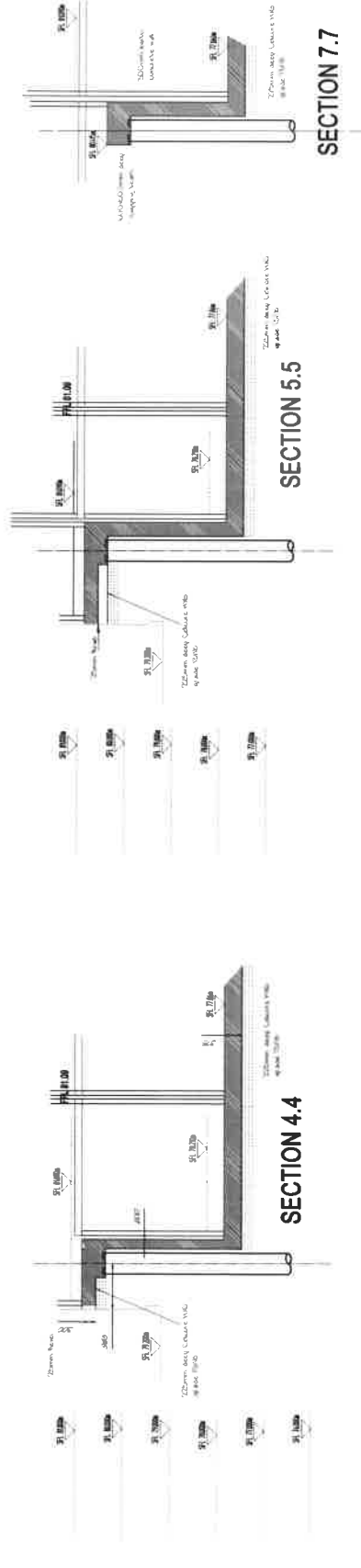


PRELIM  
ISSUE[illegible]

## SECTION 1.1

## SECTION 2.2

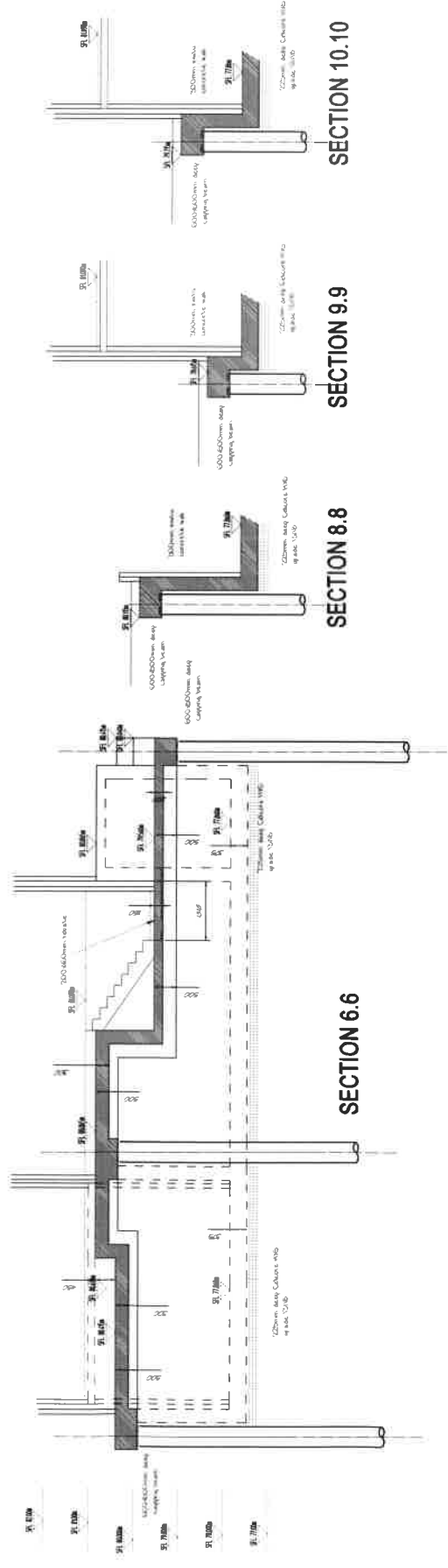
### SECTION 3.3



## SECTION 4.4

## SECTION 5.5

## SECTION 7.7



## SECTION 6.6

## SECTION 8.8

## SECTION 9.9

## SECTION 10.10

**TOTAL DESIGN CONSULTANCY  
SERVICES LLP**  
Tel No. 07931 289466

**Email: OAMC@TOTALDCLP.CO.UK**

**GAVACAN HOMES**

COMPARTMENT 10				
Name	DOB	Sex	Age	Ref
Sam	1 10	Male	65	ACT
David	ACS	Female	DOB	DOB

FOUNTAIN ELECTIONS

10	TOMASAC, 27 DISE AGO		
	BETHWOOD		
10	10	10	10
10	10	10	10

PRELIM  
ISSUE[illegible]

**TOTAL DESIGN CONSULTANCY  
SERVICES LLP**  
Tel No. 07071 200449

**Small Business Development Center**

**GAVACAN HOMES**

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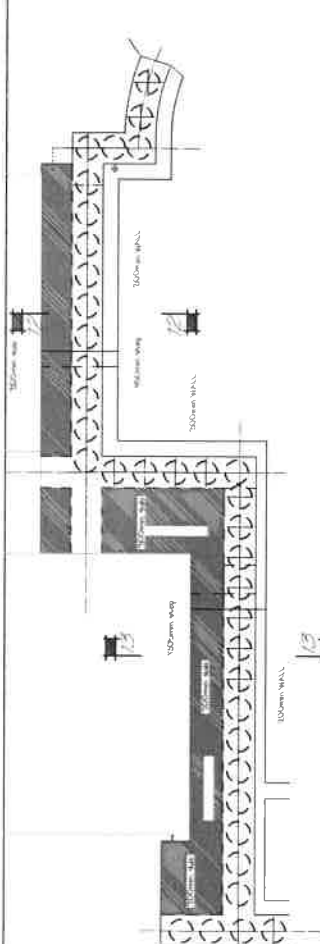
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8	1	2	3
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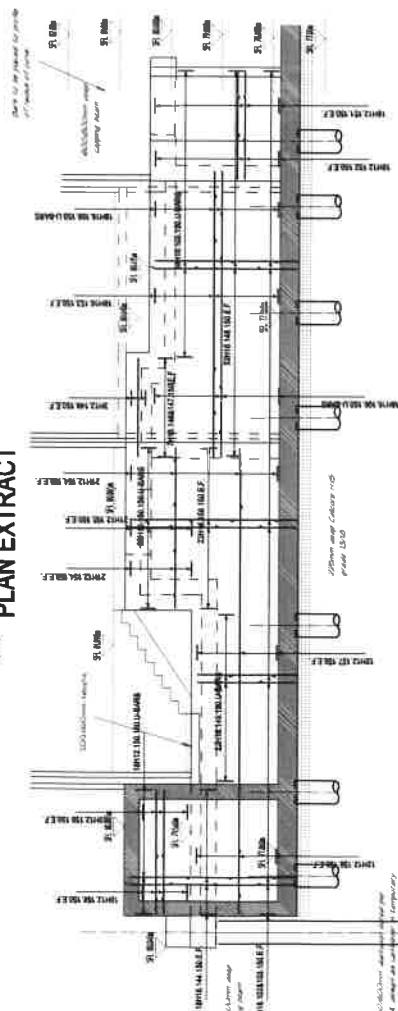
**INDICATING TIME**

TOWNSEND, 77 DEWE ROAD

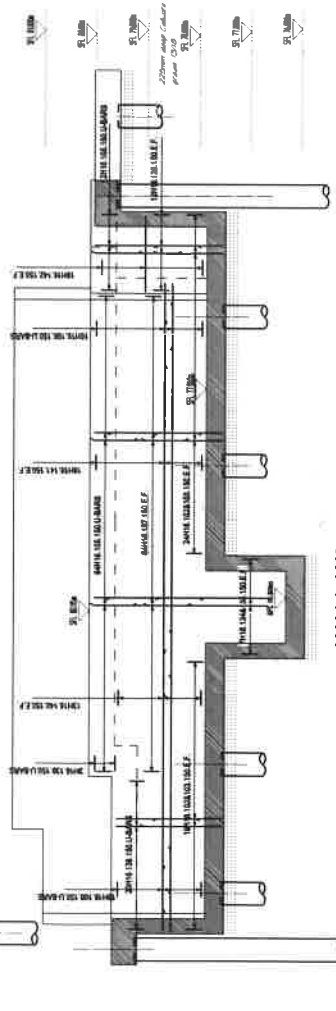
PROCEEDINGS



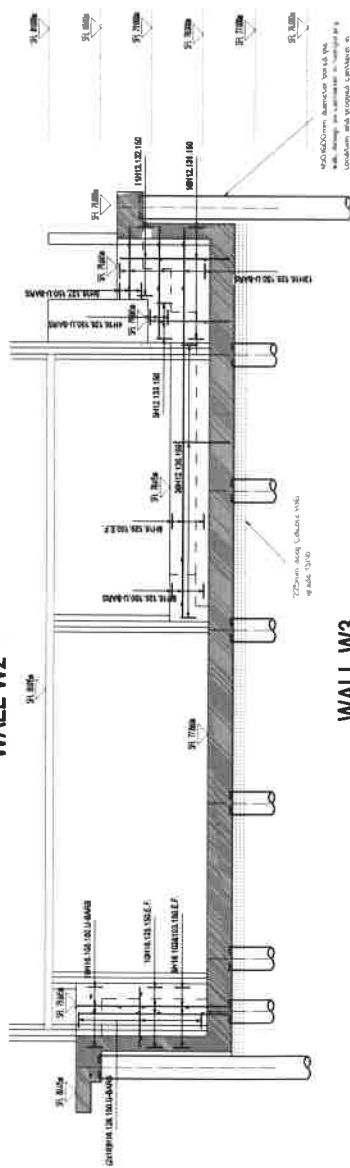
## PLAN EXTRACT



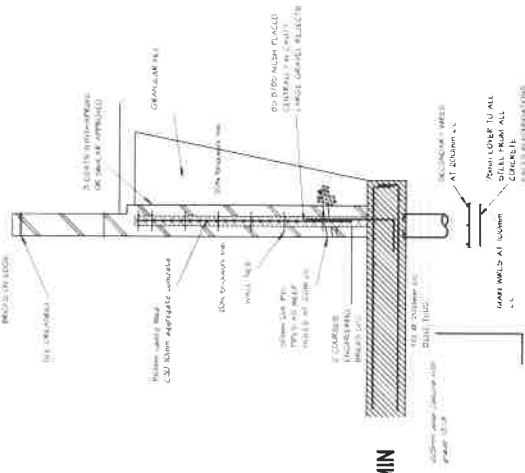
**WALL W1**



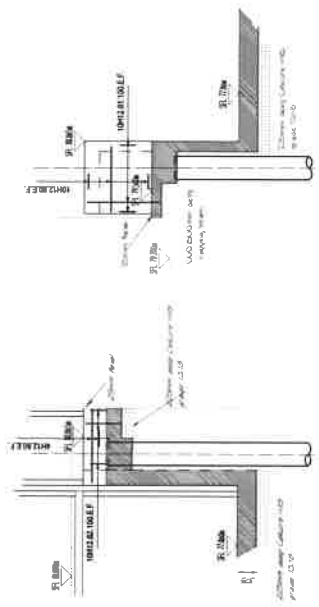
WALL W2



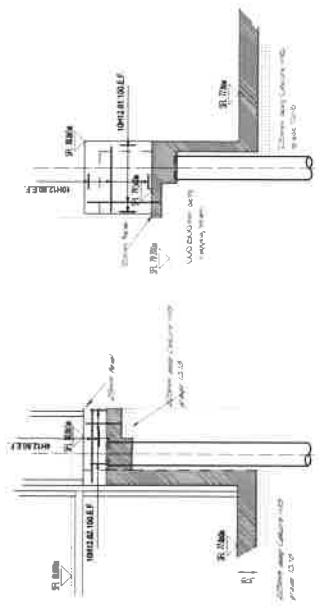
**WALL W3**



## SECTION 11.11



SECTION 12.12

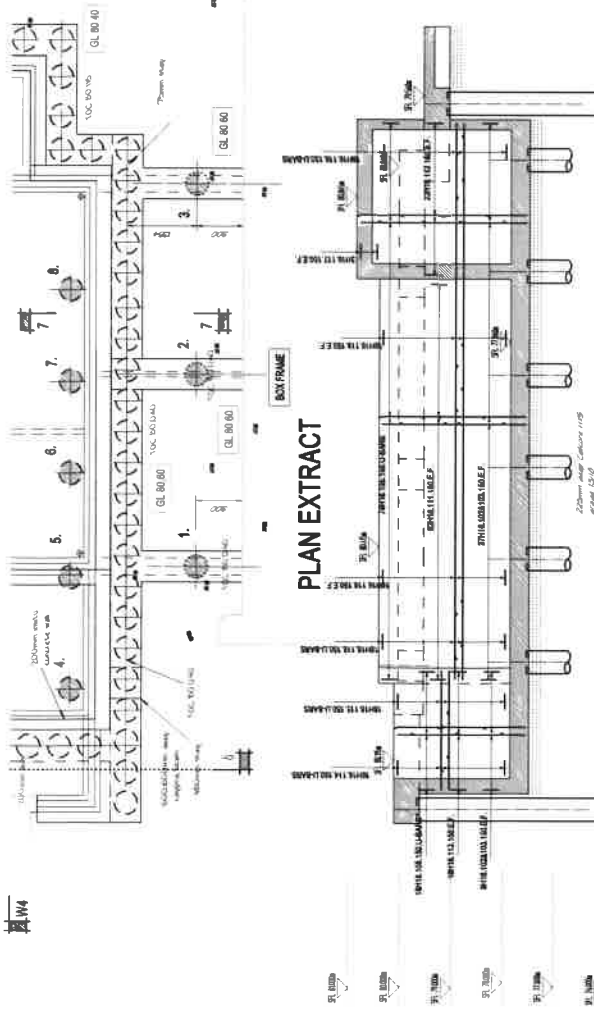


## SECTION 13.13

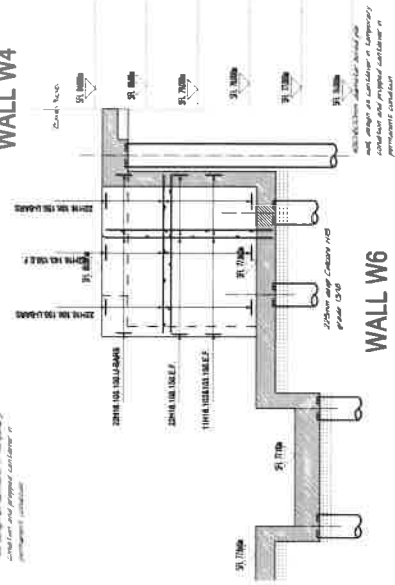


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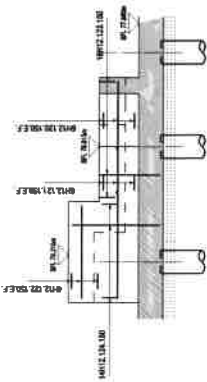
TOTAL DESIGN CONSULTANCY SERVICES LLP 100 West Street East Orange, NJ 07017 East Orange, NJ 07017	NAME	DEPT	DATE	RECY	BOOK
	NAME	DEPT	DATE	RECY	BOOK
GAVACON HOMES 100 West Street East Orange, NJ 07017 East Orange, NJ 07017	NAME	DEPT	DATE	RECY	BOOK
	NAME	DEPT	DATE	RECY	BOOK
SMALL ENVIRONMENTAL PROJECTS 100 West Street East Orange, NJ 07017 East Orange, NJ 07017	NAME	DEPT	DATE	RECY	BOOK
	NAME	DEPT	DATE	RECY	BOOK
TOWN OF 2700 ROAD 100 West Street East Orange, NJ 07017 East Orange, NJ 07017	NAME	DEPT	DATE	RECY	BOOK
	NAME	DEPT	DATE	RECY	BOOK



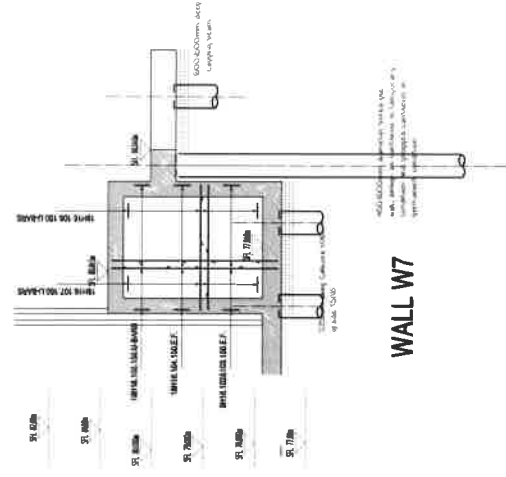
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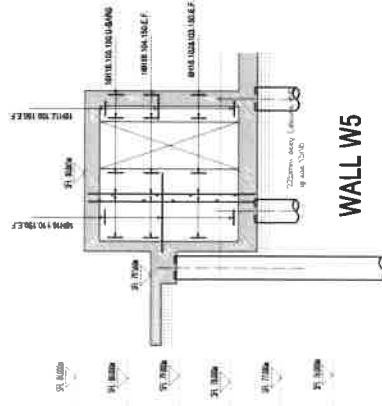
WALL W6



WALL W8



WALL W7



**WALL W5**

**COVER MAIN BARS**  
- SIDE COVER 75mm MIN  
- TOP & BOTTOM COVER - 50mm MIN

