Geotechnical Report

GEOFIRST PTY LTD
ABN 94 637 631 826
PO Box 137 Figtree 2525
2/7 Luso Drive, Unanderra NSW 2526

Our Ref: GF1404-A

Contact: Long Tsang

Email: long.tsang@geofirst.com.au

Date: 17 May 2022

Ausino Group Pty Ltd

No.71-73 Thomas Street Parramatta, NSW 2150

Email: robinsang@ausino.com.au

Dear Robin,

Re: Geotechnical Assessment for Proposed Boarding House at 71-73 Thomas Street, Parramatta

1 Introduction

At the request of Mr Robin Sang from Ausino Group, Geofirst Pty Ltd (GF) carried out a geotechnical assessment for a proposed boarding house at No.71 – 73 Thomas Street (Lot 15 in Deposited Plan 9551) in Parramatta, New South Wales 2150.

The supplied development application (ref: DA/1036/2021 dated 12 April 2022) from City of Parramatta Council condition 1B indicates that 'a Geotechnical engineer's report is to be provided which investigates the feasibility of the proposed basement construction and measures to mitigate potential impacts on adjoining properties given the proximity to the site boundaries and public roads. All elements of the basement construction including any subsoil drains, anchors, etc. are to be wholly located within the site or within appropriate easement in private land and the basement is not to rely on a pump out system for permanent dewatering. Where groundwater is likely to be encountered, the plans shall include provision for tanked basement construction'.

The supplied survey drawings (Job No. 3094, Drawing No. 3094, dated August 2021) by Jackson Surveyors Pty Ltd indicate the site covers an approximate area of 1,627m^2 and is identified as a R4 (High-Density Residential) Zone.

The supplied architectural drawings (Project No. 2154, Drawing No. DA311, DA312, DA401, DA402, DA411 to DA413, Issue A, dated October 2021) by Vourtzoumis Architects indicate the existing dwelling will be demolished and a five storey building with one to two basement levels will be constructed, involving an excavation up to 7m for the proposed basement floor construction.

The aim of the geotechnical assessment is to provide geotechnical advice relevant to the development including the assessment of excavation conditions, footing and retaining wall design in order to satisfy the council DA condition 1B.

2 Fieldwork

A team of Geotechnical engineers from Geofirst Pty Ltd visited the site on 13 May 2022 to carry out the geotechnical investigation.

Three boreholes were drilled using a track-mounted drill rig attached with tungsten carbide (TC) bit to refusal depths of 3.5m (BH1), 2.9m (BH4) and 3.4m (BH5) below existing ground level. All boreholes refused on medium to high strength shale bedrock based on our geological experience from our previous projects adjacent to the site.

Standard Penetration Tests (SPTs) were carried out inside the boreholes to assess the strength of the subsurface profile augmented with handheld pocket penetrometer tests on the recovered silty clay samples.

Due to access constraints for our drill rig to the No.71 backyard and the No.73 front-yard, three-hand augured boreholes and Dynamic Cone Penetrometer (DCP) tests could only be performed to refusal depths of 0.95m (BH2) 1.1m (BH3) and 1.8m (BH6) to assess the subsurface profile. All boreholes refused on inferred shale bedrock.

The Geotechnical test locations are shown on the attached Borehole Location Plan (refer GF1404 – Figure 1).

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3 Site Observation and Geology

3.1 Site Description

The site is located at the corner of Thomas Street (to the north) and Pemberton Street (to the east).

For site description purposes, we described the site in two parts.

No.71 Thomas Street

At the time of the fieldwork, we observed the following:

- A single-storey weatherboard dwelling with a carport occupies the street frontage.
- Lawns are present in the remaining parts.
- Large trees are noted on the south-western corner.
- The elevation difference between the northern and southern parts is about 2.2m, supported by a brick retaining wall (up to 1m high) near the middle section.
- The elevation difference between the site (i.e. high side) and the properties to the south (i.e. low side) is approximately 1.7m
- Surface level is similar between the site and the properties to the west.

The existing site conditions are shown in Photos 1 to 3 below:

Photo 1: Looking from Thomas Street

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Photo 2: Looking to the backyard

Photo 3: Looking back to the house from the backyard

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No.73 Thomas Street

At the time of the fieldwork, we observed the following:

- A two to three-storey brick house occupies the middle section of the site.
- Lawns are present in the north-eastern, north-western parts and the southern end of the site.
- Remaining areas are concreted surfaces.
- The elevation difference between the northern and southern parts of the site is about 3.8m.
- A brick retaining wall is located on the south-western of the site, retaining the existing garden.
- The elevation difference between the site (i.e. high side) and the properties to the south (i.e. low side) is approximately 1.6m.

The existing site conditions are shown in Photos 4 and 6 below:

Photo 4: Looking from Thomas Street

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Photo 4: Looking back to the house from the backyard

Photo 5: Looking to the south-western boundary

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3.2 Subsurface Condition

The 1:100,000 Sydney geological map indicates the site to be underlain by Wianamatta Group - Ashfield Shale.

A summary of the subsurface conditions encountered in the boreholes is presented in the following Table 1. Results of SPT and DCP tests are shown on the attached borehole logs. Reference should be made to individual borehole logs for more details at the particular location.

Table 1: Summary of Subsurface Profile

Geotechnical Unit	Material Description	Depth (m) to the base of the layer
Fill	Silty Clay, low to high plasticity, dark brown and dark grey with roots and trace of fine to coarse-grained gravel	0.5 – 0.6
Residual	Silty Clay, high plasticity, orange-brown and red-brown, very stiff, moisture content < plastic limit	0.9 - 1.8
Rock	Shale: light grey and light brown, extremely weathered and very low strength with occasional low to medium band	2.5 – 3.5*

Groundwater was encountered at 0.4m (BH2), 0.6m (BH3) and 0.3m (BH6) depths below the existing grade during the investigation. We consider it may be perched water within the in-situ soil. However, it should be noted that no long-term groundwater monitoring was implemented as part of the current investigation. Groundwater may vary in response to weather events, seasonal variation and other factors.

4 Discussion and Recommendation

4.1 AS2870 Site Classification

Due to the site having a fill depth exceeding 0.4m without earthwork certification, the fill is assessed as 'uncontrolled' and the site assessed as a Class P (problem) site in accordance with AS2870 – 2011 ' Residential Slabs and Footings'. Footing design should be carried out in accordance with engineering principles.

4.2 Dilapidation Report

Prior to commencing the demolition and the excavation works, it is recommended that detailed dilapidation reports should be carried out on the neighbouring buildings by a qualified structural engineer. The reports are to present a fair record of existing building conditions and may be used as a benchmark against any potential future claims arising from the excavation works.

4.3 Excavation Condition

All earthworks should be conducted in accordance with AS3798-2007: 'Guidelines on Earthworks for Commercial and Residential Developments'.

As discussed in Section 1, we anticipate that the bulk excavation for the proposed basement floor construction will require excavation to a depth of around 7m requiring the removal of fill, residual clayey soils, weathered shale and medium to high strength shale.

It is considered that the fill, residual soils and weathered rock can be excavated using conventional earthmoving equipment (e.g. 8 tonnes or heavier excavator with bucket attachment).

Rock hammer will be required once low to high strength shale is encountered. Rock saw must be used to initially cut through the medium to high strength shale along the site boundary to form a void, so that vibrations will be minimised to the neighbouring buildings.

Vibration monitoring should be carried out as per Section 4.4 below.

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4.4 Excavation Retention

Where the proposed bulk excavation extends close to the site boundaries, battering of the fill and soil profiles will not be feasible. A retention system will therefore be required to support the vertical cut in the soils (fill and residual clays and weathered rock) and should be installed prior to the excavation commencing.

Based on the results of the investigation, soldier pile walls with concrete panels may be designed along all site boundaries.

Installation of anchors will only be possible beneath a registered easement and the neighbouring property owners must grant rights to install anchors beneath their properties by registering an easement in accordance with the particulars for regulated designs order 2021.

All the temporary anchors should be removed after the building construction, if allowed.

Alternatively, where anchors are not allowed or not possible, temporary internal propping to the retaining wall may be considered. Top-down construction methods must be adopted by the construction of upper floors prior to excavation proceeding to the next floor level.

Geotechnical parameters for retaining wall design are summarised in Table 2 below:

Table 2: Summary of Geotechnical Parameters for Retention Design

Geotechnical Unit	Friction Angle (Drained) (°)	Effective Unit Weight kN/m³	Consistency /Strength	Undrained Cohesion (kPa)/Skin Friction (kPa)	Elastic Modulus E (MPa)	'At rest' Earth Pressure Coefficient (K_o)	Active Earth Pressure Coefficient (k_a)	Passive Earth Pressure (k_p)
Fill	15	10	-	-	-	-	0.6	-
Residual Clay	26	18	Very stiff	70	15	0.5	0.4	2.5
Shale	32	22	Very low	70	70	0.6	0.3	3.3

Temporary batters can be formed with the following ratios:

Material	Ratio
Fill	1V: 3H
Residual Clay	1V: 2.5H
Weathered Rock	1V:1.5H

The shoring piles should terminate at least 7m or deeper into the Class V shale or better. However, the actual embedment depths should be designed by a structural engineer based on the strength parameters recommended in this report and the external loading conditions. Alternatively, an additional investigation using rock coring techniques may be undertaken after the demolition of the existing dwellings to confirm the rock quality for shoring

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pile design. In the absence of specific information on defect spacing and clay seams, it would be prudent to design the retaining wall pile socket based on an ultimate skin friction of 70kPa for Class V Shale.

A free-draining, drainage layer or subsoil drains should be placed below the basement floor slabs subject to Council approval.

The excavation should be advanced at 1.5m intervals and a geotechnical consultant should be engaged to assess the stability issues exposed at each stage of the excavation in order to provide ongoing advice on any further support requirements that may be required.

4.5 Vibration Control

Prior to commencing the excavation, a vibration monitoring plan should be prepared to manage the vibrations generated during the excavation, in particular whilst excavating through medium to high strength shale.

Typically, the vibration frequency should be limited to an acceptable limit 5mm/s for residential development.

We recommend that vibration monitoring be carried out during trial excavations in order to establish the best method of excavation to limit the vibration of adjoining structures.

4.6 Footing Design

Based on the results of the investigation and the proposed project scope, it is anticipated that Class V shale or better will be encountered at the proposed bulk excavation level. Hence, pad foundations may be designed to support the building loads.

An allowable end bearing pressure of 700 kPa can be adopted with a minimum 1.5m embedment depth.

A geotechnical engineer should be engaged to inspect the foundation excavations and confirm the adequacy of the foundation bearing strata prior to pouring concrete. All footing excavations should be dry and cleaned of all loose and softened material.

If higher bearing capacity is required for the proposed development, additional geotechnical investigation will be required following the demolition of the existing structures. It is recommended four additional cored boreholes should be drilled until better-quality shale (i.e. Class III or better) is encountered.

4.7 Waste Disposal

Excavated/demolition material, from the new building construction, should be assessed in accordance with the NSW EPA waste classification guidelines prior to disposal off the site. The contractor should keep a record for every disposal.

4.8 Engineering Advice

On the basis of the investigation findings, the site is considered suitable for the proposed development subject to undertaking the recommendations provided in this report.

Further inspections by a suitably qualified geotechnical consultant of the work aspects listed below should be undertaken prior to/during the construction.

- Geotechnical review of structural design drawings including shoring and excavation support;
- Development of a monitoring program to assess potential movement outside the limits of excavation.
- Inspection of the shoring pile wall installation and bulk excavation;
- Inspection of all footing/piling excavations to confirm that the design ABP and required founding stratum have been achieved; and
- If higher bearing capacity is required, additional investigation is required to determine the depth of Class III or better shale rock.

Based on our geotechnical assessment and the existing site use, it is assessed that the site is suitable for the proposed boarding house subject to undertaking the engineering recommendations stated in this report.

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Please do not hesitate to contact the undersigned should you have any queries.

For and on behalf of

GEOFIRST PTY LTD

Prepared by:

Long Tsang

Principal Geotechnical Engineer

Encl: Information About The Report
BH logs and DCP test results
Geotechnical Test Location Plan (Ref: GF1404 - Figure 1)
Report Explanation Notes
Vibration Emission Design Goals
Site Survey Plan

Information About The Report

General information

This report has been prepared for the project described. The sole purpose of this report is to assess the condition of the site in accordance with the scope of works set out between GEOFIRST PTD LTD and the Client.

In preparing this report, GEOFIRST PTD LTD has not attempted to verify the accuracy or completeness of any information provided by the Client and/or from other sources. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Site Condition

This report is considered accurate at the date of issue with regards to the current conditions of the site. The engineering logs presented herein are based on geological interpretation of the subsurface condition subjects to method of drilling or excavation. The results provided in the report are indicative of the subsurface conditions on the site only at the specific sampling locations, and then only to the depths investigated and at the time of work was carried out. Subsurface conditions between the test locations may vary significantly from conditions encountered at the test locations.

Groundwater

Water table levels recorded / shown on the engineering logs may vary from time to time with seasons or recent weather changes. No matter what, allowance should be made for dewatering during the construction stages as the groundwater level may not be the same at the time of construction.

Soil Description

The methods of description and classification of subsurface profile used in this report are in according with Australian Standard AS1726:2017.

Reports

The reports are prepared by a qualified engineer and are based on the information found and on current engineering standards of interpretation and analysis. Duty of Care has been taken with the report in relation to interpretation of subsurface, recommendation and comments for design and construction, but not limit to the following:

- Subsurface condition change between the test points;
- Changes in policy or interpretation of policy by statutory authorities;
- The actions of persons or contractors responding to commercial pressures.

The company obtain a right to assist with further investigation or advice to resolve the matter.

Site Inspection

The Company recommends to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that ground conditions are similar description to the report.

Responsibility

Reporting relies on interpretation of factual information based on opinion and judgement and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants. The client /designer should consult with the GEOFIRST PTY LTD to interpret the geotechnical information prior to commencement of their projects in order to obtain an adequate geotechnical information for the construction. This will reduce the potential risk to misinterpretations of the reports by the client / designer at the initial stage, resulted in logging a claim against consultants. Haven GEOFIRST explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Copyright

Limitation

GEOFIRST accepts no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full or properly tested, inspected and documented.

GEOFIRST has prepared this report in accordance with the usual care and diligence of consulting engineers. However, no other warranty or guarantee, whether expressed or implied, is made or intended.

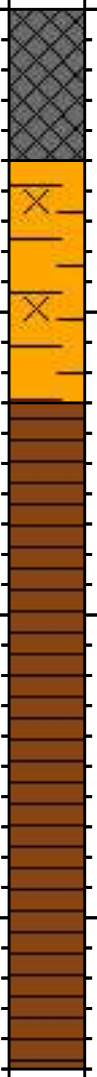
If there is any change in the proposed development described in this report, then all recommendations should be reviewed.

This report should be read in full, and no excerpts are to be taken as representative of the findings. No responsibility is accepted by GEOFIRST for use of any part of this report in any other context. This report has been prepared on behalf of, and for the exclusive use of the Client of GEOFIRST. GEOFIRST accepts no liability or responsibility for any use of this report by any third party.

This report valid for one year from date of issue. The report will be automatically withdrawn after two weeks from date of issue if no payment received. Hence, Geofirst accepts no liability or responsibility for any use of this report.

GEOFIRST PTY LTD	Client: Ausino Group c/o VOARC Architects	BH1
	Site Address: 71-73 Thomas Street, Parramatta	Sheet 1 Of 1
	Project: Proposed Boarding House	Project No.: GF1404
Fieldwork Date: 13/05/2022	E Coord (longitude): 56H316677	S Coord (latitude): 6256836 / GL (mAHD): ~17.10

Method	Sample	Test Result	Level	Depth (m)	Description	Water Depth
			16.60	0.50	Silty Clay: low plasticity, dark brown, trace of roots and fine to medium-grained gravel, moisture content > plastic limit (Fill)	
0.80 - 1.00	D	N=SPT (5,11,10/50) Refusal	16.10	1.00	Silty Clay: high plasticity, orange-brown and red-brown, mottled light grey, moisture content < plastic limit, very stiff to hard consistency (Residual)	
			15.80	1.30	Shale: light brown and light grey, extremely weathered, very low strength, with occasional low to medium strength bands (Rock)	
			15.10	2.00		
			14.10	3.00		
			13.60	3.50	End Of Borehole At 3.50 m	
			13.10	4.00		



KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed
PP - Pocket Penetrometer Test
SPT - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
'TC' bit refusal at 3.5m

Scale: 1:25

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths / Chiselling

Date	Casing	Water	From	To	Hours

GEOFIRST PTY LTD

Project Title: Proposed Boarding House

BH2

Project Number: GF1404

Client: Ausino Group
c/o VOARC Architects

Sheet 1 Of 1

GL (mAHD): ~16.60

N Coord: 6256834

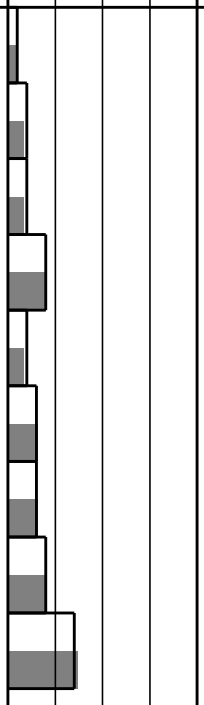
E Coord: 316688

Date: 13/05/2022

Method: Hand Auger

Logged By: JA

Scale: 1:10



Depth (m)	Level	Depth (m)	Description	Water
			Silty Clay: low plasticity, dark brown, trace of roots and fine to medium-grained gravel, moisture content > plastic limit (Fill)	
	16.30	0.30	As above, but dark brown and orange-brown, trace of fine to coarse-grained gravel (Fill)	
	16.00	0.60	Silty Clay: high plasticity, brown and red-brown, trace of fine to medium-grained gravel, moisture content < plastic limit, very stiff consistency (Residual)	
	15.70	0.90	As above, but grey, orange-brown and red-brown (possibly weathered shale) (Residual)	
	15.60	1.00	End Of Hole At 0.95 m	

KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

Hand auger refusal at 0.95m

GEOFIRST PTY LTD

Project Title: Proposed Boarding House

BH3

Project Number: GF1404

Client: Ausino Group
c/o VOARC Architects

Sheet 1 Of 1

GL (mAHD): ~16.50

N Coord: 6256832

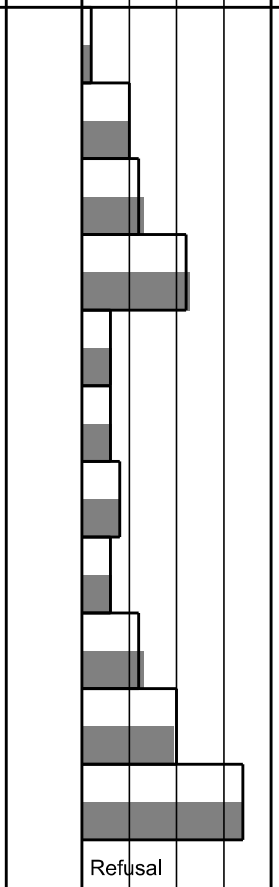
E Coord: 316698

Date: 13/05/2022

Method: Hand Auger

Logged By: DL

Scale: 1:10



Depth (m)	Level	Legend	Depth (m)	Description	Water
				Silty Clay: low plasticity, dark brown, trace of roots and fine-grained gravel, moisture content > plastic limit (Fill)	
	16.20		0.30		
				As above, but grey and brown, trace of fine to coarse-grained gravel and roots (Fill)	
	15.90		0.60		
				Silty Clay: high plasticity, brown and red-brown, trace of fine-grained gravel, moisture content < plastic limit, very stiff consistency (Residual)	
	15.50		1.00		
	15.40		1.10		
				End Of Hole At 1.10 m	

KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

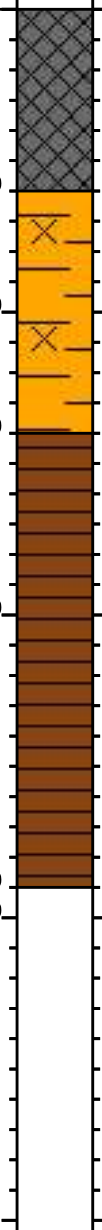
AGS

REMARKS

Hand auger refusal at 0.9m

GEOFIRST PTY LTD	Client: Ausino Group c/o VOARC Architects		BH4
	Site Address: 71-73 Thomas Street, Parramatta		Sheet 1 Of 1
	Project: Proposed Boarding House		Project No.: GF1404
Fieldwork Date: 13/05/2022	E Coord (longitude): 56H316692	S Coord (latitude): 6256796	GL (mAHD): ~13.00

Method	Sample	Test Result	Level	Depth (m)	Description	Water Depth
		N=SPT (3,7,13/100mm) Refusal	12.40	0.60	Silty Clay: low plasticity, dark brown, trace of roots and fine to medium-grained gravel, moisture content > plastic limit (Fill)	
			12.00	1.00	Silty Clay: high plasticity, orange-brown and red-brown mottled light grey, moisture content < plastic limit, very stiff to hard consistency (Residual)	
			11.60	1.40	Shale: light brown and light grey, extremely weathered, very low strength, with occasional low to medium strength bands (Rock)	
			11.00	2.00		
			10.10	2.90		
			10.00	3.00	End Of Borehole At 2.90 m	
			9.00	4.00		



KEY

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SPT - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
'TC' bit refusal at 2.9m

Scale: 1:25

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

Chiselling

From	To	Hours

GEOFIRST PTY LTD	Client: Ausino Group c/o VOARC Architects	BH5
	Site Address: 71-73 Thomas Street, Parramatta	Sheet 1 Of 1
	Project: Proposed Boarding House	Project No.: GF1404
Fieldwork Date: 13/05/2022	E Coord (longitude): 56H316680	S Coord (latitude): 6256798 / GL (mAHD): ~13.30

Method	Sample	Test Result	Level	Depth (m)	Description	Water Depth
					Silty Clay: low plasticity, dark brown, trace of roots and fine to medium-grained gravel, moisture content > plastic limit (Fill)	
			12.60	0.70		
					Silty Clay: high plasticity, orange-brown and red-brown, mottled light grey, moisture content < plastic limit, very stiff to hard consistency (Residual)	
		N=SPT(4,7/60,-) Refusal	12.30	1.00		
			12.10	1.20		
					Shale: light brown and light grey, extremely weathered, very low strength, with occasional low to medium strength bands (Rock)	
			11.30	2.00		
			10.30	3.00		
			9.90	3.40	End Of Borehole At 3.40 m	
			9.30	4.00		

KEY

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SPT - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
'TC' bit refusal at 3.5m

Scale: 1:25

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

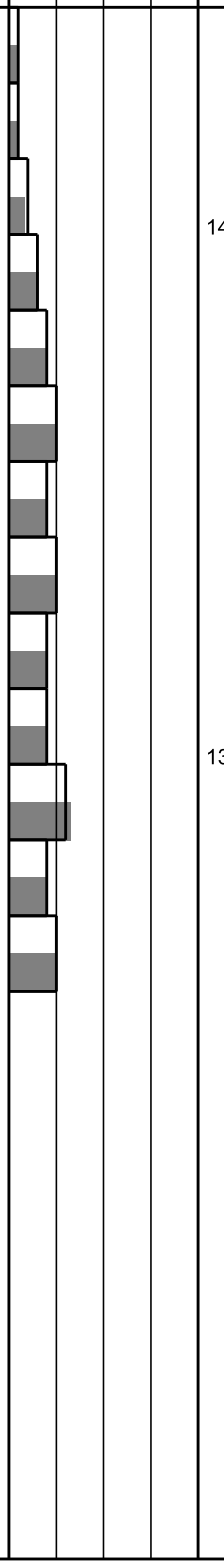
Chiselling

From	To	Hours

GEOFIRST PTY LTD

Project Title: Proposed Boarding House			BH6
Project Number: GF1404	Client: Ausino Group c/o VOARC Architects		Sheet 1 Of 2
GL (mAHD): ~14.40	N Coord: 6256806		E Coord: 316667
Date: 13/05/2022	Method: Hand Auger	Logged By: DL	Scale: 1:10

Depth (m)	Type	Blows per 100mm (0 5 10 15 20)	Level	Legend	Depth (m)	Description	Water
						Silty Clay: low plasticity, dark brown, trace of roots and fine to medium-grained gravel, moisture content > plastic limit (Fill)	
			14.10		0.30		
						Silty Clay: high plasticity, grey, orange-brown and red-brown, trace of fine to medium-grained ironstone gravel, moisture content < plastic limit, stiff consistency (Fill)	
			13.40		1.00		
						Hole Continues	



KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

Hand auger refusal at 1.8m

GEOFIRST PTY LTD

Project Title: Proposed Boarding House			BH6
Project Number: GF1404	Client: Ausino Group c/o VOARC Architects		Sheet 2 Of 2
GL (mAHD): ~14.40	N Coord: 6256806		E Coord: 316667
Date: 13/05/2022	Method: Hand Auger	Logged By: DL	Scale: 1:10

Depth (m)	Type	Blows per 100mm (0 5 10 15 20)	Level	Legend	Depth (m)	Description	Water
			13.10		1.30	Silty Clay: high plasticity, grey, orange-brown and red-brown, trace of fine to medium-grained ironstone gravel, moisture content < plastic limit, stiff consistency (Fill)	
		Refusal	12.60		1.80	As above, very stiff to hard consistency (Residual)	
						End Of Hole At 1.80 m	

KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

Hand auger refusal at 1.8m

GEOFIRST PTY LTD

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PO Box 137 Figtree NSW 2525

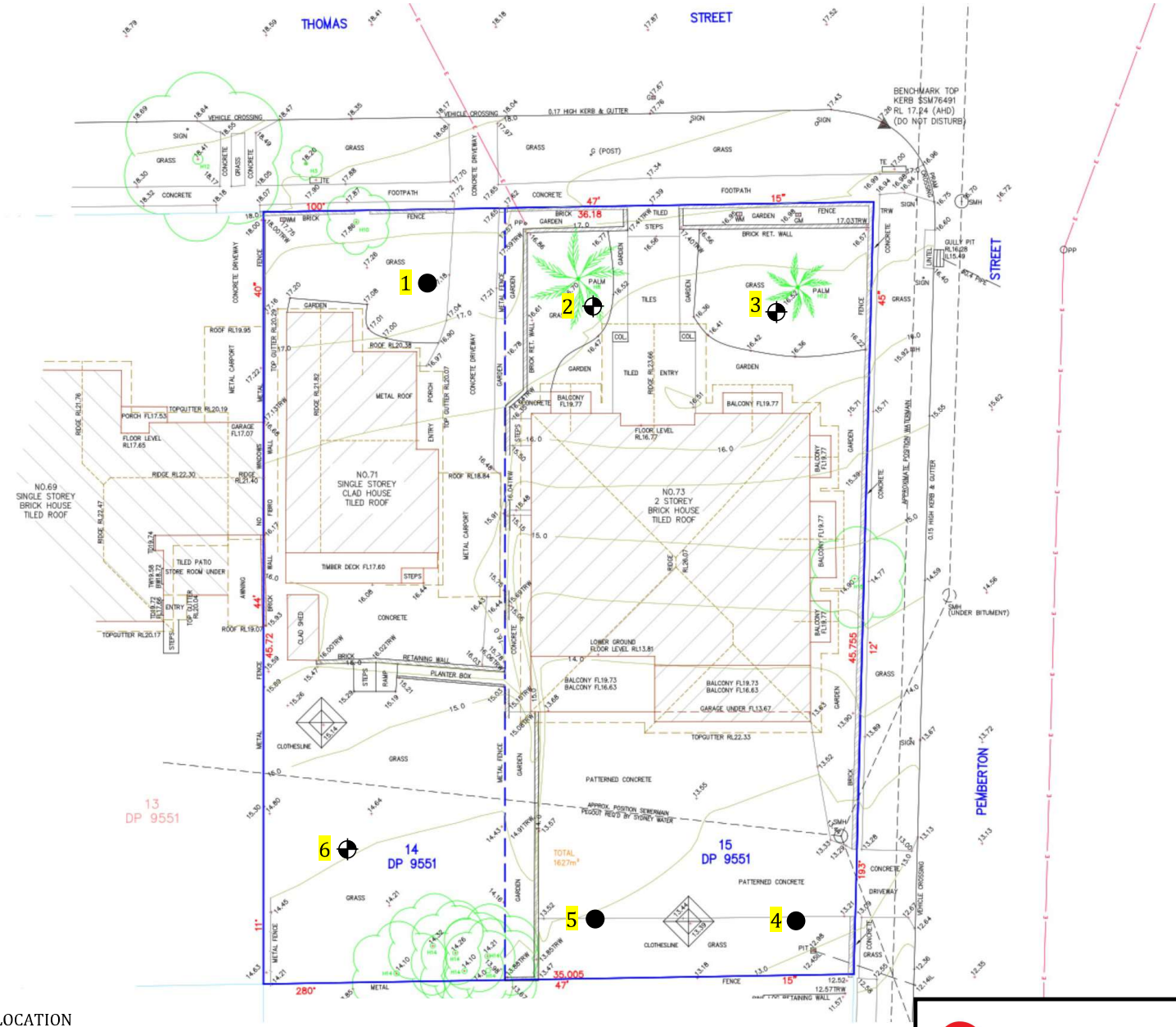
DYNAMIC CONE PENETRATION TEST RESULT

Client:	Ausino Group		
Project:	Proposed Boarding House		
Location:	71-73 Thomas Street, Parramatta		
Job No.	GF1404	Hammer Weight & Drop: 9kg/510mm	
Date:	13-5-22	Rod Diameter: 16mm	
Tested By:	JA	Point Diameter: 20mm	

Number of Blows per 100mm Penetration

Test Location	BH2	BH3	BH6	
Depth (mm)	DCP2	DCP3	DCP6	
0 - 100	1	1	1	
100 - 200	2	5	1	
200 - 300	2	6	2	
300 - 400	4	11	3	
400 - 500	2	3	4	
500 - 600	3	3	5	
600 - 700	3	4	4	
700 - 800	4	3	5	
800 - 900	7	6	4	
900 - 1000	End	10	4	
1000 - 1100	Bouncing	17	6	
1100 - 1200		End	4	
1200 - 1300		Bouncing	5	
1300 - 1400			15	
1400 - 1500			25	
1500 - 1600			11	
1600 - 1700			11/50mm	
1700 - 1800			End	
1800 - 1900			Refusal	
1900 - 2000				
2000 - 2100				
2100 - 2200				
2200 - 2300				
2300 - 2400				
2400 - 2500				
2500 - 2600				
2600 - 2700				
2700 - 2800				
2800 - 2900				
2900 - 3000				

Remarks:
1. The procedure used for this test is similar to that described in AS1289.6.3.2-1997, Method 6.3.2.
2. Usually 8 blows per 20mm is taken as refusal



LEGEND

- ● APPROXIMATE BOREHOLE LOCATION
- ⊕ APPROXIMATE BOREHOLE AND DCP TEST LOCATION

GEOTECHNICAL TEST LOCATION PLAN

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Dated 16 May 2022

Report No. GF1404-A Figure No. 1

GEOFIRST PTY LTD

Report Explanation Notes

Introduction

These notes have been provided to amplify the geotechnical report in regards to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

This report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual condition throughout an area.

If another party misinterpreted the report without consulting with Geofirst, Geofirst cannot be accept responsible for such misinterpretation and for problem that may occur due to changed factors if they are not consulted.

The data obtained in the report should not be separated. The report should be read in whole presents the findings of the site assessment. The report should not be copied in part or altered in any way.

Engineered Logs

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the subsurface conditions. They reliability will depend to some extend on the frequency of sampling and the method of investigation.

The explanatory notes define the terms and symbols used in preparation of the logs are descripted below. Subsurface conditions between the investigation points may vary significantly from conditions encountered at that particular locations.

Soil Classification and Description

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726-2017, the Geotechnical Site Investigations. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusion. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil Classification

Fraction	Components	Grain	Size* mm
Oversize	Boulders		>200
	Cobbles		63-200
Coarse grained soil	Gravel	Coarse	19-63
		Medium	6.7-19
		Fine	2.36-6.7
	Sand	Coarse	0.6-2.36
		Medium	0.21-0.6
		Fine	0.075-0.21
Fine grained soil	Silt		0.002-0.075
	Clay		<0.002

*These sizes correspond approximately to standard sieve sizes.

Descriptive terms for plasticity of cohesive soils

Descriptive term	Range of liquid limit for silt	Range of liquid limit for clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	> 35 and ≤50
High plasticity	>50	>50

Soil Strength Assessment

The strength (consistency) of the cohesive soils (i.e. clay) is assessed either by use of hand penetrometer, laboratory testing or engineering examination.

Granular soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT).

Consistency terms for cohesive soils (i.e. Clay)

Consistency	Indicative undrained Shear Strength (kPa)
Very Soft (VS)	≤12
Soft (S)	>12 and ≤25
Firm (F)	>25 and ≤25
Stiff (St)	>50 and ≤100
Very Stiff (VSt)	>100 and ≤200
Hard (H)	>200
Friable	Strength not attainable

Strength terms for granular soils (i.e. sand and gravel)

Relative Density	Density Index (%)	SPT 'N' Value (blows/300mm)
Very Loose (VL)	≤15	≤4
Loose(L)	>15 and ≤35	4 and 10
Medium Dense (MD)	>35 and ≤65	>10 and ≤30
Dense (D)	>65 and ≤85	>30 and ≤50
Very Dense (VD)	>85	>50

Rock Classification and Description

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. In the Sydney basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

Classification of Material Weathering.

Term	Abbreviation	
Residual Soil	RS	
Extremely Weathered	XW	
Highly Weathered	HW	DW
Moderately Weathered	MW	
Slightly Weathered	SW	
Fresh	FR	

Classification of Rock Strength

Strength	Abbreviation	Point Load Strength Index ($Is_{(50)}$)
Very Low	VL	0.03- 0.1
Low	L	0.1 - 0.3
Medium Strength	M	0.3 -1.0
High Strength	H	1.0 -3.0
Very High Strength	VH	3.0 to 10
Extremely High Strength	EH	≥10

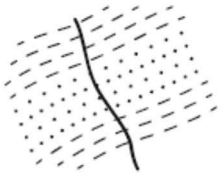
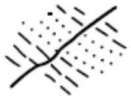
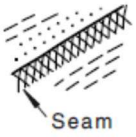
Groundwater

Where groundwater levels are recorded in the logs, the level will vary from time to time with seasons or recent weather changes and investigation methods. Hence, it is only for general indication and it may not be the same at the time of construction.

Rock Defects

Rock Defect Types		Abbreviation
Parting		PT
Joint		JT
Sheared Surface		SH
Sheared Zone		SZ
Sheared	Seam	SS
Crushed		CS
Infilled		IS
Extremely Weathered		XWS

ROCK DEFECT TYPES

Type	Sub-type	Definition	Diagram
Parting		A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering (e.g. bedding) or a planar anisotropy in the rock material (e.g. cleavage). May be open or closed.	
Joint		A surface or crack with no apparent shear displacement and across which the rock has little or no tensile strength, but which is not parallel or sub-parallel to layering or to planar anisotropy in the rock material. May be open or closed.	
Sheared Surface (refer to Note)		A near planar, curved or undulating surface which is usually smooth, polished or slickensided and which shows evidence of shear displacement.	
Sheared Zone (refer to Note)		Zone of rock material with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.	
Seams	Sheared Seam (refer to Note)	Seam of soil material with roughly parallel almost planar boundaries, composed of soil materials with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.	
	Crushed Seam (refer to Note)	Seam of soil material with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock material which may be more weathered than the host rock. The seam has soil properties.	
	Infilled Seam	Seam of soil material usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1 mm thick may be described as a veneer or coating on a joint surface.	
	Extremely Weathered Seam	Seam of soil material, often with gradational boundaries. Formed by weathering of the rock material in place.	

NOTE: Sheared surfaces, sheared zones, sheared seams and crushed seams are generally faults in geological terms.

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Vibration Emission Design Goals

Reference

German Standard DIN 4150 – Part 3: 1986

- A guideline levels of Vibration Velocity for evaluating the effects of vibration in structures

The DIN 4150 Values for Structural Damage - Safe Limits for Building Vibration

Group	Type of Structure	Peak Vibration Velocity in mm/s			
		At Foundation Level at a Frequency of			Plane of Floor of Uppermost Storey
		Less than 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and Buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 and 2 and have intrinsic value (eg buildings that are under a preservation order	3	3 to 8	8 to 10	8

Note:

- For frequencies above 100Hz, the higher values in the 50Hz to 100Hz column should be used.
- Maximum levels of the DIN 4150 values may measure in any direction at the foundation or in (x) or (y) horizontal directions, in the plane of the uppermost floor.
- Peak vibration velocities higher than the minimum numbers in Table 1 for low frequencies may be considered as 'SAFE', based upon the frequency content of the vibration and the actual condition of the structure.
- The values summarised in Table 1 are only a broad guide. Their limitations should be read in safe limits explanation below.

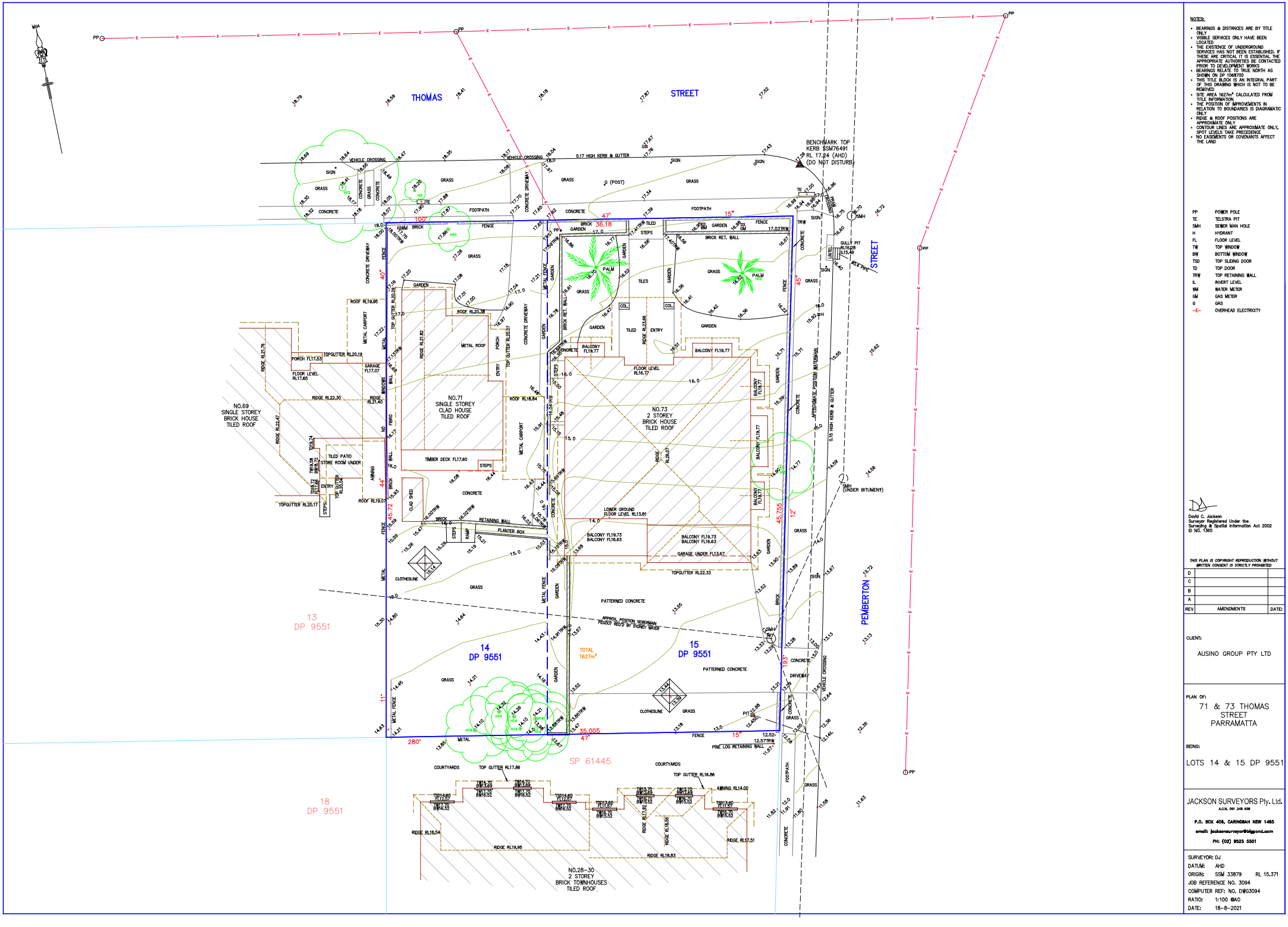
Safe Limits Explanation

The level assessed to be 'Safe limits', up to which no damage due to vibration effects has been observed for the particular class of building.

Damage include minor non-structural effects:

- Superficial cracking in cement render
- The enlargement of cracks already present
- The separation of partitions;
- Intermediate walls from load bearing walls

Should damage be observed at vibration levels lower than the 'Safe limits', then it may be attributed to other causes.



NOTES:

- BEARINGS & DISTANCES ARE BY TITLE ONLY
- VISIBLE SERVICES ONLY HAVE BEEN LOCATED
- THE EXISTENCE OF UNDERGROUND SERVICES HAS NOT BEEN ESTABLISHED. IF THESE ARE CRITICAL IT IS ESSENTIAL THE APPROPRIATE AUTHORITIES BE CONTACTED PRIOR TO DEVELOPMENT WORKS
- BEARINGS RELATE TO TRUE NORTH AS SHOWN ON DP 1068700
- THIS TITLE BLOCK IS AN INTEGRAL PART OF THIS DRAWING WHICH IS NOT TO BE REMOVED
- SITE AREA 1627m² CALCULATED FROM TITLE INFORMATION
- THE POSITION OF IMPROVEMENTS IN RELATION TO BOUNDARIES IS DIAGRAMATIC ONLY
- RIDGE & ROOF POSITIONS ARE APPROXIMATE ONLY
- CONTOUR LINES ARE APPROXIMATE ONLY, SPOT LEVELS TAKE PRECEDENCE
- NO EASEMENTS OR COVENANTS AFFECT THE LAND

PP	POWER POLE
TE	TELSTRA PIT
SMH	SEWER MAN HOLE
H	HYDRANT
FL	FLOOR LEVEL
TW	TOP WINDOW
BW	BOTTOM WINDOW
TSD	TOP SLIDING DOOR
TD	TOP DOOR
TRW	TOP RETAINING WALL
IL	INVERT LEVEL
WM	WATER METER
GM	GAS METER
G	GAS
-E-	OVERHEAD ELECTRICITY

David C. Jackson
Surveyor Registered Under the Surveying & Spatial Information Act 2002
ID NO. 1385

REV	AMENDMENTS	DATE
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C		
B		
A		

CLIENT:

AUSINO GROUP PTY LTD

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BEING:

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