

Version	Prepared By	Approved By	Date	Change Summary
1.0	TSP	RW	15 Aug 2024	

Re: Preliminary assessment of site conditions

Advice Reference: WittC-MGC-BDA-2-R-1.0

Attention

Siobhan Berkery
sb@mysonberkery.com.au

1 Introduction

Witt Consulting has prepared this preliminary geotechnical assessment for the property at 6 Joalah Rd, Duffys Forest, NSW, at the request of Siobhan Berkery, acting on behalf of Mr Gary Crannage. The assessment aims to evaluate the site's preliminary geotechnical conditions in relation to the proposed addition and whether a detailed geotechnical report is required.

We have conducted our geotechnical site investigation in accordance with AS 1726 (2017) 'Geotechnical Site Investigations'.

2 Scope of Works

Our scope of work for the geotechnical site investigation at 6 Joalah Rd, Duffys Forest, NSW included the following:

- Review of published architectural and landscape mapping
- Site inspection carried out by a geotechnical engineer
- Preparation of a preliminary geotechnical assessment report for the preliminary development application.

3 Proposed Development

We understand that the proposed addition is approximately 20 m wide and will extend 20 m from the northern facade of the existing residential development. It will include a pool, paddling pool, spa, elevated pool deck, pergolas, lawn and retaining wall, as presented in **Appendix A**.

The architectural plans indicate that the proposed addition will align with the existing ground level of the development. The estimated maximum excavation depth is 1.4 meters, while the maximum fill height is anticipated to be 0.5 meters.

4 Site Identification and Description

Table 1 below summarises the identification, location and setting of the site, according to the NSW Planning Portal Spatial Viewer web application:

Item	Details
Street Address	6 Joalah Rd, Duffy's Forest
Legal Property Description	Lot 375 DP752017
Approximate Site Size	2 ha
Approximate Geographic Co-ordinates	33°40'22.1"S 151°11'05.9" E
Local Government Area	Northern Beaches Council
Land Use Zoning	RU4 Primary Production Small Lots
Current Land Use	Urban Residential Development
Landslip Risk Classification	Area B - Flanking Slopes 5 to 25
Geology	Colluvial and residual soils, possibly deeper than in Class A, developed on Hawkesbury Sandstone. Minor detached sandstone blocks, occasional exposures of sandstone in cliffs and road cuts. Occasional fill areas associated with playing fields, roads and some developments.

Table 1 - Site Identification, Location and Setting

5 Soil Landscape

The NSW Environment & Heritage eSPADE web application identifies the soil landscape at the site as Somersby residual soil (9130tg). The site is characterised as:

Landscape – “gently undulating to rolling rises in deeply weathered Hawkesbury Sandstone plateau. Local relief to 40 m, slopes <15%. Rock outcrop is absent. Crests are broad and convex, valleys are narrow and concave. Extensively cleared, low eucalypt open-woodland and scrubland.”

Soils – “moderately deep to deep (100–300cm) Red Earths (Gn2.14) and Yellow Earths (Gn2.24, Gn2.21) overlying laterite gravels and clays on crests and upper slopes; Yellow Earths (Gn2.21, Gn2.24) and Earthy Sands (Uc5.11, Uc5.22) on mid-slopes; Grey Earths (Gn2.81), Leached Sands (Uc2.23) and Siliceous Sands (Uc1.22) on lower slopes and drainage lines; Gleyed Podzolic Soils (Dg3.82, Dg4.51) in low lying poorly drained areas.”

Limitations – “localised permanently high watertables, areas of laterite and stony soil, very low soil fertility, highly permeable soil.”

An excerpt of the eSPADE web application showing the location of the site with the associated soil landscapes is presented in **Appendix C**.

6 Geology

The Sydney 1:100,000 Geological Series Sheet 9130, indicates that the site is in an area underlain by Hawkesbury Sandstone from the Triassic period. The geological series sheet describes the lithology of Rh as *quartz sandstone with minor shale lenses*.

An excerpt of the 1:100,000 Geological Series Sheet 9130 with the location of the site is presented in **Appendix D**.

7 Acid Sulfate Soils

A review of the Warringah Council Local Environmental Plan 2011 maps indicate that the site is not located in a zone with acid sulfate potential.

8 Hydrogeology

A review of the Water NSW Groundwater database (<https://realtimedata.waternsw.com.au/water.stm>) indicated that there are 2 groundwater bores located within 500 m of the site.

A nearby groundwater monitoring site, Site GW105191, indicates the presence of water 32 m below ground level. We do not anticipate that the groundwater table will be encountered during the proposed works at the site. We conclude that subsurface seepage would not likely be observed following rainfall events.

Additionally, it is our opinion that the proposed works at the site are not likely to lower the groundwater level across the site by more than 1 m.

9 Geotechnical Model

A site inspection conducted on 09 Aug 2024 revealed Hawkesbury Sandstone as the underlying geology. The overlying soil within the site was observed to be a yellow/light-brown sandy clay. The ground surface gently slopes from the northern facade of the existing development downwards along the new proposed addition area.

As per Mr Gary Crannage's description, the land had been cut for the building construction and filled in the backyard during the construction phase of the existing residential development. Outcrops of Hawkesbury Sandstone were found across the site during the existing development construction works. This information was confirmed during the site inspection, and documented in **Appendix B**.

In summary, the current ground geological profile comprises three distinct layers: a surface fill cover, underlain by a relatively shallow stratum of sandy clay soil, supported by Hawkesbury sandstone bedrock.

No evidence of past landslides or ongoing slope instability was observed during our site inspection indicating that the existing development is geotechnically stable.

10 Landslide Risk

We understand that cuts to fill works within the existing embankment are proposed for the construction of the new proposed addition area. Based on our review of the site conditions and development drawings, it is our opinion that the proposed slope modifications do not impose any significant risk of landslide failure. It is our opinion that no further assessment of landslide risk is required.

11 Recommendations

Based on our assessment of the site conditions and the expected load magnitudes associated with the proposed works, we recommend that new structures are founded on residual soil (minimum Hard Clay), or Low strength Rock.

If these materials are not encountered at the proposed foundation depth, we suggest that the designer consider the implementation of piles or mass concrete pads to support the pool and other structures. Pile foundations should be founded below the fill areas and into sandstone bedrock to mitigate the potential of differential settlement.

The proposed works are not expected to adversely affect the existing subsurface flow conditions or cause negative impacts from stormwater discharge associated with the addition.

Given our recommendations, along with the geological data, identified site conditions and loading requirements, we have determined that a geotechnical report is not necessary for this project.

12 Limitations

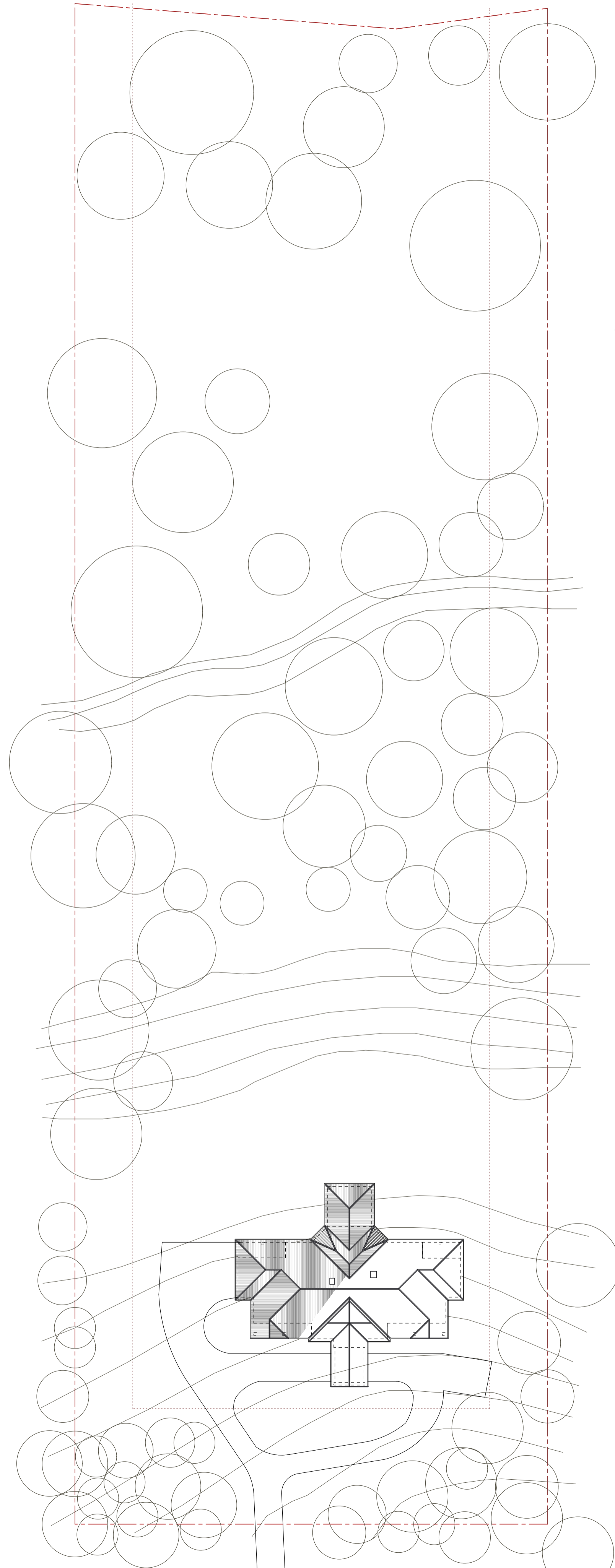
The recommendations presented in this report include specific issues to be addressed during the design and construction phases of this project. In the event that any of the construction phase recommendations presented in the report are not implemented, the general recommendations may become inapplicable and Witt Consulting accepts no responsibility for the performance of the structure where recommendations are not implemented in full, inspected and documented.

Subsurface conditions at the site may vary from those observed, or interpreted to be different from those expected. If differences from those interpreted in this report exist, we recommend that immediate geotechnical advice is sought. This report provides an assessment of the geotechnical aspects of the proposed architectural design. As part of this documentation stage of this project, Contract Documents and Specifications may be prepared based on our report. The designers should satisfy themselves that all the necessary advice has been obtained.

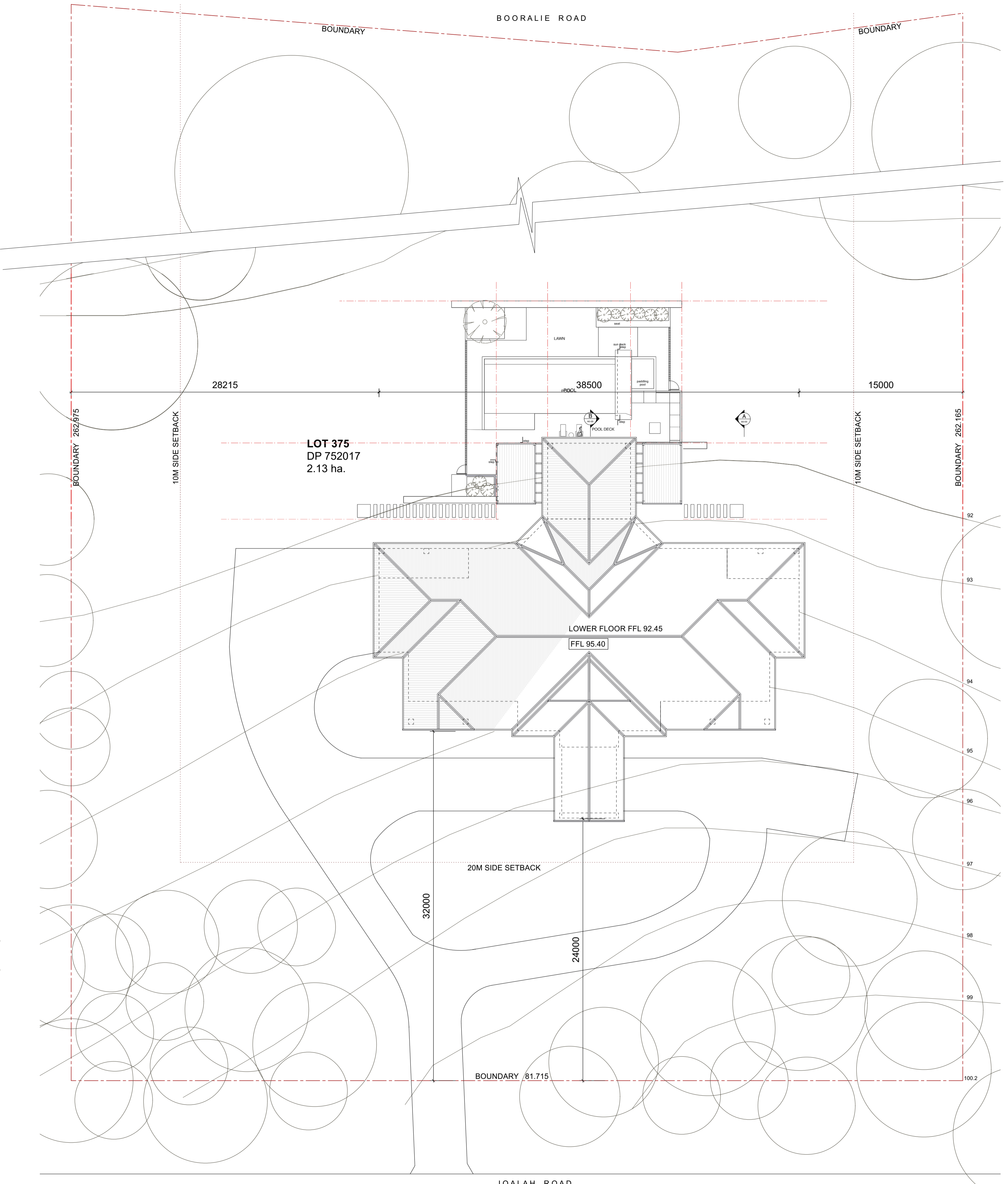
This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other use. If there are any changes to the proposed development described in this report then the recommendation in this report must be reviewed.

Appendix A. Site Location and Site Survey

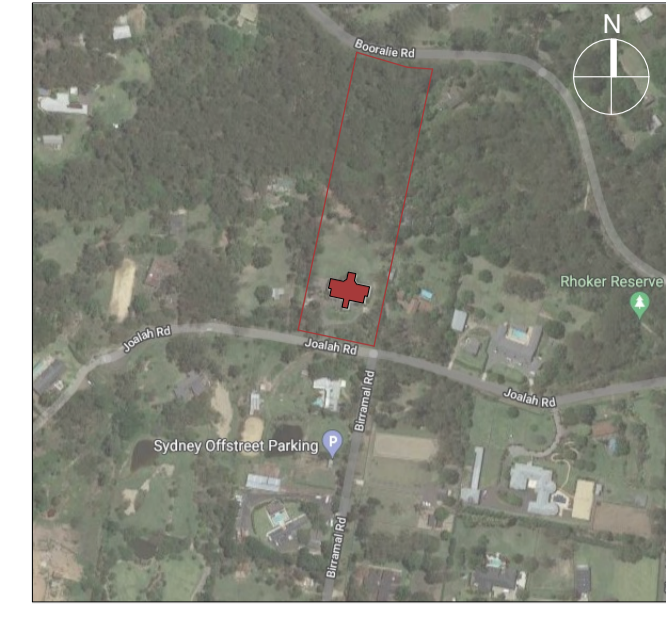
[240801_6JoalahRd-preDA.pdf](#)



01 EXISTING SITE/ ROOF PLAN
SCALE 1:500 REF



02 PROPOSED SITE/ROOF PLAN
SCALE 1:200 REF



03 LOCATION PLAN
SCALE N.T.S. REF

- DRAWING LIST:**
- A0.01 : SITE, ROOF + LOCATION PLANS
 - A0.02 : EXISTING GROUND FLOOR PLAN
 - A0.03 : EXISTING LOWER GROUND FLOOR PLAN
 - A0.04 : EXISTING ELEVATIONS
 - A0.05 : EXISTING SECTIONS

DEVELOPMENT DATA

SITE AREA :	2.13 Ha
EXISTING GFA :	1023.2 m ²
PROPOSED GFA :	1023.2 m ²
EXISTING FSR :	0.13 : 1
PROPOSED FSR :	0.13 : 1
ZONING :	RU4
LANDSLIP RISK :	AREA B
BUSHFIRE PRONE LAND :	YES
RIPARIAN LAND :	YES

- LEGEND:**
- AFW: ALUM. FRAMED WINDOW
 - EPF: SCANNING
 - EFFL: EXISTING FINISHED FLOOR LEVEL
 - WC: FIBRE CEMENT
 - WFC: FIBRE CEMENT
 - MR: METAL ROOFING
 - TB: TIMBER BATTENED SCREEN

Rev	Status	Date
A	FOR INFORMATION	xx.xx.24

EXISTING SITE, ROOF + LOCATION PLANS

Scale @ A1	1:200 / 1:500	Date	15 FEB 2024
Job Number	16 28	Draw No.	A0-01
		Revision	A

PROJECT:
6 JOALAH ROAD, DUFFYS FOREST NSW 2084

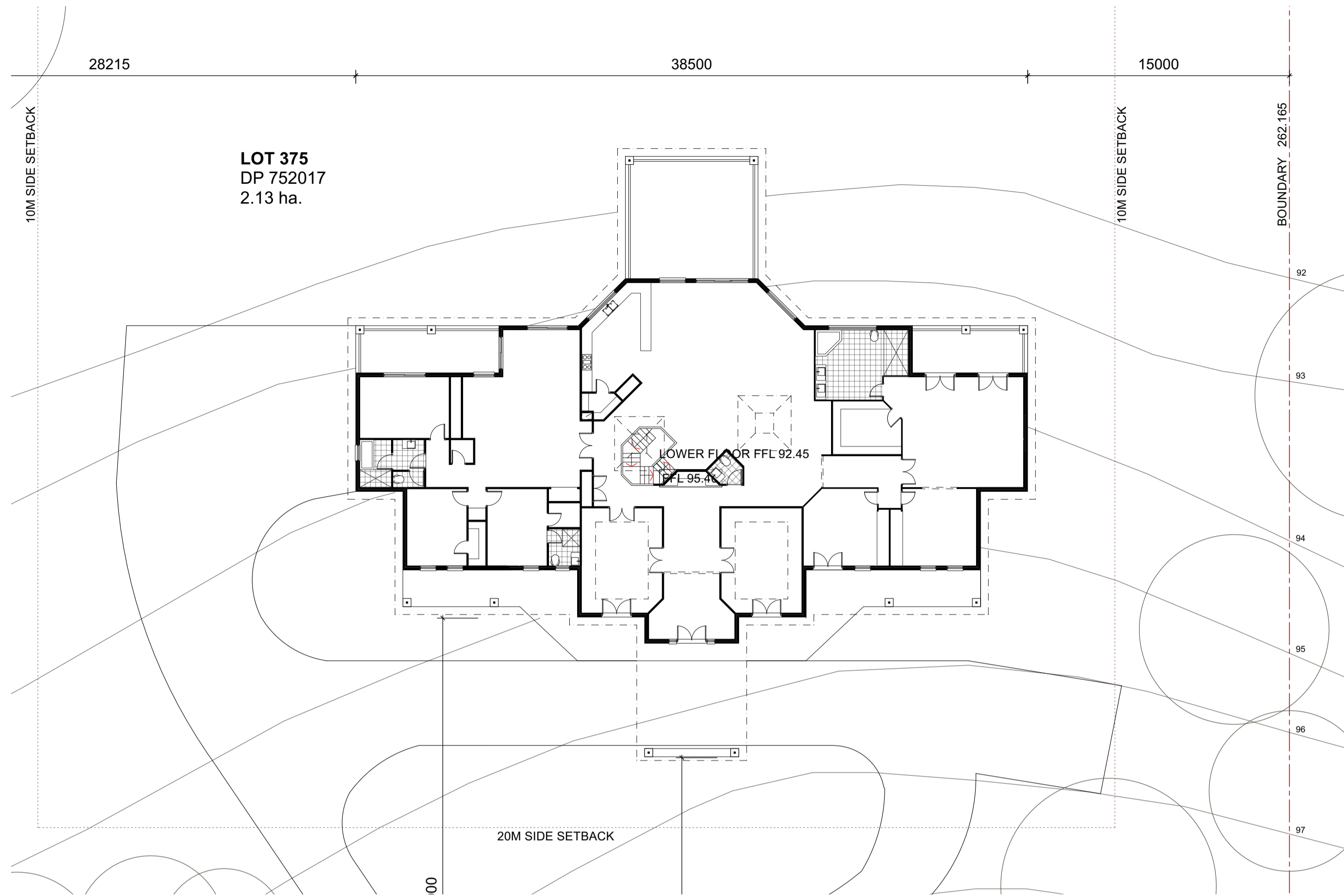
CLIENT:
G. CRANNAGE

Myson + Berkery Architects

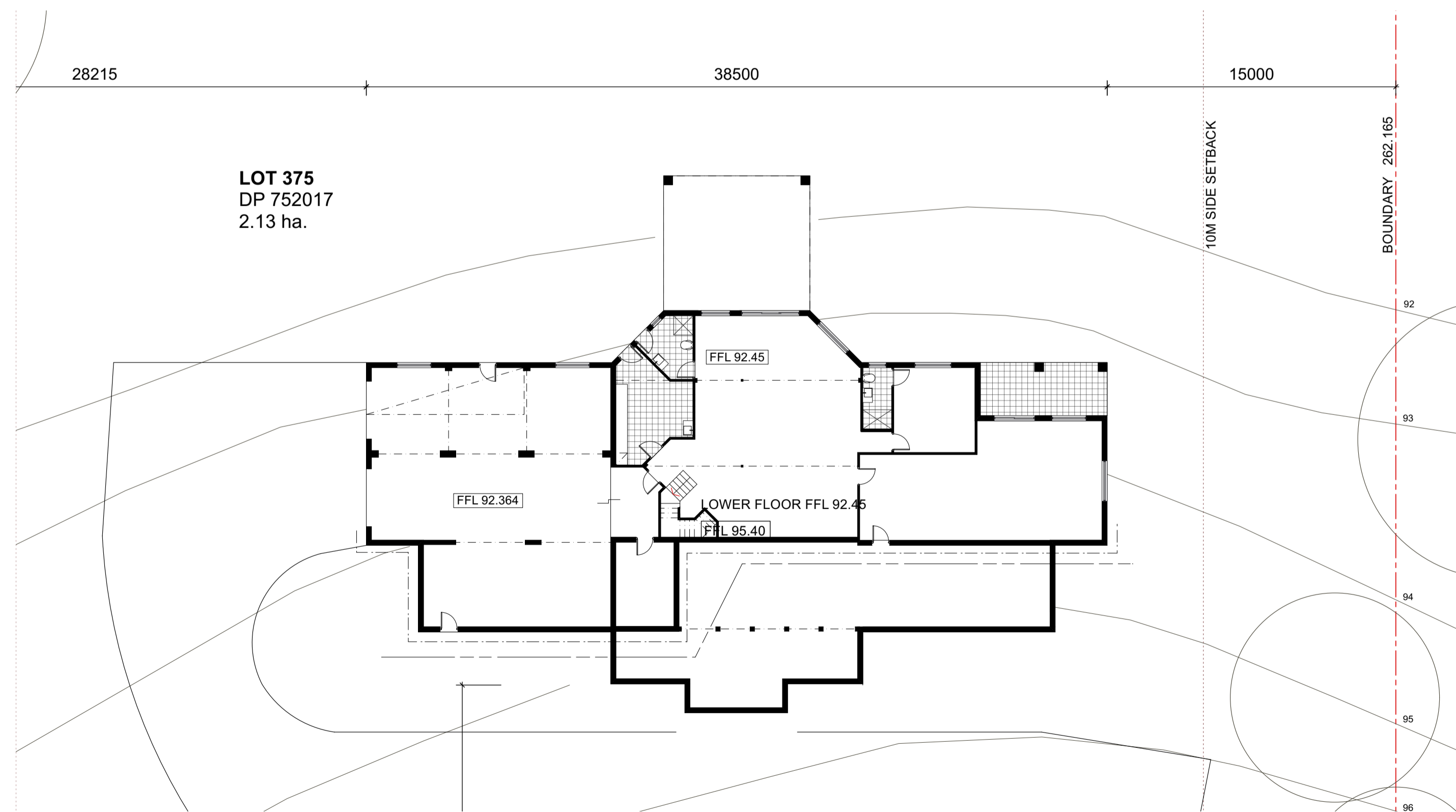
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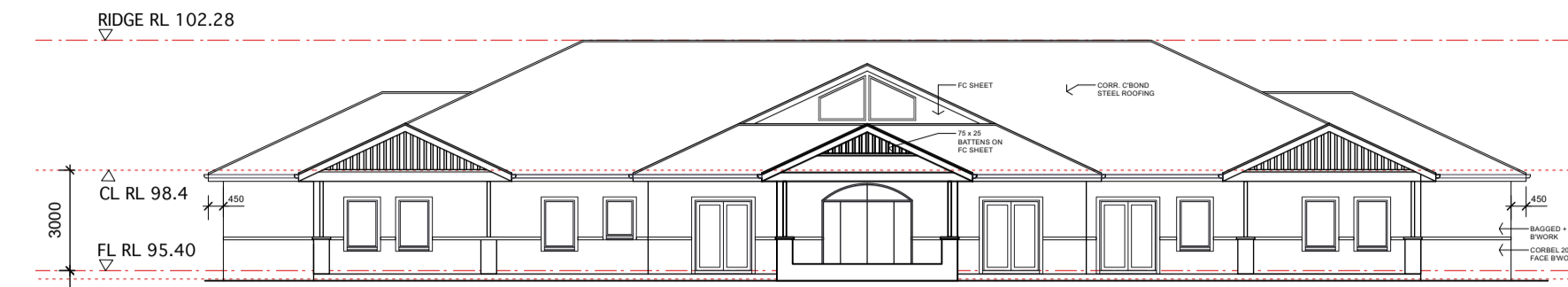
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01 EXISTING GROUND FLOOR PLAN
SCALE 1:200 REF



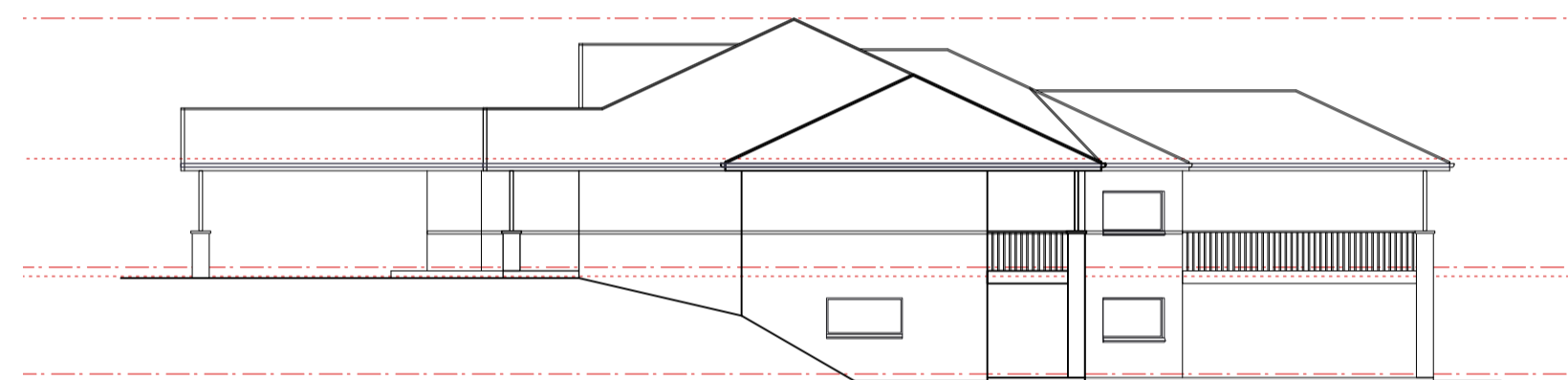
01 EXISTING LOWER GROUND FLOOR PLAN
SCALE 1:200 REF



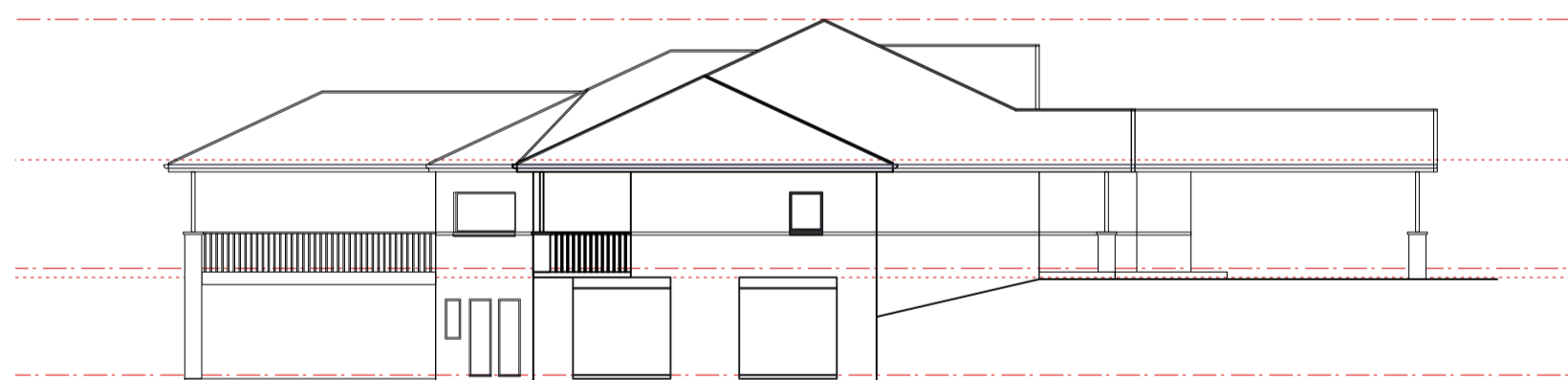
01 EXISTING SOUTH ELEVATION
SCALE 1:100 REF



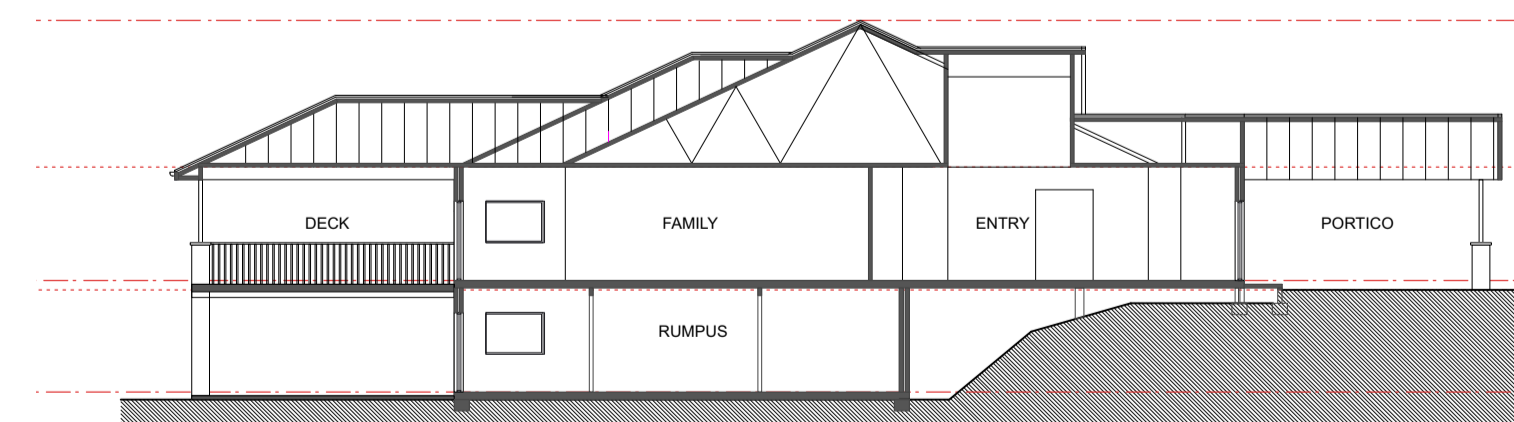
02 EXISTING NORTH ELEVATION
SCALE 1:100 REF



03 EXISTING EAST ELEVATION
SCALE 1:100 REF



04 EXISTING WEST ELEVATION
SCALE 1:100 REF



05 EXISTING SECTION
SCALE 1:100 REF

LEGEND:
 AFW: ALUM. FRAMED WINDOW
 EP: SCANNING
 EFL: EXISTING FINISHED FLOOR LEVEL
 FFC: FIBRE CEMENT
 WFC: FACE WATERFALL
 MR: METAL ROOFING
 TB: TIMBER BATTENED SCREEN

A FOR INFORMATION
 Rev Status Date

EXISTING PLANS + SITE ANALYSIS

Scale: @ A1
 1:100
 Date: 15 FEB 2024

Job Number: 16 28
 Draw No: EX-A0-02 A

PROJECT:
 6 JOALAH ROAD, DUFFYS FOREST NSW 2084
 CLIENT:
 G. CRANNAGE

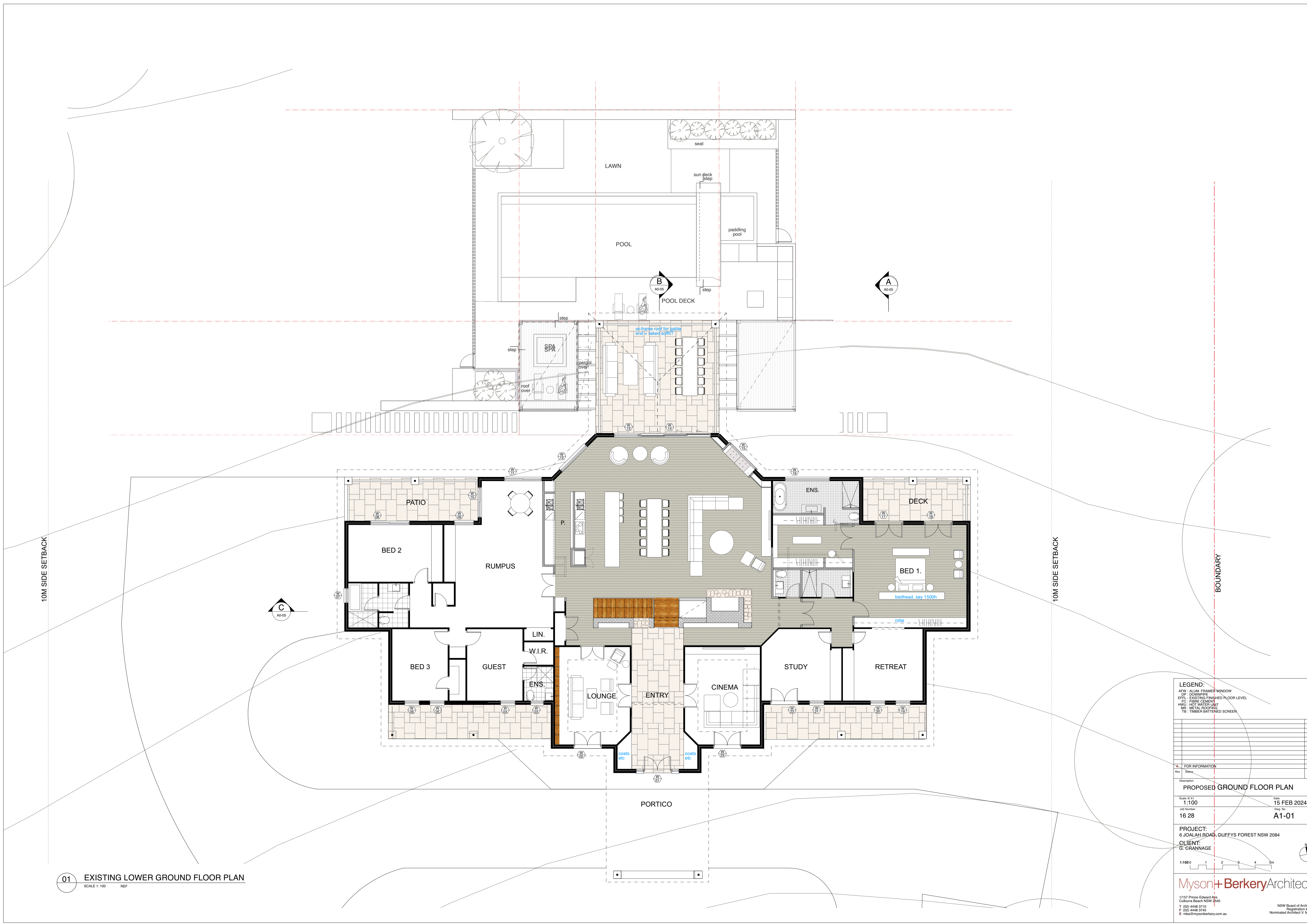
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01 EXISTING LOWER GROUND FLOOR PLAN
SCALE 1:100 REF

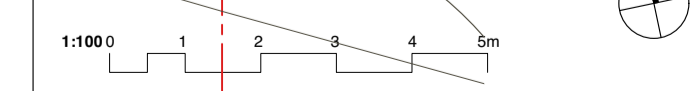
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- AFW: ALUM. FRAMED WINDOW
 - SP: SCANNING
 - EFF: EXISTING FINISHED FLOOR LEVEL
 - FC: FIBRE CEMENT
 - WFC: FIBRE WATER
 - MR: METAL ROOFING
 - TB: TIMBER BATTENED SCREEN

FOR INFORMATION		xx.24
Rev	Status	Date

PROPOSED GROUND FLOOR PLAN	
Scale @ A1 1:100	Date 15 FEB 2024
Job Number 16 28	Draw No. Revision A1-01 A

PROJECT:
6 JOALAH ROAD, DUFFYS FOREST NSW 2084

CLIENT:
G. GRANNAGE

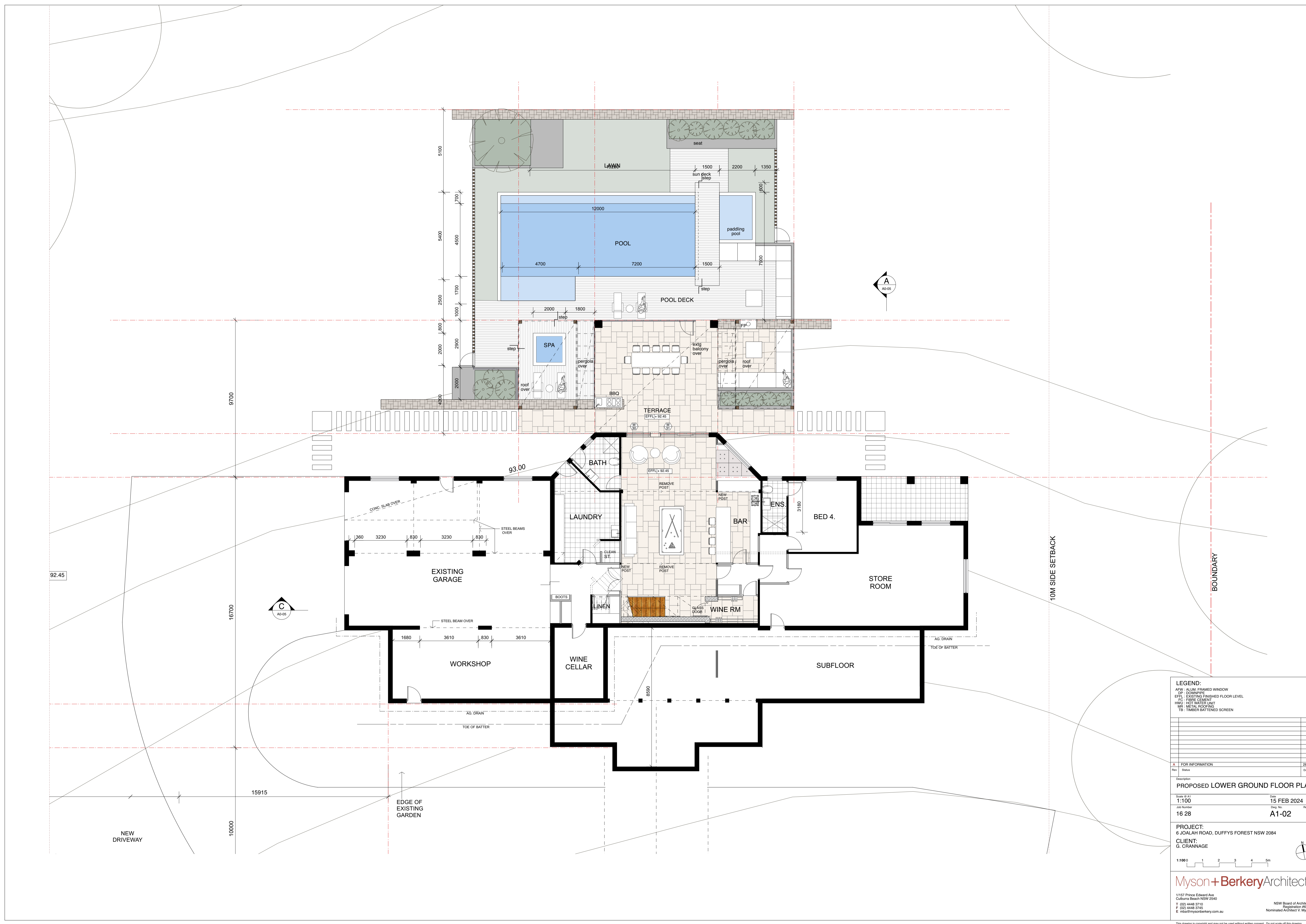


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LEGEND:

- AFW: ALUM. FRAMED WINDOW
- SP: SCANNING
- EFF: EXISTING FINISHED FLOOR LEVEL
- FC: FIBRE CEMENT
- WFC: WET WATER FLOOR
- MR: METAL ROOFING
- TB: TIMBER BATTENED SCREEN

Rev	Description	Date
A	FOR INFORMATION	28.06.24

PROPOSED LOWER GROUND FLOOR PLAN

Scale @ A1: 1:100 Date: 15 FEB 2024

Job Number: 16 28 Draw No: A1-02 Revision: A

PROJECT: 6 JOALAH ROAD, DUFFYS FOREST NSW 2084

CLIENT: G. CRANNAGE

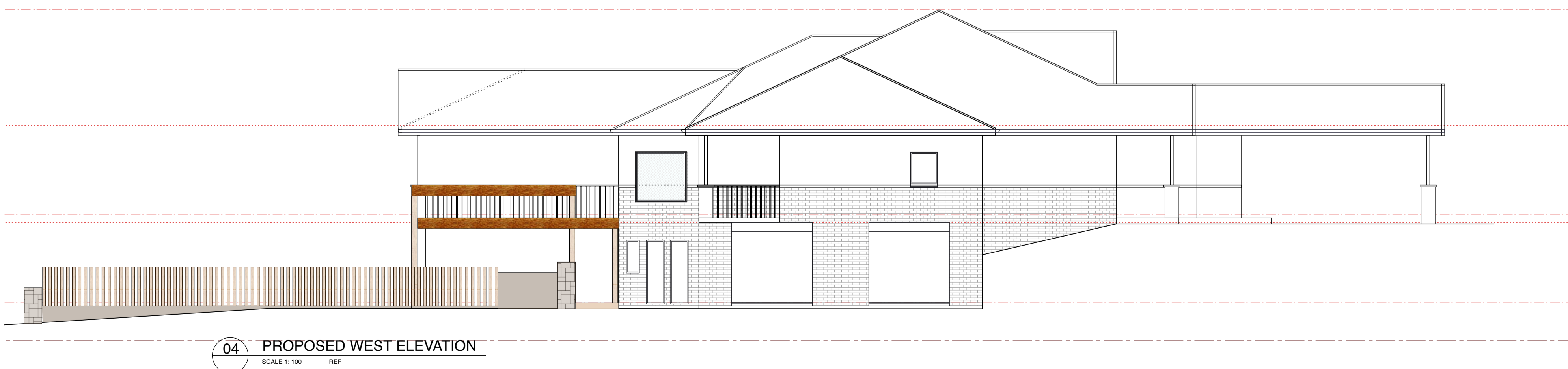
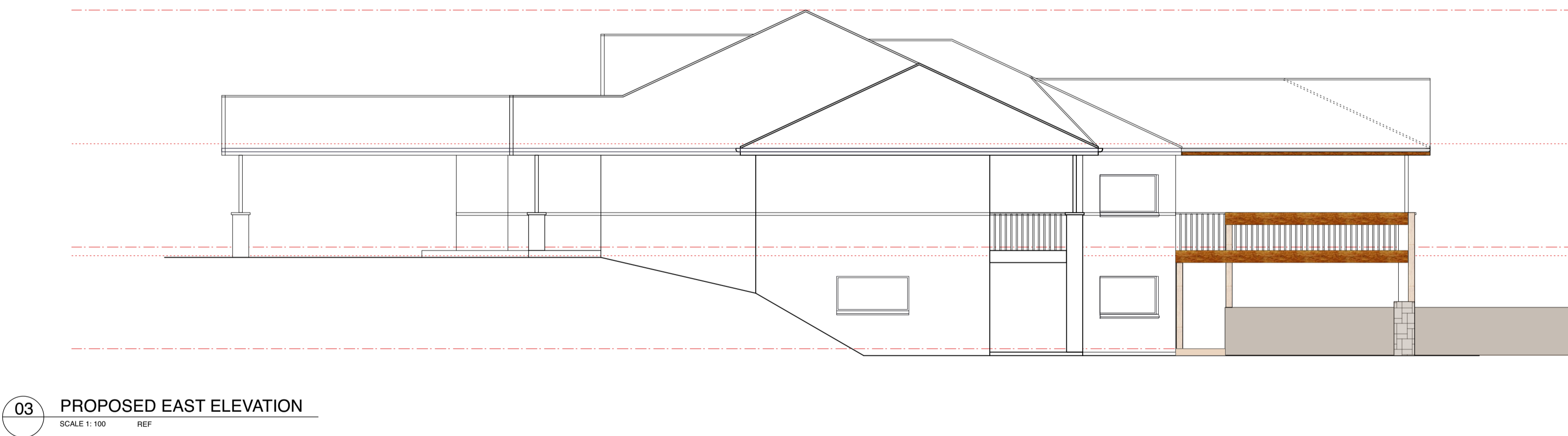
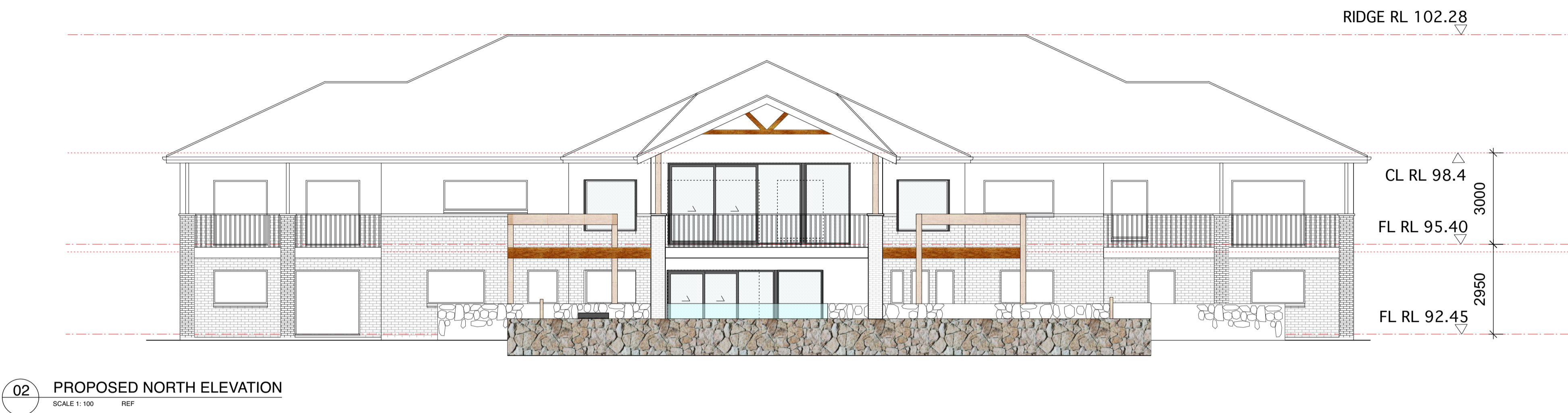
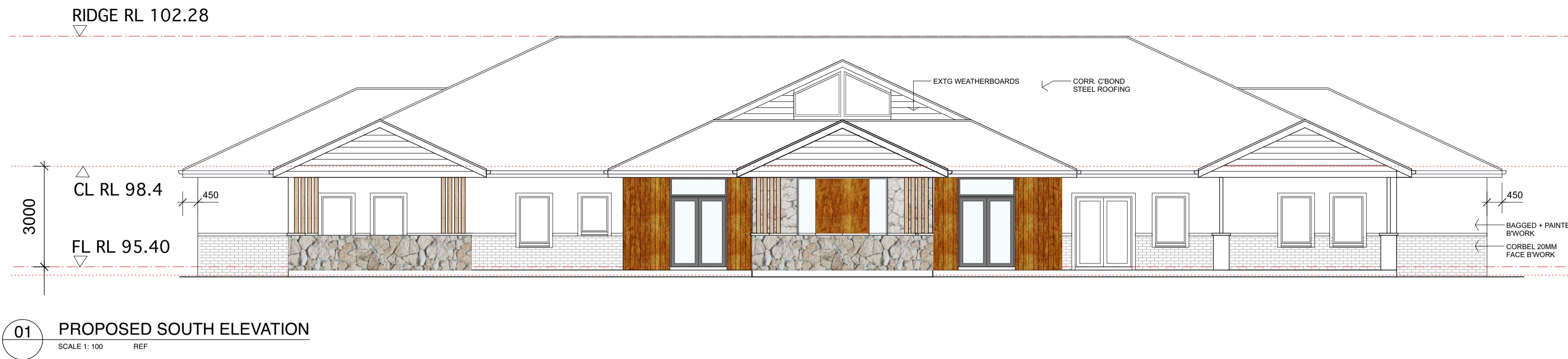
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LEGEND:
 AFW: ALUM. FRAMED WINDOW
 EFF: EXISTING FINISHED FLOOR LEVEL
 EFC: EXISTING FINISHED CEILING LEVEL
 WFC: FIRE CEMENT
 WFL: HOT WATER HEAT
 MR: METAL ROOFING
 TB: TIMBER BATTENED SCREEN

Rev	Status	Date
A	FOR INFORMATION	28.06.24

PROPOSED ELEVATIONS

Scale	Date
1:100	15 FEB 2024

Job Number	Client
16 28	A2-01

PROJECT:
6 JOALAH ROAD, DUFFYS FOREST NSW 2084

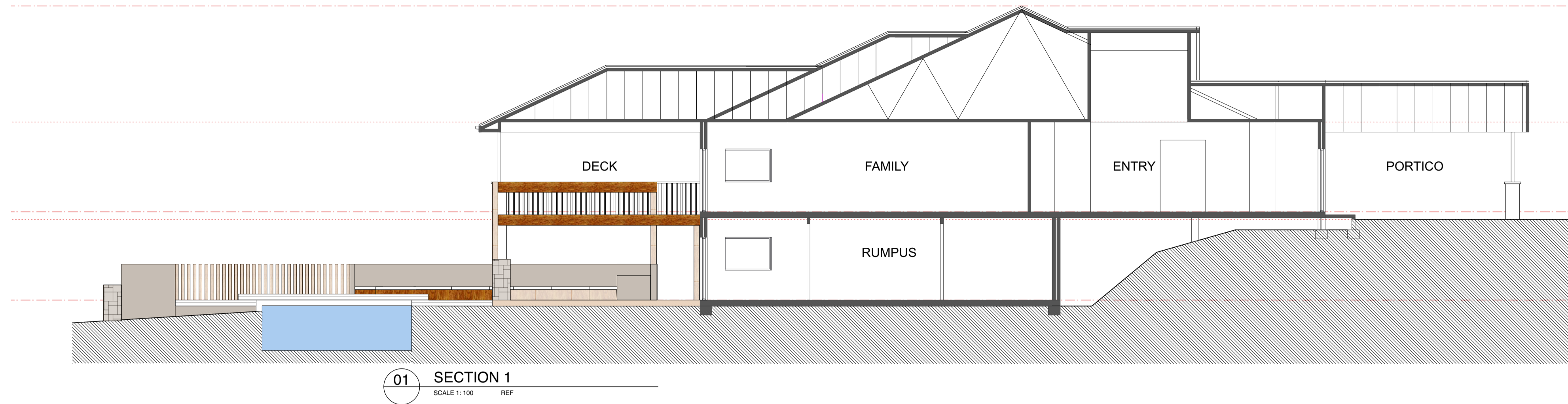
CLIENT:
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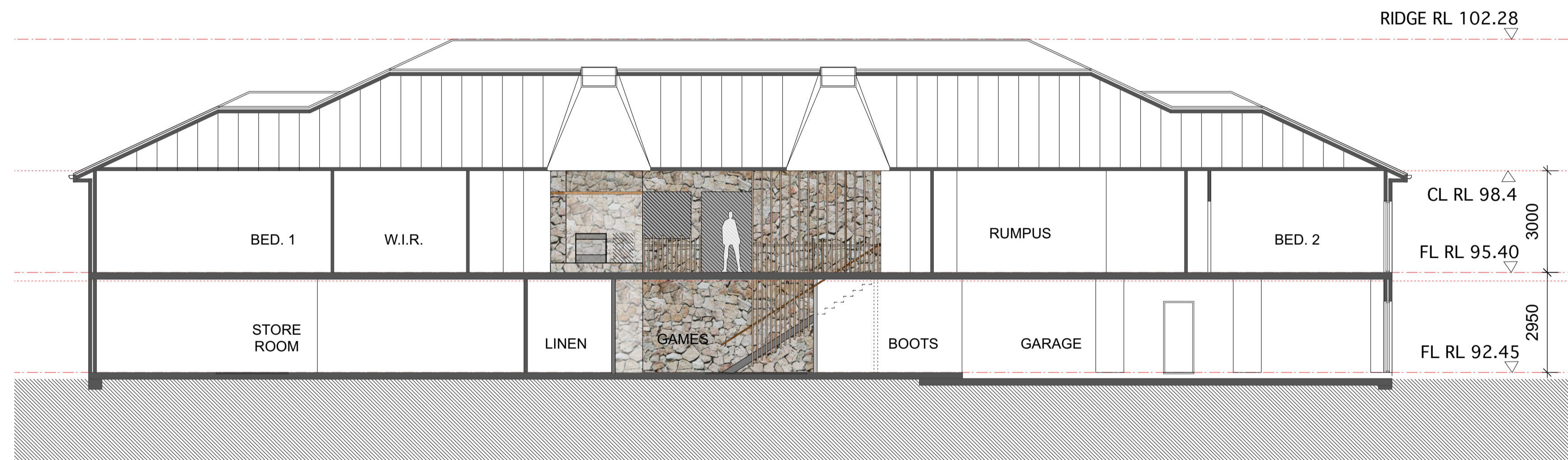
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01 SECTION 1
SCALE 1:100 REF



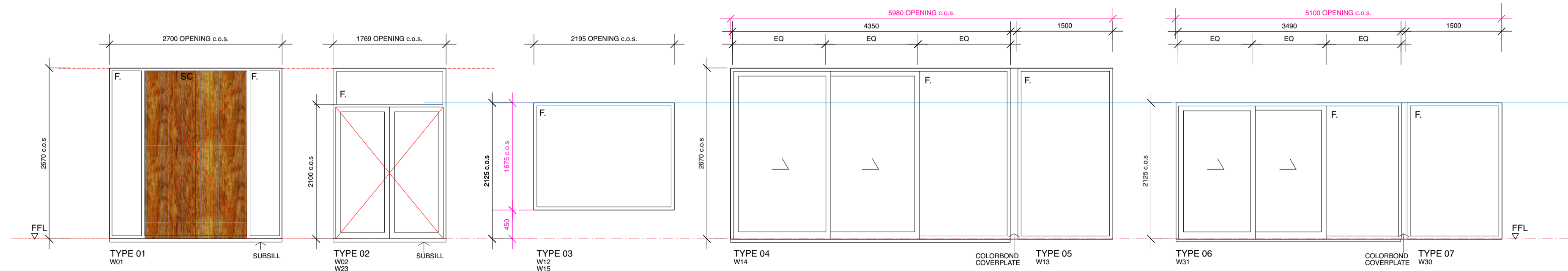
02 SECTION 2
SCALE 1:100 REF

WINDOW SCHEDULE:			
GROUND FLOOR LEVEL:			
TYPE	NO.	H x W	DESCRIPTION
01	01	2150 x 1770	SC TIMBER FRENCH DOORS
02	02	1430 x 970	FRENCH DOORS
03	03	1430 x 970	COOL BARS
04	04	1430 x 970	COOL BARS
05	05	1430 x 970	COOL BARS
06	06	1430 x 970	COOL BARS
07	07	1245 x 897	AL SL DOOR
08	08	2031 x 1847	AL SL DOOR
09	09	2095 x 1129	AL SL DOOR
10	10	2125 x 1847	AL SL DOOR
11	11	1245 x 2554	AL SL DOOR
12	12	1274 x 2138	AL SL DOOR
13	13	1274 x 2138	AL SL DOOR
14	14	1274 x 2138	AL SL DOOR
15	15	1274 x 2138	AL SL DOOR
16	16	1274 x 2554	AL SL DOOR
17	17	2150 x 1770	FRENCH DOORS
18	18	2150 x 1770	FRENCH DOORS
19	19	1430 x 970	COOL BARS
20	20	1430 x 970	COOL BARS
21	21	1430 x 970	COOL BARS
22	22	2150 x 1770	FRENCH DOORS
23	23	2150 x 1770	FRENCH DOORS
LOWER GROUND FLOOR LEVEL:			
24	24	1217	
25	25	DF1	
26	26	DF1	
27	27	DF1	
28	28	DF1	
29	29	1905	
30	30	2015	AL SL DOORS
31	31	2031 S/D	AL SL DOORS
32	32	1217	
33	33	1217	
34	34	1217	
35	35	2031 S/D	AL SL DOORS
36	36	1217	
37	37	1905	

- NOTES:**
- ALUMINIUM WINDOWS DOMESTIC RANGE; POWDER-COAT "MONUMENT MATT"
 - GLAZING TO AS 1286 AS2206 AS2047
 - GLAZING TO MEET REQUIREMENTS OF ASS959 SGL-12.5
 - ALL WINDOWS E-VANTAGE VIRIDIAN LOW-E NEUTRAL
 - ALL OPENING WINDOWS TO BE FLY-SCREENED- MAGNETIC STRIP TYPE U.N.O
 - LOUVRED WINDOWS TO HAVE 152mm BLADES, U.N.O
 - ALL WINDOWS VIEWED FROM OUTSIDE
 - ALL DOORS VIEWED FROM OUTSIDE
 - DIMENSIONS PROVIDED ARE OPENING SIZES; ALLOW FOR TOLERANCE
 - MEASURE ON-SITE PRIOR TO FABRICATION

- GENERAL NOTES:**
- USE INSTALLATION METHODS SUCH THAT BUILDING LOADS AND BUILDING MOVEMENTS ARE NOT TRANSFERRED TO WINDOW FRAMES.
 - UNLESS OTHERWISE SPECIFIED PROVIDE WINDOWS WITH STANDARD HARDWARE PURPOSE MADE OR AS RECOMMENDED BY THE WINDOW MANUFACTURER FOR THE WINDOW SYSTEM.
 - INSTALL FLASHINGS, WEATHER BARS, DRIPS, STORM MOULDS, CAULKING, POINTING OR THE LIKE SO THAT WATER IS PREVENTED FROM PENETRATING THE BUILDING BETWEEN THE WINDOW FRAME AND BUILDING STRUCTURE. FLASHINGS ETC TO BE COMPATIBLE WITH FRAMES.
 - ON COMPLETION REPLACE DAMAGED GLASS. LEAVE THE WHOLE WORK CLEAN, POLISHED AND IN GOOD CONDITION.

- LEGEND:**
- F: FIXED GLAZING
 - H: HANDED MIRROR
 - OG: OBSCURE GLASS



03 WINDOW SCHEDULE
SCALE 1:50 REF

LEGEND:

- AFW: ALUM. FRAMED WINDOW
- EF: EXISTING FINISHED FLOOR LEVEL
- EFF: EXISTING FINISHED FLOOR LEVEL
- FC: FIBRE CEMENT
- HC: HOT WATER HEAT
- MS: METAL ROOFING
- TB: TIMBER BATTENED SCREEN

Rev	Status	Date
A	FOR INFORMATION	28.06.24

PROPOSED SECTIONS + WINDOW SCHEDULE

Scale: 1:11 Date: 15 FEB 2024

Job Number: 16 28

PROJECT:
6 JOALAH ROAD, DUFFYS FOREST NSW 2084

CLIENT:
G. CRANNAGE

1:1000 1 2 3 4 5m

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Appendix B. Site Inspection Photos



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8

Appendix C. Soil Landscape

[9130so.pdf](#)



Source: Soil and Land Resources of the Hawkesbury-Nepean Catchment *interactive DVD*

Landscape—gently undulating to rolling rises in deeply weathered Hawkesbury Sandstone plateau. Local relief to 40 m, slopes <15%. Rock outcrop is absent. Crests are broad and convex, valleys are narrow and concave. Extensively cleared, low eucalypt open-woodland and scrubland.

Soils—moderately deep to deep (100–300cm) Red Earths (Gn2.14) and Yellow Earths (Gn2.24, Gn2.21) overlying laterite gravels and clays on crests and upper slopes; Yellow Earths (Gn2.21, Gn2.24) and Earthy Sands (Uc5.11, Uc5.22) on mid-slopes; Grey Earths (Gn2.81), Leached Sands (Uc2.23) and Siliceous Sands (Uc1.22) on lower slopes and drainage lines; Gleyed Podzolic Soils (Dg3.82, Dg4.51) in low lying poorly drained areas.

Limitations—localised permanently high watertables, areas of laterite and stony soil, very low soil fertility, highly permeable soil.

LOCATION

Sandstone plateau surfaces of the Hornsby Plateau in Ku-ring-gai Chase National Park and at North Seaforth, Ingleside and Terrey Hills. The unit also occurs in the Erina Hills physiographic region at Bilgola Plateau, Kilcare Heights and in Brisbane Water National Park.

LANDSCAPE

Geology

Hawkesbury Sandstone which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Deep weathering of the sandstone is widespread. The deep weathering

products are known as friable sandstone and have been described by Pecover (1984). Laterite material occurs on some crests (Hunt *et al.*, 1977).

Topography

Undulating low rises and plains on plateau surfaces. Local relief is up to 40 m. Slope gradients are generally <15%. Ridges and crests are broad and valleys are wide and open. Rock outcrop is absent.

Vegetation

The original low eucalypt open-woodland and scrub have been extensively cleared. Common remaining species include scribbly gum *Eucalyptus haemastoma*, black ash *E. sieberi*, red bloodwood *E. gummifera*, smooth-barked apple *Angophora costata* and old man banksia *Banksia serrata*.

Poorly drained areas support scrubland of heath banksia *Banksia ericifolia* and teatree *Leptospermum* spp.

Land use

Land uses include market gardens, citrus orchards, plant nurseries, cut flower nurseries, horse riding schools, horse studs, and sand and gravel quarries. Some areas have been used for urban residential development, for example parts of Terrey Hills, Belrose and North Seaforth. Parts of Terrey Hills and Ingleside are gazetted as national park. Small areas of unused bushland remain.

Existing Erosion

Minor to moderate sheet and rill erosion occur on land cleared for cultivation, especially when cultivation is not on the contour. Severe sheet and rill and minor to moderate gully erosion have occurred where soils have been disturbed by road construction, quarrying and over-grazing.

Associated Soil Landscapes

Small areas of Lambert (1a) soil landscape have been included within the unit.

SOILS

Dominant Soil Materials

so1—Loose dark brown sandy loam. This is a loose dark brown loamy sand or sandy loam with apedal single-grained structure and porous sandy fabric. It usually occurs as topsoil (A1 horizon). The colour is usually brown (10YR 3/3) or brownish-black (7.5YR 3/2,3/3) and often becomes lighter with depth. The pH ranges between strongly acid (pH 4.5) and slightly acid (pH 6.5). Small rounded ironstone nodules are rare. Charcoal and roots are common.

so2—Earthy, bright-brown sandy clay loam. This is a bright-brown clayey sand or sandy clay loam with apedal massive structure and porous earthy fabric. It usually occurs as subsoil (B horizon). Texture often increases gradually with depth. The surface condition is hardsetting when exposed. Colours are bright and are commonly yellowish-brown (10YR 6/8), brown (7.5YR 5/8) or reddish-brown (5YR 5/8). The pH ranges from moderately acid (pH 5.0) to slightly acid (pH 6.0). Rounded, gravel-sized ironstone nodules are often present. These are either concretionary nodules or small iron oxide coated stones. Charcoal fragments and roots are rare. Faunal casts and channels are widespread and common.

so3—Hardsetting, cemented ironstone gravel. This material consists of ironstone nodules in a reddish-brown soil matrix that is extremely hardsetting when exposed. This material usually occurs as deep subsoil. It is often referred to as the indurated or gravelly zone of a laterite soil profile. Texture ranges from a sandy clay loam to sandy clay and structure is apedal and massive.

Fabric is earthy and porous in the soil profile but is hard and non-porous when exposed. Rounded, concretionary, dark brown and brownish-red ironstone nodules are abundant. Soil matrix colours include reddish-brown (5YR 4/8), dull reddish-brown (5YR 5/4) and bright yellowish-brown (10YR 6/6, 10YR 5/8). Mottles are often present. Roots and charcoal fragments are usually absent.

so4—Pallid grey sandy clay. This is a pallid grey sandy clay loam to light clay with apedal massive structure and earthy porous fabric. This generally occurs as deep subsoil and is commonly found overlying bedrock (B₃ or C horizon).

Colour ranges from light grey (10YR 8/1–8/2, 7.5YR 8/2, 2.5Y 8/1) to dull yellow orange (10YR 7/2, 2.5Y 7/2) or greyish-yellow (10YR 7/3). Two distinct zones are present. They are often referred to as mottled and pallid laterite zones. In the red mottled variant, upper layers are characterised by interconnected, prominent, reddish-brown mottles that harden on exposure. The mottles become larger and less abundant with increasing depth. The pallid variant lacks the dark red mottles and is mostly pallid throughout except for pale red, orange or yellow mottles that are occasionally present at the base. The pH ranges from strongly acid (pH 4.5) to slightly acid (pH 6.0). Hard mottled iron indurated nodules are often present. Roots are rare and do not branch.

so5—Earthy, brownish-yellow light sandy clay loam. This is a brownish-yellow light sandy clay loam with apedal massive structure and earthy porous fabric. It generally occurs as subsoil (B horizon). Texture is commonly a light sandy clay loam but can range from a sandy loam to a sandy clay loam. Texture often increases gradually with depth. Porosity often decreases with depth. Colour ranges from yellowish-brown (10YR 5/6–6/6) to bright brownish-yellow (10YR 6/8). The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.5). Sandstone rock and ironstone fragments are common whilst roots and charcoal fragments are rare.

so6—Pallid, light yellow sandy loam. This is pallid loamy sand to sandy loam with apedal massive structure and earthy porous fabric. It commonly occurs as subsoil in wet areas (B or C horizon). Surface condition is loose. This material is characterised by pallid soil colours such as light yellow (2.5Y 7/4) and bright yellowish-brown (2.5YR 7/6). Rusty coloured piped mottles are present around root channels. The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.5). Roots are rare and charcoal and stone fragments are absent.

so7—Friable sandstone. This is strongly weathered sandstone that has a distinct sugary appearance. It generally occurs as a deeply weathered parent material (C horizon). Texture is commonly a clayey sand which often becomes sandier with depth. Structure is apedal and massive and fabric is usually sandy or occasionally earthy. Colour varies from light grey (10YR 8/1) to dull yellow orange (10YR 7/2). It is readily disrupted by a moderate force. Disrupted particles have a feel and appearance similar to sugar crystals. The pH ranges from extremely acid (pH 3.5) to strongly acid (pH 5.0). Strongly weathered fragments of sandstone are commonly found at depth and roots are few with minimal branching, except where bedrock is approached. Rust coloured piped mottles often follow root traces.

Occurrence and Relationships

Crests and upper sideslopes. Up to 40 cm of loose, dark brown sandy loam topsoil (**so1**) overlies up to 2 m of earthy, bright brown sandy clay loam (**so2**). Usually **so1** and **so2** on crests overlie 30–150 cm of hardsetting, cemented ironstone gravels (**so3**). In many areas, the **so1** and **so2** materials have been removed to quarry the gravelly **so3** for road base. Pallid grey, sandy clay (**so4**) underlies **so3** and may be up to several metres thick. Total soil depth is >150 cm. The boundary between soil materials is usually gradational [Yellow Earths (Gn2.24, Gn2.21) and occasional Red Earths (Gn2.14)].

Sideslopes. Up to 30 cm of so1 overlies up to 100 cm of earthy, brownish-yellow light sandy clay loam (so5). A pallid variant of so4 with a maximum thickness of 50 cm occurs as deep subsoil. Total soil depth is >150 cm. The deepest soils tend to occur on slopes with gradients <5%. In these situations, friable sandstone (so7) often occurs as deep subsoil. Boundaries between soil materials are gradational to diffuse [Yellow Earths (Gn2.24) and Earthy Sands (Uc5.11, Uc5.22)].

Poorly drained areas. Up to 50 cm of so1 directly overlies up to 200 cm of pallid light yellowish-brown sandy loam (so6) [Leached Sands (Uc2.2), Grey Earths (Gn2.87)] and/or a pallid variant of so4 [Gleyed Podzolic Soils (Dg3.82, Dg4.51)]. so7 may occur as a deep subsoil. Soil depth varies from 50 cm to more than 2 m. The boundary between soil materials is clear.

Drainage depressions. Up to 150 cm of so1 often occurs overlying bedrock or several metres of so7 [Siliceous Sands (Uc1.1, Uc1.22) and Leached Sands (Uc2.23)]. In other places, so1 may overlie more than 50 cm of grey sandy clay loam so6 [Grey Earths (Gn 2.81)].

LIMITATIONS TO DEVELOPMENT

Urban Capability

High capability for urban development.

Rural Capability

Land generally capable of regular cultivation and grazing.

Landscape Limitations

Laterite rock outcrop (localised)

Waterlogging (localised)

Soil Limitations

so1 Stoniness (localised)
Low fertility

so2 Stoniness (localised)
Low available water capacity
Hardsetting surface
Very low fertility

so3 Stoniness
Low available water capacity
Low permeability (localised)
Extremely hardsetting
Very low fertility
Very strongly acid
High aluminium toxicity

so4 Low wet strength
Low permeability
Low available water capacity
Stoniness
Hardsetting
Very low fertility
Very strongly acid
High aluminium toxicity

- so5** Stoniness
Hardsetting
Very low fertility
Strongly acid
High aluminium toxicity
- so6** Low available water capacity
Very low fertility
Strongly acid
Very high aluminium toxicity
- so7** Stoniness
Low available water capacity
Very low fertility
Strongly acid
High aluminium toxicity

Fertility

The fertility is low to very low. The soils of this unit are generally acidic, with poor waterholding capacities and low to very low nutrient status and CECs. However, the soils are deep and well drained and can be productive with suitable fertiliser and lime applications.

Erodibility

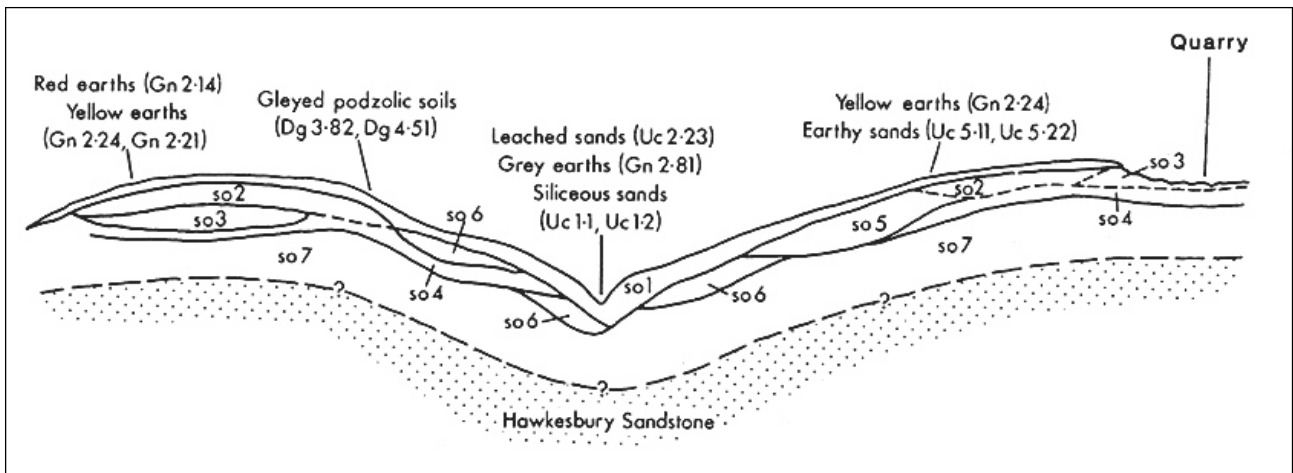
so1 has a low to moderate erodibility as it has a moderate amount of organic matter and consists mainly of highly permeable coarse and fine sand grains. **so2–so7** have moderate erodibility as they are composed of sand grains held together by iron oxides and clay minerals. On exposure, **so3** becomes extremely hard making the erodibility very low.

Erosion Hazard

The erosion hazard for non-concentrated flows is generally low to moderate, but ranges from low to very high. Calculated soil loss for the first twelve months of urban development ranges up to 58 t/ha for topsoil and 162 t/ha for exposed subsoil. Soil erosion hazard for concentrated flows is high.

Surface Movement Potential

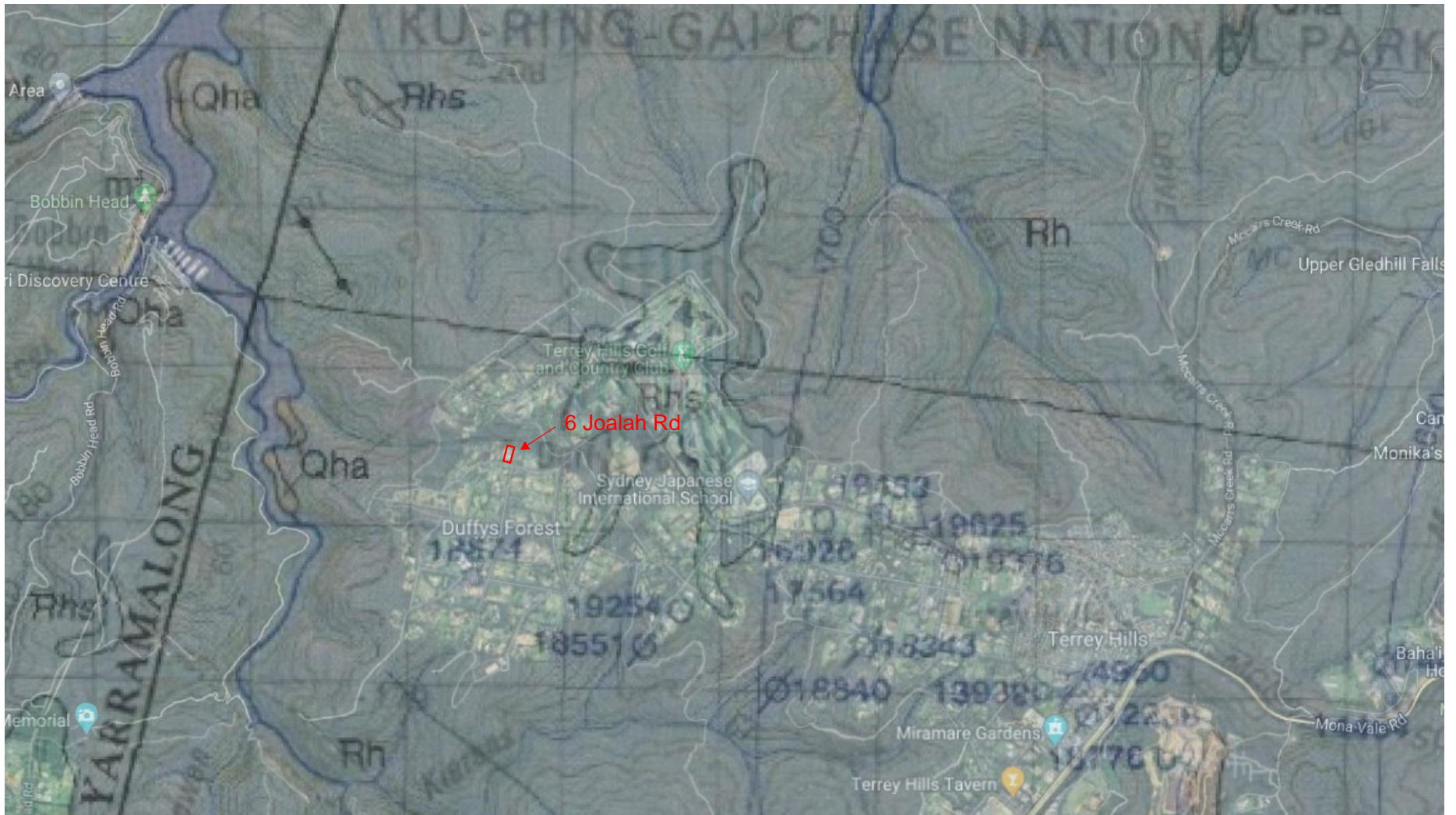
Soils are generally slightly reactive.



Schematic cross-section of Somersby soil landscape illustrating the occurrence and relationship of the dominant soil materials.

Appendix D. Geological Mapping Sheet

[Geological Map.pdf](#)



Appendix E. Geotechnical Risk Management Forms

The image shows a scanned form titled "GEOTECHNICAL RISK MANAGEMENT POLICY FOR INFRASTRUCTURE". The form is divided into several sections:

- Project Information:** Includes fields for Project Name, Location, and Client.
- Risk Assessment:** A table with columns for Risk Category, Risk Level, and Mitigation Measures. Several rows are filled with text, and some have checkmarks in the Risk Level column.
- Approval and Signatures:** Includes fields for Project Manager, Geotechnical Engineer, and other stakeholders, with lines for signatures and dates.
- Notes:** A section at the bottom for additional comments or observations.

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO. 1 – To be submitted with Development Application

Development Application for _____	Mr Gary Crannage
Name of Applicant	
Address of site _____ 6 Joalah Rd, Duffys Forest NSW 2084	

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Rahsn Witt on behalf of Witt Consulting Pty Ltd.
 (Insert Name) (Trading or Company Name)

on this the 15th day of August, 2024 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least \$10million.

I:
Please mark appropriate box

- ~~have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009~~
- ~~am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009~~
- have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.
- ~~have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.~~
- ~~have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.~~
- ~~have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report~~

Geotechnical Report Details:

Report Title: Preliminary assessment of site conditions
Report Date: 15th August 2024
Author: Rahsn Witt
Author's Company/Organisation: Witt Consulting Pty Ltd.

Documentation which relate to or are relied upon in report preparation:

Architectural drawings, Revision A, issued on 15th February 2024
NSW Planning Portal Spatial Viewer web application, eSPADE web application, The Sydney 1:100,000 Geological Series Sheet 9130, Warringah Council Local Environmental Plan 2011 and Water NSW Groundwater database

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature Rahsn Witt

Name Rahsn Witt

Chartered Professional Status... CPEng, NER, APEC, IPEA, RPEQ, RINA, RIW

Membership No. MIEAust 2287439

Company... Witt Consulting Pty Ltd.

**GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1(a) - Checklist of Requirements For Geotechnical Risk Management Report for
Development Application**

Development Application for _____	Mr Gary Crannage
Address of site _____	Name of Applicant
6 Joalah Rd, Duffys Forest NSW 2084	

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

Geotechnical Report Details:

Report Title: Preliminary assessment of site conditions
Report Date: 15th August 2024
Author: Rahsn Witt
Author's Company/Organisation: Witt Consulting Pty Ltd.

Please mark appropriate box

- ⊗ Comprehensive site mapping conducted _____
(date)
- ⊗ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ⊗ Subsurface investigation required
 - ⊗ No Justification
 - ⊗ Yes Date conducted
- ⊗ Geotechnical model developed and reported as an inferred subsurface type-section
- ⊗ Geotechnical hazards identified
 - ⊗ Above the site
 - ⊗ On the site
 - ⊗ Below the site
 - ⊗ Beside the site
- ⊗ Geotechnical hazards described and reported
- ⊗ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
 - ⊗ Consequence analysis
 - ⊗ Frequency analysis
- ⊗ Risk calculation
- ⊗ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ⊗ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ⊗ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009
- ⊗ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.
- ⊗ Design Life Adopted:
 - ⊗ 100 years
 - ⊗ Other
specify
- ⊗ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified
- ⊗ Additional action to remove risk where reasonable and practical have been identified and included in the report.
- ⊗ Risk assessment within Bushfire Asset Protection Zone.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature *Rahsn Witt*

Name Rahsn Witt

Chartered Professional Status..... CPEng, NER, APEC, IPEA, RPEQ, RINA, RIW

Membership No. MIEAust 2287439

Company..... Witt Consulting Pty Ltd.