Budawang School Flood Advice

17 Croobyar Road, Milton

NW30123

Prepared for

School Infrastructure NSW

16 April 2021

Cardno

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Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
Rev A	16/03/2021	For Client Comment	Ghazal Hosseini	David Stone
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Rev C	16/04/2021	For SSDA submission	Ghazal Hosseini	David Stone

Table of Contents

Appendices

Tables

Figures

1 Objectives and Background

1.1 Objectives

The objective of this study is to provide preliminary flooding advice to inform the preparation of a State Significant Development Application (SSDA) for Budawang School (BS) at 17 Croobyar Road, Milton. The school is proposed to be located in the north eastern corner of this site (refer **Figure 1-1)**.

A Concept Masterplan for the proposed school has been prepared by Group GSA (refer **Appendix A**).

Figure 1-1 Locality Plan (Image source – Nearmap)

1.2 Scope

The scope of this report includes the following (in relation to flooding):

- Compiling available data;
- Review the initial Concept Masterplan;
- Estimate the peak flow at the site in the existing watercourse in the 1% AEP event;
- Review the controls in Shoalhaven DCP 2014 – Chapter G9;
- Review the relevant Secretary's Environmental Assessment Requirements (SEARs) as follows:

- Identify any flood risk on-site in consultation with Council and having regard to the most recent flood studies for the project area and the potential effects of climate change, sea level rise and an increase in rainfall intensity;
- Assess the impacts of the development, including any changes to flood risk onsite or off-site, and detail design solutions to mitigate flood risk where required;

> Provide preliminary flood assessment based on SEARs requirements.

1.3 Site Topography

The site contains a number of key topographic features. These include (refer **Figure 1-2**):

> Unnamed Creek
  - meanders through the western part of the site, flowing from north to south
  - has a catchment area extending approximately 10ha to the north of the site (refer **Figure 1-4)**
  - discharges to Pettys Creek approximately 1km to the south of the site
  - while the creek itself has not been surveyed, the LiDAR data extracted from Elevation and Depth Foundation Spatial Data (known as ELVIS) indicates it ranges in level from approximately 46 mAHD at the northern end of the site (Croobyar Road) to 42 m AHD at the south western corner.

> The Masterplan Area
  - generally slopes from east to west with a high point of 52.5 mAHD and a low point of 48.0 mAHD.
  - A shallow depression runs through the site from east to west

The site survey is also provided in **Appendix B**.

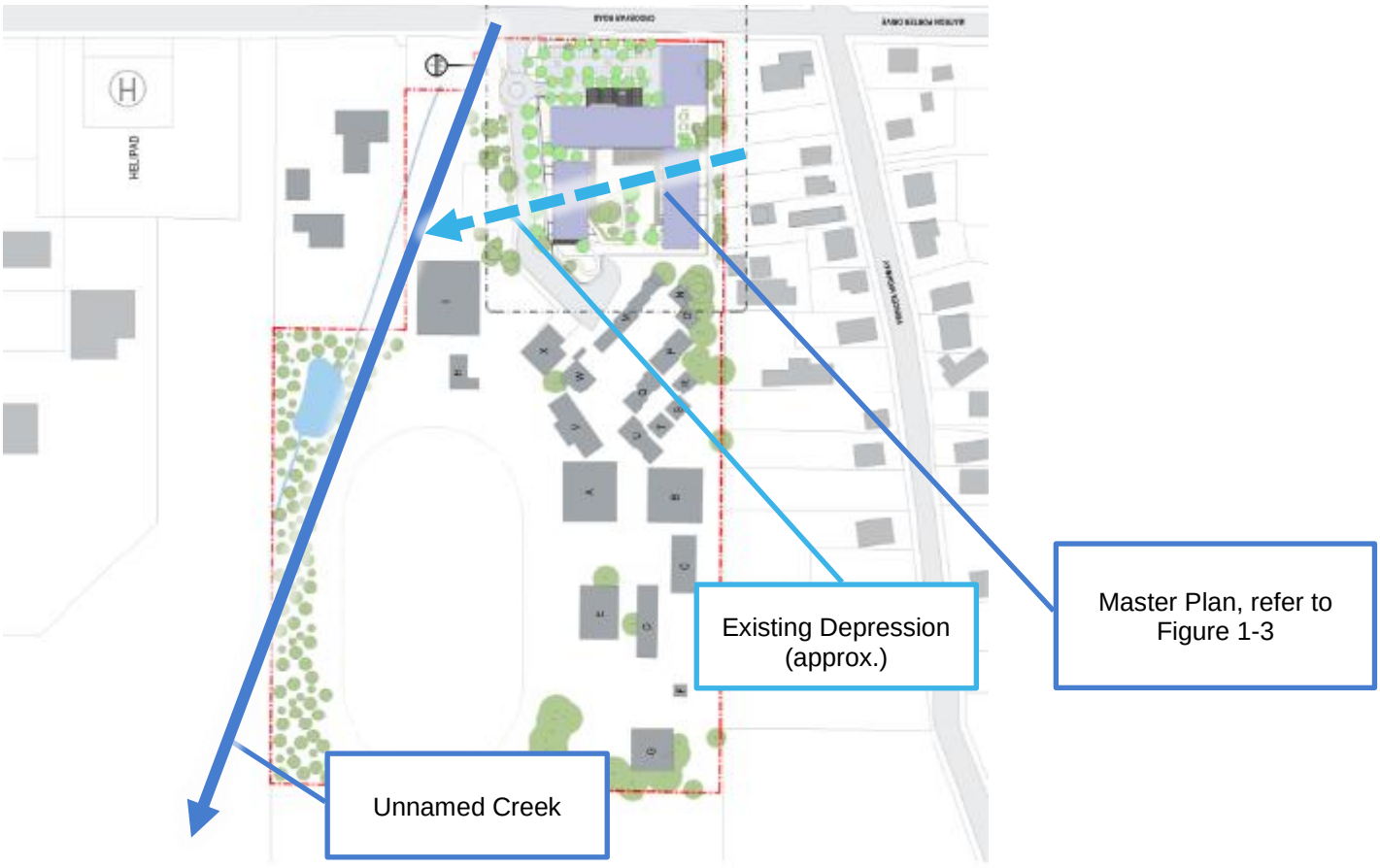


Figure 1-2 Key Topographic Features and Initial Masterplan

Figure 1-3 Initial Masterplan

Figure 1-4 Catchment area

2 Flood Behaviour

2.1 Existing

There is no publicly available flood study for this catchment. Therefore, hydrological and hydraulic models have been established to estimate flood behaviour. A hydrological model simulates the complicated hydrological processes of the catchment by converting rainfall into runoff. A hydraulic model produces water levels and velocities by converting runoff (traditionally from a hydrological model) throughout the major drainage/creek systems in the study area.

A hydrological modelling tool (XPRAFTS) was utilised to estimate the peak flow in the unnamed creek. Catchment parameters used in the model are summarised in **Table 2-1**. The design rainfall temporal patterns were developed using standard techniques provided in Australian Rainfall and Runoff (AR&R) 2019. The estimated peak flow for the 1% AEP event is 8.1 m^3/s.

Table 2-1 Catchment Parameters

Catchment area (ha)	Catchment Slope (%)	Impervious Area
10	3%	70%

A hydraulic modelling tool (DRAINS) was then utilised to provide an indicative estimate of flood levels. A cross section of the creek was extracted near Croobyar Road and is shown in **Figure 2-1.** Peak flood levels for the 1% AEP event near Croobyar Road were found to be approximately RL 47.0 mAHD and have a depth of approximately 0.5 – 1.0 m. The depth of flow here is expected to also be indicative of depths in the creek further downstream.

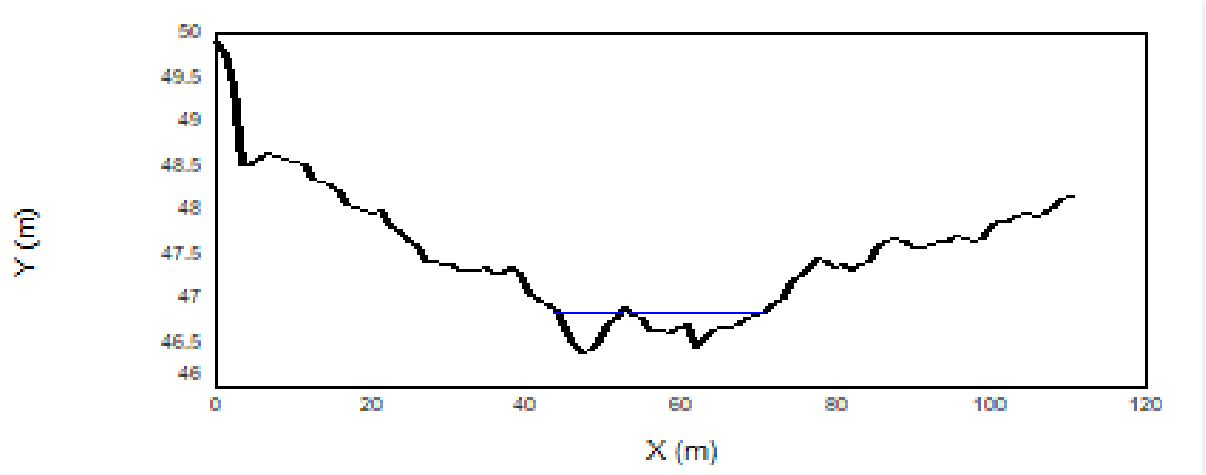


Figure 2-1 Creek Cross Section and 1% AEP Flood Level

2.2 Climate Change

A preliminary assessment has been undertaken to assess the impacts of increases in rainfall intensities. The estimated peak flows for 10% and 30% increases in rainfall intensity for the 1% AEP event are 8.9 m^3/s and 10.7 m^3/s respectively (compared to 8.1 m3/s for present day conditions). The increased rainfall intensity would result in minor increases in flood levels of less than 0.1m. This increase is considered to be insignificant in relation to the proposed development.

Given the sites elevation, sea level rise will have no effect on flooding for this site.

2.3 Potential Impacts

The masterplan does not include any works within or near the unnamed creek. Potential impacts on flood behaviour on adjacent properties would be associated with changes in flows from an increase in impervious area. It is expected these potential impacts would be managed by the civil and stormwater design through the provision of on-site detention.

2.4 Flood Planning Levels

Shoalhaven City Council Development Control Plan (DCP) 2014 Section G9 – provides the relevant development controls related to flooding which apply to development on land at or below the flood planning level (FPL), defined in the DCP as the level of a 1:100 Average Recurrence Interval (ARI) (equivalent to 1% AEP) flood event plus 0.5 m freeboard. Council's DCP had sufficient information to inform this assessment and therefore additional consultation with Council was not undertaken.

3 Discussion and Conclusion

Based on our review of estimated flood levels, Council's development controls and SEARs, the key flood related issues for the proposed development are:

1. The site is relatively high (minimum level of approximately 48.0 mAHD) when compared to the flood levels (maximum approximately 47.0 mAHD in the 1% AEP event). The proposed development is therefore expected to remain largely unaffected by flooding and above the FPL;
2. If any significant cut/fill is proposed along the western edge of the proposed development then a flood impact assessment may be required;
3. Minor overland flows, which are currently conveyed in the existing east/west depression through the site, will need to be accommodated in the proposed civil and stormwater design;
4. Given the relatively small catchment (10 ha) upstream of Croobyar Road and the general site topography, it is not expected that any significant issues related to flood evacuation would be experienced. Even in larger events, up to and including the Probable Maximum Flood (PMF), evacuation would be available to the Princes Highway from the north eastern corner of the site if necessary.

17 Croobyar Road, Milton

APPENDIX A

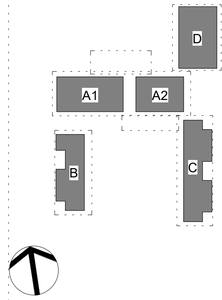
CONCEPT MASTERPLAN

SITE PLAN LEGEND

- NEW LANDSCAPE
- NEW PATHWAYS
- NEW BUILDINGS
- ROADS
- PARKING SPACES
- BUDAWANG SCHOOL BOUNDARY
- EXISTING SEWERLINE
- EXISTING TREES
- PROPOSED TREES
- BOUNDARY TREES
- DOE OWNERSHIP
- LP LIGHT POLE

Amendments

Issue	Description	Date
A	ISSUE FOR INFORMATION	12/03/2021
B	ISSUE FOR INFORMATION	23/03/2021
C	ISSUE FOR INFORMATION	25/03/2021
D	ISSUE FOR SSDA	08/04/2021



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nom architect M. Sheldon 3990

Project Title

BUDAWANG SCHOOL

Drawing Title

SITE PLAN

Scale	1 : 250
Drawing Created (date)	02/24/21
Drawing Created (by)	TKD
Plotted and checked by	RF
Verified	RF
Approved	RK

Project No	Drawing No	Issue
190941	SSDA-2000	D

9/04/2021 12:36:00 AM

17 Croobyar Road, Milton

APPENDIX B

SURVEY

Client: School Infrastructure Projects NSW

REVISIONS:	PLAN SHOWING SPOT HEIGHTS, CONTOURS, BUILDINGS, ROOF HEIGHTS, ADJOINING BUILDINGS, TREES AND UNDERGROUND SERVICES OVER LOT 200 D.P.1192140 CROOBYAR RD MILTON .	
13/1/21 Rising Main	SCALE 1:200	Phillip Brown Land Surveyors
	DATE 1/12/20	P.O. Box 168 Milton N.S.W. 2538 Phone 02 44540842
DRAWING FILE: 5647CONT3D.DWG	REFERENCE: 5647.SITE1	Email: pbrown@shoal.net.au Fax 02 44545900

Phillip Brown Land Surveyors
P.O. Box 168 Milton N.S.W. 2538 Phone 02 44540842
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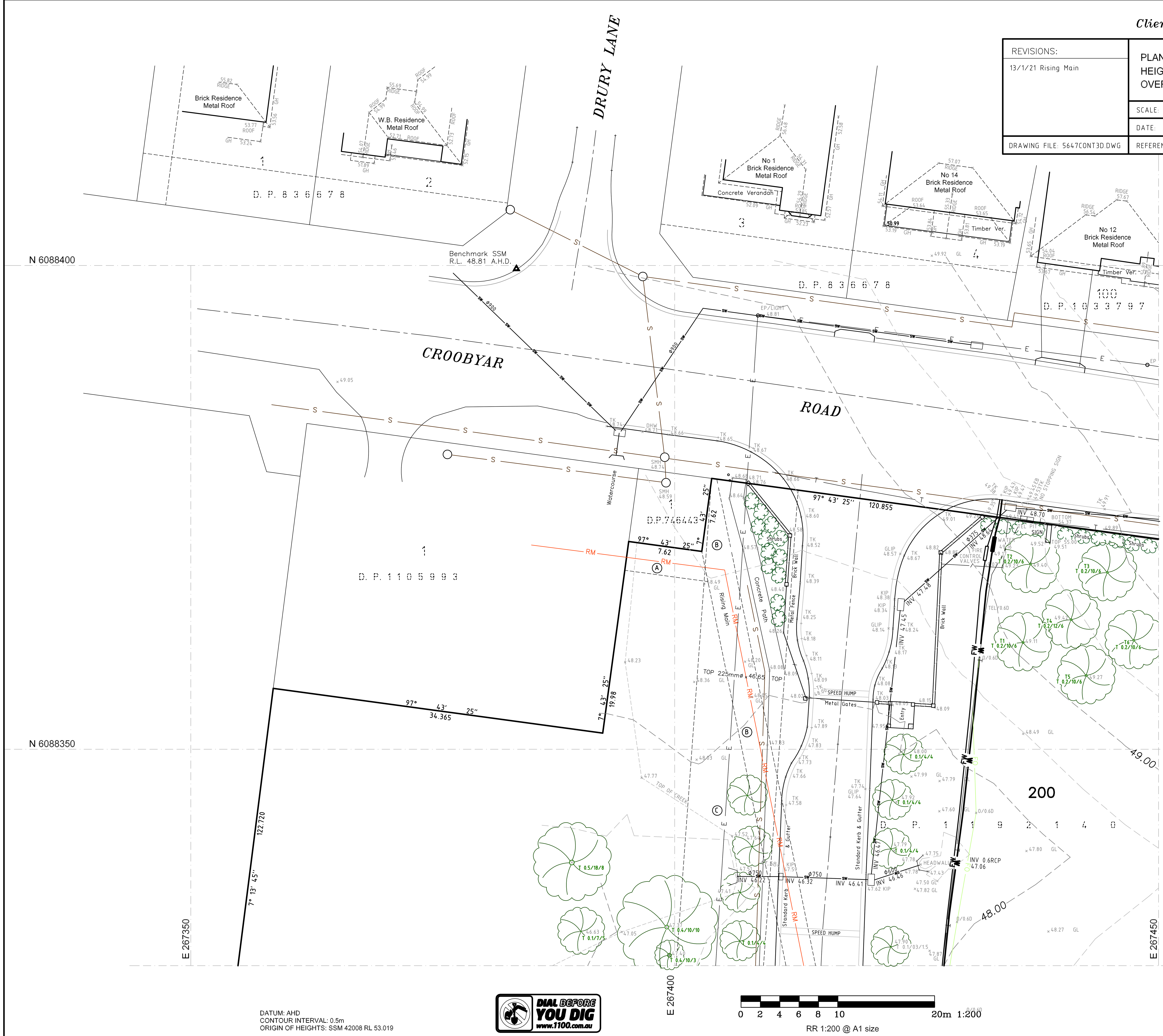

NOTES

- THIS PLAN HAS BEEN PREPARED FOR School Infrastructure Projects NSW FROM A COMBINATION OF FIELD SURVEY RECORDS FOR THE PURPOSE OF SHOWING THE PHYSICAL FEATURES OF THE LAND TO ASSIST IN DESIGNING FUTURE DEVELOPMENT AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
- BOUNDARIES AND IMPROVEMENTS HAVE BEEN LOCATED WITH APPROPRIATE ACCURACY FOR THE PURPOSE OF THIS SURVEY.
- RELATIONSHIPS OF IMPROVEMENTS TO BOUNDARIES FOR FINANCIAL OR ANY OTHER PURPOSES SHOULD BE CONFIRMED BY FURTHER SURVEY BY A REGISTERED SURVEYOR.
- THE LOCATION OF UNDERGROUND SERVICES BETWEEN LOCATING MARKS SHOWN ON THIS PLAN ARE INDICATIVE ONLY.
- CONTACT DIAL BEFORE YOU DIG TO CONFIRM.
- THIS WARNING NOTE SHOULD NOT BE REMOVED FROM ANY COPY OR ELECTRONIC FILE.
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LEGEND

Spot height	×27.65 GL
Top of kerb height	×27.65 TK
Overhead electricity	E
Underground electricity	UE
Sewer pipeline	S
Sewer rising main	RM
Fire system pipeline	FW
Water pipeline	W
Optical fibre cable	FO
U/G Telephone cable	T
Stormwater	SW
Sewer Manhole	S.M.H.
Electricity Pole	EP
Tree Dia/Height/Spread	T 0.2/10/8
Gutter height	GH
Water Meter	WM
Edge of Bitumen	× EB 77.81
Gutter lip	× GLIP 77.81

A – DENOTES EASEMENT FOR DRAINAGE OF SEWAGE 3 WIDE (AD70414)
B – DENOTES EASEMENT TO PUMP SEWAGE 3 WIDE (D.P.811690)
C – DENOTES EASEMENT FOR OVERHEAD POWERLINES 9 WIDE (DP1022218)

DATUM: AHD
CONTOUR INTERVAL: 0.5m
ORIGIN OF HEIGHTS: SSM 42008 RL 53.019

DIAL BEFORE YOU DIG www.1100.com.au

0 2 4 6 8 10 20m 1:200
RR 1:200 @ A1 size

LEGEND

Spot height	× 27.65 GL
Top of kerb height	× 27.65 TK
Overhead electricity	E
Underground electricity	UE
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Fire system pipeline	FW
Water pipeline	W
Optical fibre cable	FO
U/G Telephone cable	T
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Gutter lip

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RR 1:200 @ A1 size

Sheet 2 of 4 sheets

Client: School Infrastructure Projects NSW

REVISIONS:

PLAN SHOWING SPOT HEIGHTS, CONTOURS, BUILDINGS, ROOF HEIGHTS, ADJOINING BUILDINGS, TREES AND UNDERGROUND SERVICES OVER LOT 200 D.P.1192140 CROOBYAR RD MILTON .

SCALE:	1:200
DATE:	1/12/20
REFERENCE:	5647.SITE2
DRAWING FILE:	5647CONT3D.DWG

Phillip Brown Land Surveyors
P.O. Box 168 Milton N.S.W. 2538 Phone 02 44540842
Email: pbrown@shoal.net.au Fax 02 44545900

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13/1/21 Rising Main	SCALE: 1:200
	DATE: 1/12/20
DRAWING FILE: 5647CONT3D.DWG	REFERENCE: 5647 SITE3

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Sheet 3 of 4 sheets

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RR 1:200 @ A1 size

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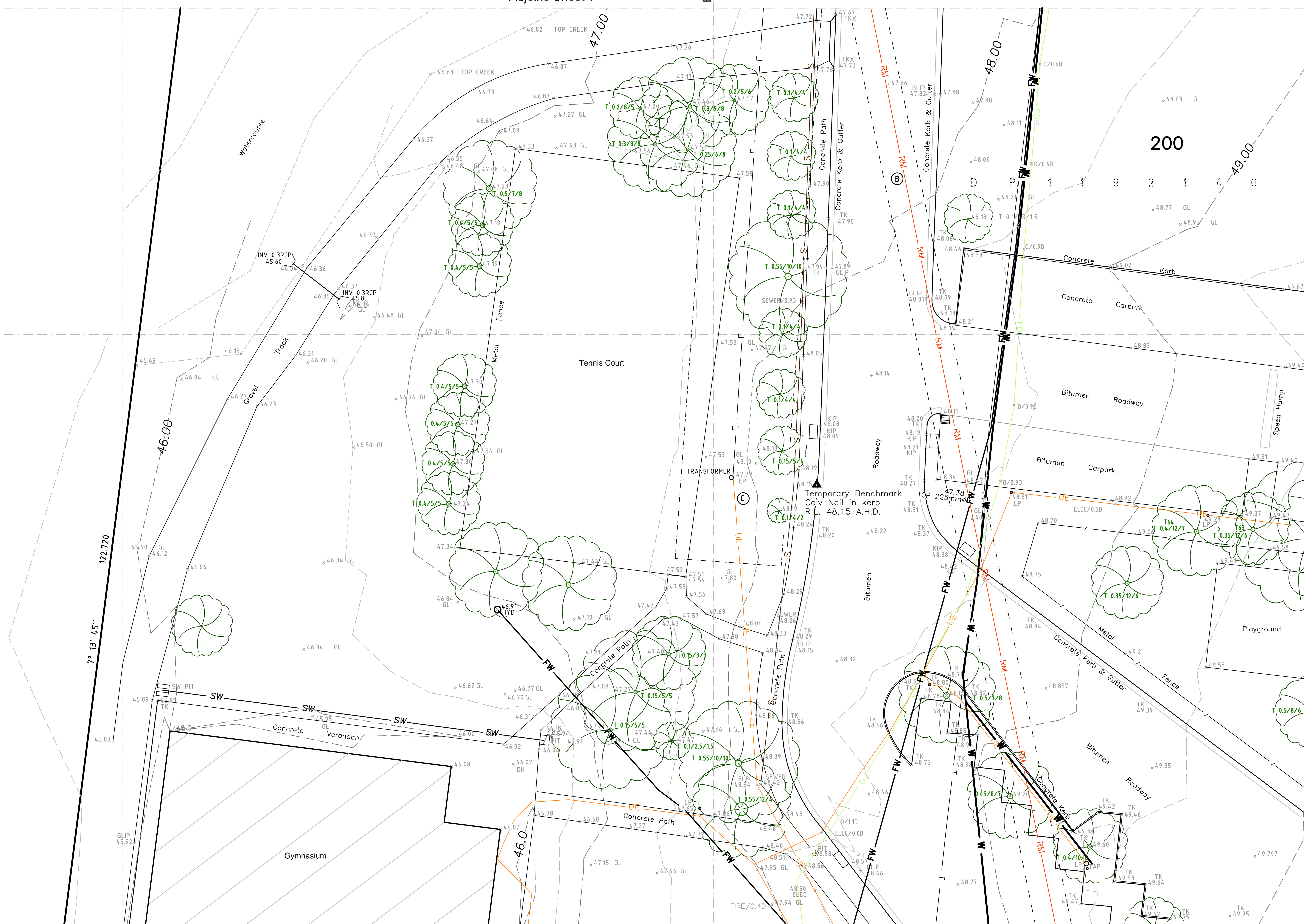

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Edge of Bitumen	× EB 77.81
Gutter lip	× GLIP 77.81

DATUM: AHD
CONTOUR INTERVAL: 0.5m
ORIGIN OF HEIGHTS: SSM42008 RL53.019

N 6088350

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RR 1:200 @ A1 size

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DRAWING FILE: 5647CONT3D.DWG	REFERENCE: 5647.SITE4	Email: pbrown@shoal.net.au Fax 02 44545900

Sheet 4 of 4 sheets

Adjoins Sheet 2

MGA

LEGEND

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Top of kerb height	x 27.65 TK
Overhead electricity	E
Underground electricity	UE
Sewer pipeline	S
Fire system pipeline	FW
Water pipeline	W
Optical fibre cable	FO
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DATUM: AHD
CONTOUR INTERVAL: 0.5m
ORIGIN OF HEIGHTS: SSM42008 RL53.019