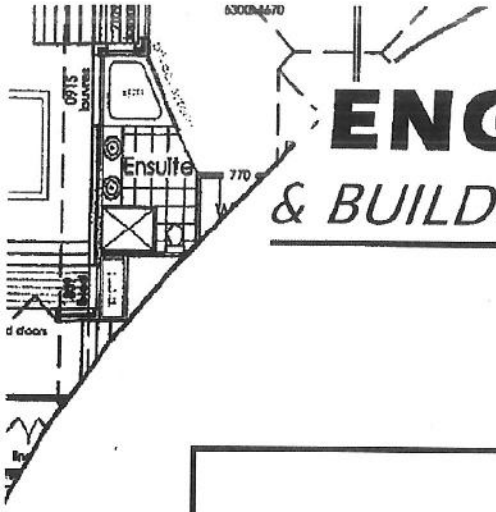


ENGINEERING
& BUILDING INVESTIGATION SERVICES

EBIS

ACN: 104 324 969
ABN: 93 104 324 969

SITE INVESTIGATION & SITE CLASSIFICATION REPORT

LOT 2 MON TERRE DRIVE, MON TERRE RIDGE ESTATE LITTLE MOUNTAIN

CLIENT:	Glynnis Schwarzel 5 Tallowwood Close LITTLE MOUNTAIN Q 4551
EBIS REFERENCE:	160580-SI
PROJECT DESCRIPTION:	Pre-Purchase Soil Test
DATE:	30 January 2017

PO Box 973 Buddina Q 4575 Unit 2/4 Textile Avenue Warana P (07) 5436 9199; F (07) 5436 9198; Email: admin@ebis.com.au

SITE INVESTIGATION AND SITE CLASSIFICATION

1.0 INTRODUCTION

1.1 General Information

We were commissioned to undertake a Site Investigation and Site Classification at Mon Terre Drive Mon Terre Ridge Estate, Little Mountain for the proposed pre-purchase soil test.

The site investigation was undertaken on 18 January, 2017.

2.0 TESTING

2.1 Locations

Two (2) boreholes were excavated using a hand auger and two (2) Dynamic Cone Penetrometer (DCP) tests were undertaken at the locations shown on the attached site sketch.

2.2 Field Testing

Soil samples were hand classified and soil profiles recorded on the attached Borehole report no. 160580-BH.

Laboratory testing was performed on one (1) undisturbed sample and the results are recorded in section 3.5 of this report.

3.0 FINDINGS

3.1 Slope & Topography

The allotment has a slope of approximately 30% to the northeast. There are rock retaining walls along the front south side ranging from 800mm to 1900mm in height and on the east side ranging from 1100mm to 2500mm in height.

3.2 Vegetation

The site is sparsely grassed with some coarse shrubs and weeds. The site previously had a cover of trees pre-development.

3.3 Site Drainage

We consider the drainage to be poor due to the steep site. Surface water runoff will be rapid.

3.4 Soil Conditions

The natural soil was found to be shallow high plasticity silty clay overlying hard extremely weathered sandstone rock. Approximately 200mm of high plasticity silty clay fill was observed in Borehole no 1. In Borehole no 2 approximately 500 mm of medium to high plasticity silty clay fill with gravels and cobbles was observed with auger refusal on cobbles in the fill at 500m depth. DCP testing at Borehole no 2 on the east side indicated that the extremely weathered rock to be at approximately 1600mm depth. Rocks and boulders were observed on the site. Seepage was not observed however is likely to occur above the bedrock layer during and after extended wet weather.

3.5 Test Results

The shrink/swell index was found to be 4.0.
The design surface movement (y_s) was calculated to be 36mm which is in the range of 20mm to 40mm.

4.0 CLASSIFICATION

4.1 Site Classification

In accordance with the "Residential Slabs and Footings" code we have classified the above site as a 'P' Class site.

4.2 Classification Reasons

This site has been classified as a 'P' site due to the presence of the following on or near the site:

- Steep site
- Fill

A 'P' classified site requires engineering design input beyond a "Deemed to Comply" detail to AS2870 'Residential Slab and Footings Code'.

The site has also been classified as "M" in terms of soil as it is moderately reactive to changes in soil moisture.

4.3 Footing Design Considerations

The footing design for this site must consider the following factors:

1. The site slopes steeply (Refer to separate slope stability report).
2. Fill exists on the site.
3. Shallow weathered sandstone rock at Borehole no. 1.
4. Trees previously removed from the site.
5. Clays present in the soil profile are moderately reactive.
6. Rocks/rock floaters are likely to be encountered during footing excavations.
7. There needs to be drainage control of surface and subsurface water.

5.0 RECOMMENDATIONS

5.1 Site Preparations

Site preparations should include removal of the vegetation in the vicinity of the proposed building work.

Should it be necessary to remove any large vegetation from the site, the resulting voids created by its removal must be backfilled and compacted to 98% standard compaction using clean soil containing no organic material.

5.2 Site Drainage

The site should be profiled prior to construction so that water drains away from the proposed building works.

The site drainage should be maintained after completion of the building so that water does not pond next to the footings.

On predominantly clay sites the moisture content of the soil should be monitored prior to the commencement of construction and maintained as set out in the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance". Refer to CSIRO website www.publish.csiro.au/pid/7076.htm.

5.3 Footing Design

The footings should be constructed to suit the designated site classification as given in section 4.1 of this report and as specified in the separate slope stability report (Reference no. 160580-SU-Geo). Factors identified in Section 4.3 "Footing Design Considerations" and the separate slope stability report should be considered during design of the footings and slab.

5.4 Site Maintenance

Care should be taken to observe recommendations as set out in the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance". Refer to CSIRO website www.publish.csiro.au/pid/7076.htm.

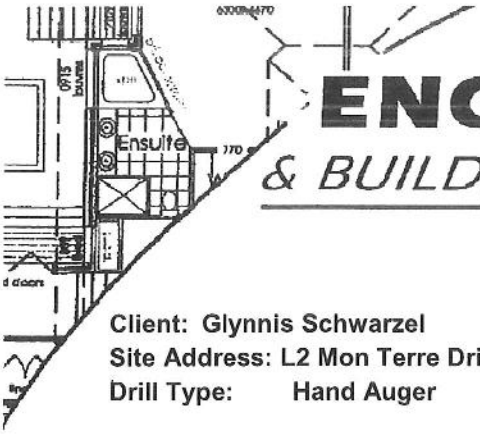
5.5 Limitations

Engineering and Building Investigation Services are unable to guarantee that the soil profile will not vary slightly across the site from that given in this report. This is due to the inherent variable nature of all natural soils. If the soil conditions do appear to differ from those indicated in this report Engineering and Building Investigation Services should be contacted and requirements confirmed.

D. R. Stanfield
B.E. (civil), C.P. Eng., M.I.E. Aust., R.P.E.Q. No. 4177, Vic EB 19910.

ENCLOSURES:

1. Borehole Report no. 160580-BH
2. Site Sketch
3. Photographs of site
4. Borehole Explanatory Notes
5. Site Drainage Diagram - DD1
6. Publication from the Cement and Concrete Association of Australia "Articulated Walling - Technical Note 61"



ENGINEERING & BUILDING INVESTIGATION SERVICES

EBIS

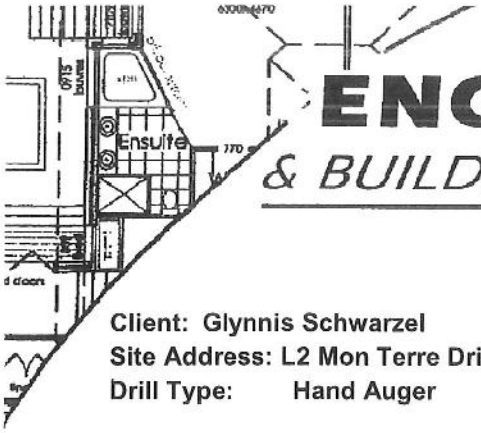
ACN: 104 324 969
ABN: 93 104 324 969

Client: Glynnis Schwarzel
Site Address: L2 Mon Terre Drive, Little Mountain
Drill Type: Hand Auger

Our Reference: 160580-BH
Date Tested: 18.01.17
Borehole Location: Refer Site Sketch

BOREHOLE LOG NO.1

Samples Taken	FILL	DCP	Depth	Classification Symbol	SOIL DESCRIPTION	Moisture	Consistency/ Density
	↓		0	(CH)	(Fill) Silty clay	Moist	Uncontrolled
		4	100		Traces of gravels		
		2	200		Mottled orange brown grey		
S @ 300		3	300	(CH)	Silty clay	Slightly moist	Stiff
		5	400		Traces of gravels Grey Green mottled orange brown		
		10	500		END BOREHOLE Hand Auger UTP (extremely weathered rock)		
		20+	600				



ENGINEERING & BUILDING INVESTIGATION SERVICES

EBIS

ACN: 104 324 969
ABN: 93 104 324 969

Client: Glynnis Schwarzel
Site Address: L2 Mon Terre Drive, Little Mountain
Drill Type: Hand Auger

Our Reference: 160580-BH
Date Tested: 18.01.17
Borehole Location: Refer Site Sketch

BOREHOLE LOG NO.2

Samples Taken	FILL	DCP	Depth	Classification Symbol	SOIL DESCRIPTION	Moisture	Consistency/ Density
	↓		0	(CI-CH)	(Fill) Silty clay	Moist	Uncontrolled
		1	100		With gravels & cobbles		
		1	200		Mottled dark grey, orange brown		
		1	300				
		1	400				
		1	500				
		2	600		END BOREHOLE Hand Auger UTP		
		2	700		(Cobbles in fill)		
		2	800				
		2	900				
		3	1000				
		4	1100				
		2	1200				
		3	1300				
		5	1400				
		5	1500		(Possible extremely weathered rock on tip of DCP rod when removed)		
		UTP	1600				

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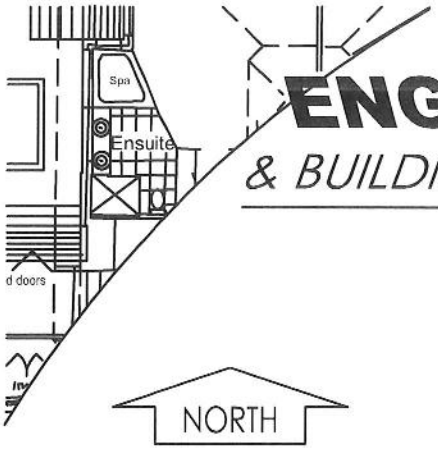

NORTH

DETAILS ON THIS PLAN ARE APPROXIMATE ONLY. DO NOT SCALE FROM PLAN FOR CONSTRUCTION PURPOSES.

EXISTING RESIDENCE

APPROXIMATE MANHOLES

APPROXIMATE MANHOLES

30%

ROCK RETAINING WALL

BH2/ DCP

1.1m

VACANT

COARSE GRASSES

DOWN

BH1/ DCP

2.1m

VACANT

30%

2.5m

SCATTERED SMALL SHRUBS

0.8m

1.3m

DOWN

MON TERRE DRIVE

1.9m

LOT 2
1250 sqm
RP (Not Registered)
SITE SKETCH
JOB No.: 160580
Scale.: N.T.S.

PO Box 973 BUDDINA Q 4575
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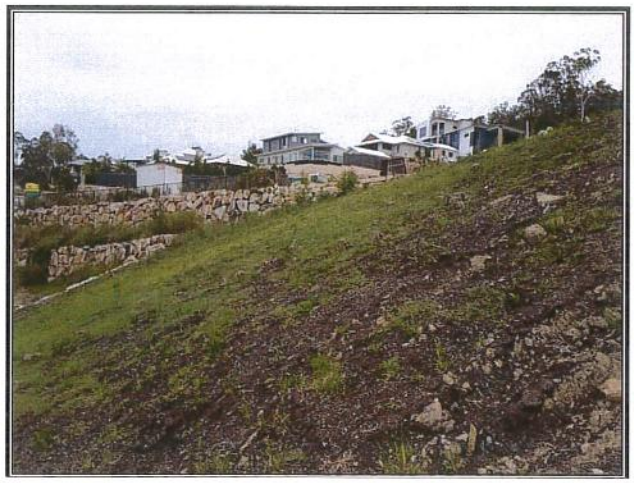
E admin@ebis.com.au

LOT 2 MON TERRE DRIVE, LITTLE MOUNTAIN

PHOTOGRAPHS OF SITE

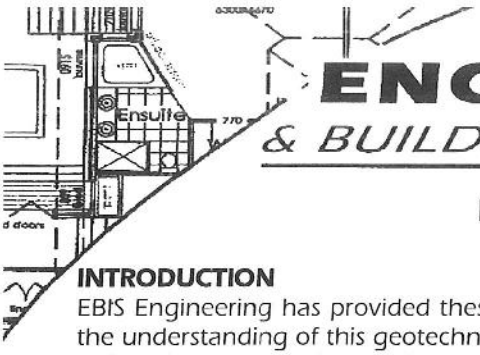
Allotment rear north to south



Rocks & boulders on ground surface

Existing rock retaining walls

Sewer & stormwater on rear north side



ENGINEERING & BUILDING INVESTIGATION SERVICES

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ACN: 104 324 969
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BOREHOLE LOG EXPLANATORY NOTES

INTRODUCTION

EBIS Engineering has provided these notes to aid in the understanding of this geotechnical report and to define the terms and symbols used in our borehole logs.
Some of these notes may not be relevant to all reports.

SOILS

Soils exhibit a variety of characteristics which can change across a site and alter over time. Geotechnical engineering involves collecting constrained facts about these soil characteristics in order to recognize and predict the behaviour of the soil on a particular site under certain conditions.

Description and classification methods for soils and rocks used in this report are based on the Australian Standard AS1726-1993 and include properties such as major soil or rock type, minor soil or rock type, inclusions, colour, structure, strength, density and plasticity.

SAMPLES TAKEN

Two types of samples can be taken.

1. D – Disturbed Sample. These samples are taken during drilling and provide information on grain size, plasticity, colour, moisture content, minor constituents and sometimes strength and structure.

2. U50 – Undisturbed Sample. These samples are usually only taken from cohesive soils and are performed by pressing a tube with a thin wall and 50mm diameter into the soil and pulling it out with a section of the soil in a fairly intact state. Strength, structure, volume change potential and compressibility are some of the tests which can be performed using this sample.

BOREHOLES

There are several methods for digging through the soil to find the constituents that make up the soil type in that location. Generally most soil testing by EBIS is done by hand auger as this process has the least impact on the location of the testing. Occasionally when necessary, other methods such as drilling with a powered auger, truck mounted drill rig or excavation using a backhoe or excavator may be used.

It must be recognised that boreholes represent the soil conditions in a very small sample of the overall subsurface situation and as such the soil profile may vary across the site. If the soil conditions do appear different from those indicated in this report, EBIS should be contacted to confirm the requirements.

Boreholes are terminated for two reasons.

1. UTP – Unable to Penetrate. When there is refusal for the hand auger and it cannot penetrate any further due to rock, rock fragments, gravel or hard clay.

2. The soil type is consistent and able to support building foundations. Industry standards generally recognise two (2) metres as 'typical' depth to termination of boreholes without a limiting layer (eg rock) for 'typical' dwellings.

FIELD TESTING

There are two main tests which we perform on the site.

1. DCP – Dynamic Cone Penetrometer. A rod is driven into the ground using a falling weight hammer and the number of drops that it takes the hammer to drive the rod in 100mm increments into the ground is recorded. Higher numbers indicate more stable soils.

2. PP – Pocket Penetrometer. This is a hand-held instrument which is used to measure shear strength and indicates unconfined compressive strength. A number over 100 is acceptable but higher numbers indicate more stable soils.

CLASSIFICATION

Soils are generally divided into two main categories according to their cohesiveness. After cohesiveness, they are separated by the dominant size of the particles in the soil. This is shown on the table on the following page.

FILL

Fill relates to any soil or other material which has been placed on top of the natural soil. It is sometimes recognised by the inclusion of foreign materials, such as organic matter, metal or bricks, or through unusual colour, texture or compaction which varies considerably from the natural soil profile.

The variation in material type, degree of compaction and strength of fill materials can differ from the natural soil and, in some instances where it is uncontrolled, this leads to a greater possibility of unfavourable engineering properties and deficiencies in performance and possible complications for building on the site. The performance of the fill as a foundation material is dependent upon the depth of the fill and the degree of compaction.

Fill can be:
UC – Uncompacted
VC –Variably Compacted
WC – Well Compacted

PLASTICITY

Plasticity is defined by the Liquid Limit of the sample. As such, this term relates only to cohesive soils. Liquid Limit (LL) is the water content where a soil changes from plastic to liquid in behaviour.

Code	Term	Liquid Limit Range (%)
CL	Low Plasticity	<35
CI	Medium Plasticity	≥35 ≤50
CH	High Plasticity	>50

Liquid Limit is measured as a percentage.

MOISTURE

This refers to the moisture content of the soil at the time of testing.

Code	Term	Cohesive Soils	Non-Cohesive Soils
DR	Dry	Hard, Powdery, Friable	Free-flowing, Very Loose
MO	Moist	Smooth	
DA	Damp	Can be moulded,	Cool, dark, Tends to cohere
VDA	Very Damp	Sticky	
WE	Wet	Weakened. Free water forms on hands when holding	Cool, dark, Tends to cohere

CONSISTENCY / DENSITY

Cohesive soils have consistency.
Non-Cohesive Soils have relative density.

Consistency – Cohesive Soils

Code	Term	Description
H	Hard	Thumb nail indents with difficulty
VSt	Very Stiff	Thumb nail can indent
St	Stiff	Indented by thumb. Cannot be moulded by hand
F	Firm	Moulded by strong finger pressure
S	Soft	Moulded by light finger pressure
VS	Very Soft	Easily squeezed, sloppy

Density – Non-Cohesive Soils

Code	Term	Index
VD	Very Dense	>85
D	Dense	≥65 ≤85
MD	Moderately Dense	≥35 ≤65
L	Loose	≥15 ≤35
LL	Very Loose	<15

ROCK MATERIAL

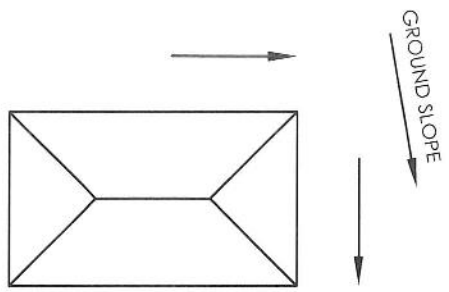
Rock Material has **Strength** and can be **Weathered**.

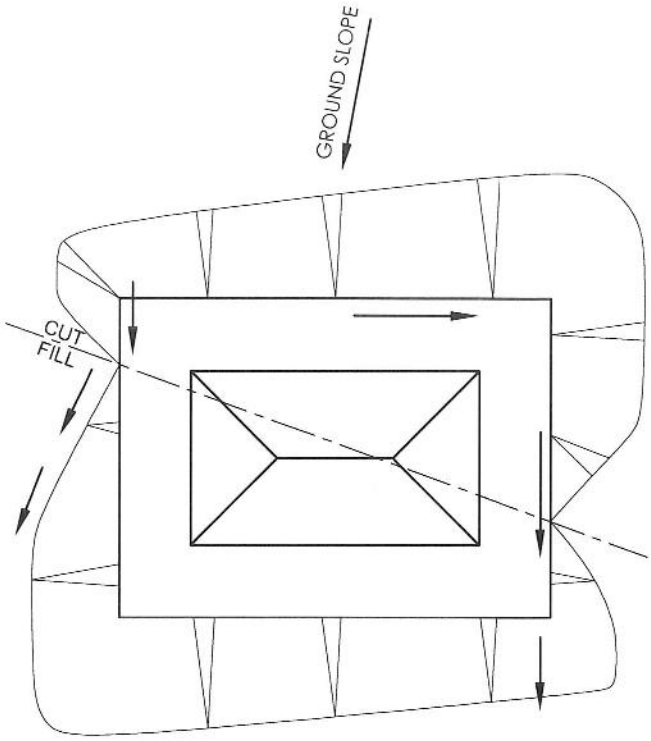
STRENGTH

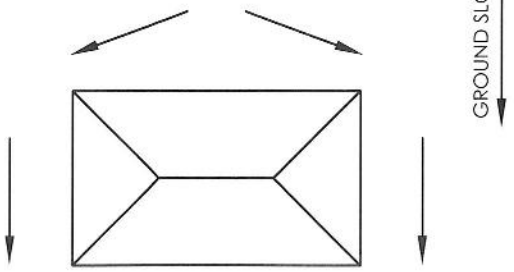
Code	Term	Description
EX	Extremely High	May break after many blows when hit with pick. Ringing sound.
VH	Very High	Breaks after more than one blow when hit with pick. Ringing sound.
H	High	Breaks after one blow when hit with pick. Ringing sound.
M	Medium	Readily scored with a knife. Broken in hand with difficulty.
L	Low	Easily scored with a knife. Indentations up to 3mm appear with firm pick blows. Dull sound
VL	Very Low	Pealed with a knife. Crumbles with firm blows. Broken by finger pressure.
EL	Extremely Low	Shows soil properties. Easily remoulded by hand

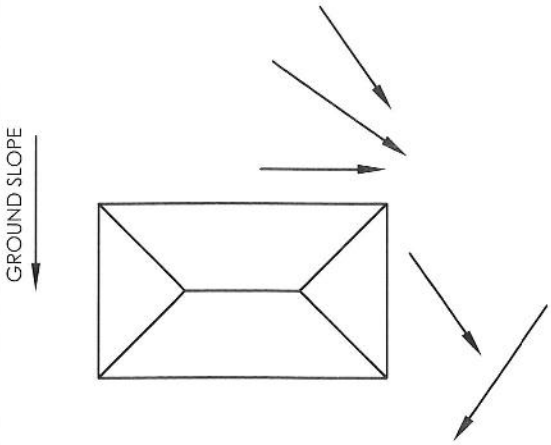
WEATHERING

Code	Term	Description
FR	Fresh Rock	No staining or decomposition
SW	Slightly Weathered Rock	Slightly discoloured but little/no change in strength
DW	Distinctly Weathered Rock	Highly discoloured usually by iron. Change in strength
XW	Extremely Weathered Rock	'Soil' properties ie disintegrates or can be remoulded in water
RS	Residual Soil	Soil developed from rock – structure and substance of rock is no longer evident

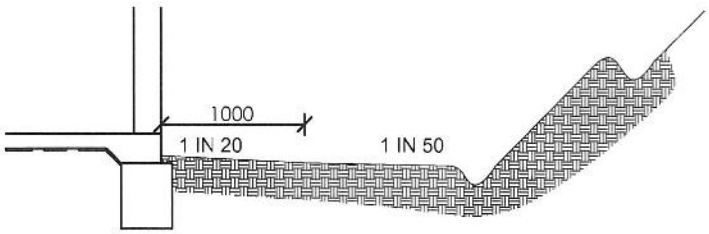








GROUND OUTSIDE BUILDING
SURFACE TO DRAIN AWAY FROM HOUSE.
TYPICALLY:
1 IN 20 TO FIRST METER FROM BUILDING EDGE AND
1 IN 50 THEREAFTER



SPOON DRAIN 1 IN 100 MIN. FALL

NOTES:

1. IT IS EXTREMELY IMPORTANT TO MAINTAIN GOOD DRAINAGE THROUGHOUT CONSTRUCTION OF ANY BUILDING.

2. FALL AWAY FROM THE BUILDING SHALL BE 1 IN 20 TO FIRST METER FROM BUILDING EDGE AND 1 IN 50 THEREAFTER, AS SHOWN SO THAT WATER DOES NOT POND AGAINST OR NEAR THE BUILDING.

3. ALL WATER RUN-OFF SHALL BE DIRECTED AWAY FROM THE BUILDING AT ALL TIMES PRE AND POST CONSTRUCTION.

4. FOR FLAT SITES, AN ENGINEER SHOULD BE CONSULTED TO ENSURE THAT THE FINISHED HEIGHT OF THE BUILDING ALLOWS PROPER DRAINAGE AWAY FROM THE BUILDING.

5. DRAINAGE MUST NOT DIRECT WATER TO ADJACENT BLOCKS IN A CONCENTRATED STREAM.

Engineering & Building Investigation Services
Unit 2/4 Textile Ave, Warana PO Box 973 Buddina 4575
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SITE DRAINAGE DIAGRAMS

Drawing No.: DD1