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Noise Assessment for Proposed Flight School

11 May 2018

NGH ENVIRONMENTAL PTY LTD

TJ958-03F01 Noise Assessment (r3).docx

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1 Introduction

Renzo Tonin & Associates was engaged by NGH Environmental to undertake a noise assessment for the proposed recreational flight school to be located in Southern NSW approximately 9km south of Bega and 16km northwest of Merimbula. Noise impacts from the flight operation of recreational aircraft at the proposed flight school will be addressed in accordance with Australian Standard AS 2021:2015 'Acoustics – Aircraft noise intrusion – Building siting and construction'; and noise impacts from the operation of fixed mechanical plant at the proposed site will be addressed in accordance with the NSW 'Noise Policy for Industry' (NPfI) as part of the submission to Bega Valley Shire Council.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Project Description

2.1 Background Information

The proposed recreational flight school is to be located at the existing Frogs Hollow Airstrip in Bega Valley on an existing airfield that is currently used as a landing ground by a recreational aviation club. The existing airfield has two (2) active runways, namely the Primary and the Secondary runway as shown in Figure 2. It is also noted that the Primary runway would be used predominantly, whilst the Secondary runway would typically only be used when the prevailing wind conditions dictate this.

The flight school would provide recreational flight training packages including aviation training and onsite accommodation and meals. Aircraft hangars, aircraft repairs and servicing, classrooms, ancillary offices, retail premises and staff accommodation would also be located onsite.

At full operation, the flight school is proposed to use both runways and cater for up to 1,200 students per year, with approximately 200 staff and a maximum of 40 aircraft onsite. The flight school will be using three (3) different aircraft for training purposes during each student's stay at the school.

Appendix B presents the site plan of the proposed flight school.

2.2 Noise Issues

The following noise issues relating to the operation of the proposed flight school have been identified as potentially impacting the nearest sensitive receivers:

- Take-off and landing of recreational aircraft from Frogs Hollow Airfield;
- Recreational aircraft flying non-circuits around the airfield at Frogs Hollow;
- Recreational aircraft flying circuits around the airfield at Frogs Hollow; and
- Recreational aircraft taxiing and moving around the airfield.

It is understood that the aircraft will not perform special manoeuvres or aerobatics.

It is noted that mechanical plant for air-conditioning and ventilation facilities are potential noise sources; however, due to the relatively large distances of the closest receivers to the proposed site, it is not expected there will be a significant noise impact from the mechanical plant. Nevertheless, in-principle noise management measures are provided for mechanical plant in Section 4.5.2.

2.3 Hours of Operation

The flight school will be operating during the following standard daytime hours:

- Monday to Saturday: 7:00am to 6:00pm
- Sunday and public holidays: 8:00am to 6:00pm

Note: there would be no training activity or flights conducted on a Sunday.

2.4 Affected Receivers

The nearest affected receivers surrounding the Frogs Hollow airfield were identified through aerial maps and during a site visit. It is noted that the existing residential property located to the north of the primary runway will be acquired as part of the flight school and will be used for accommodating the maintenance personnel for the flight school. Figure 1 shows the land to be acquired by SAFCA and Figure 2 provides details of the receivers sounding the Frogs Hollow airfield. At Council's request, existing lots that have potential for a future dwelling to be erected upon have also been identified as "receivers" and are illustrated in Figure 2.

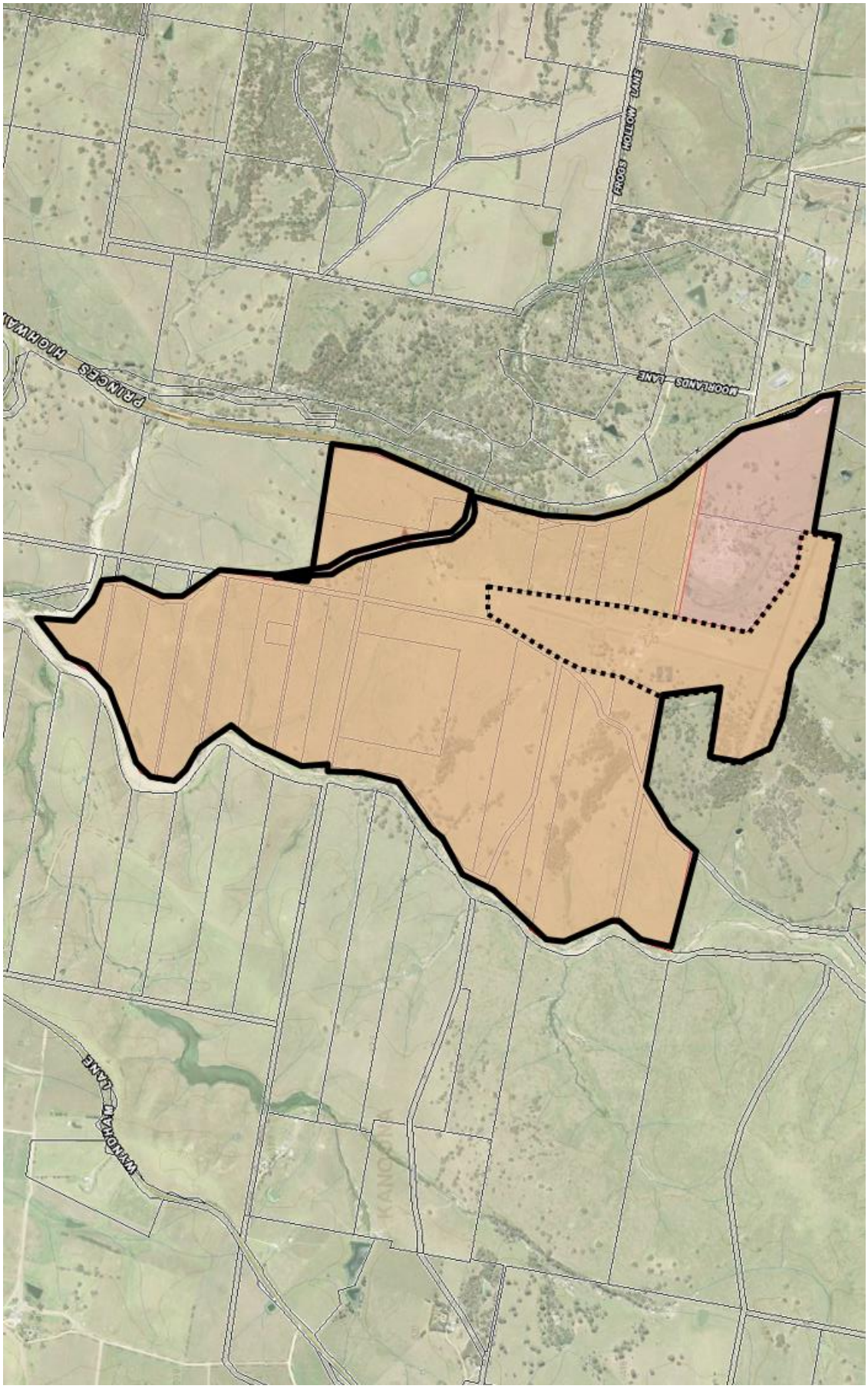
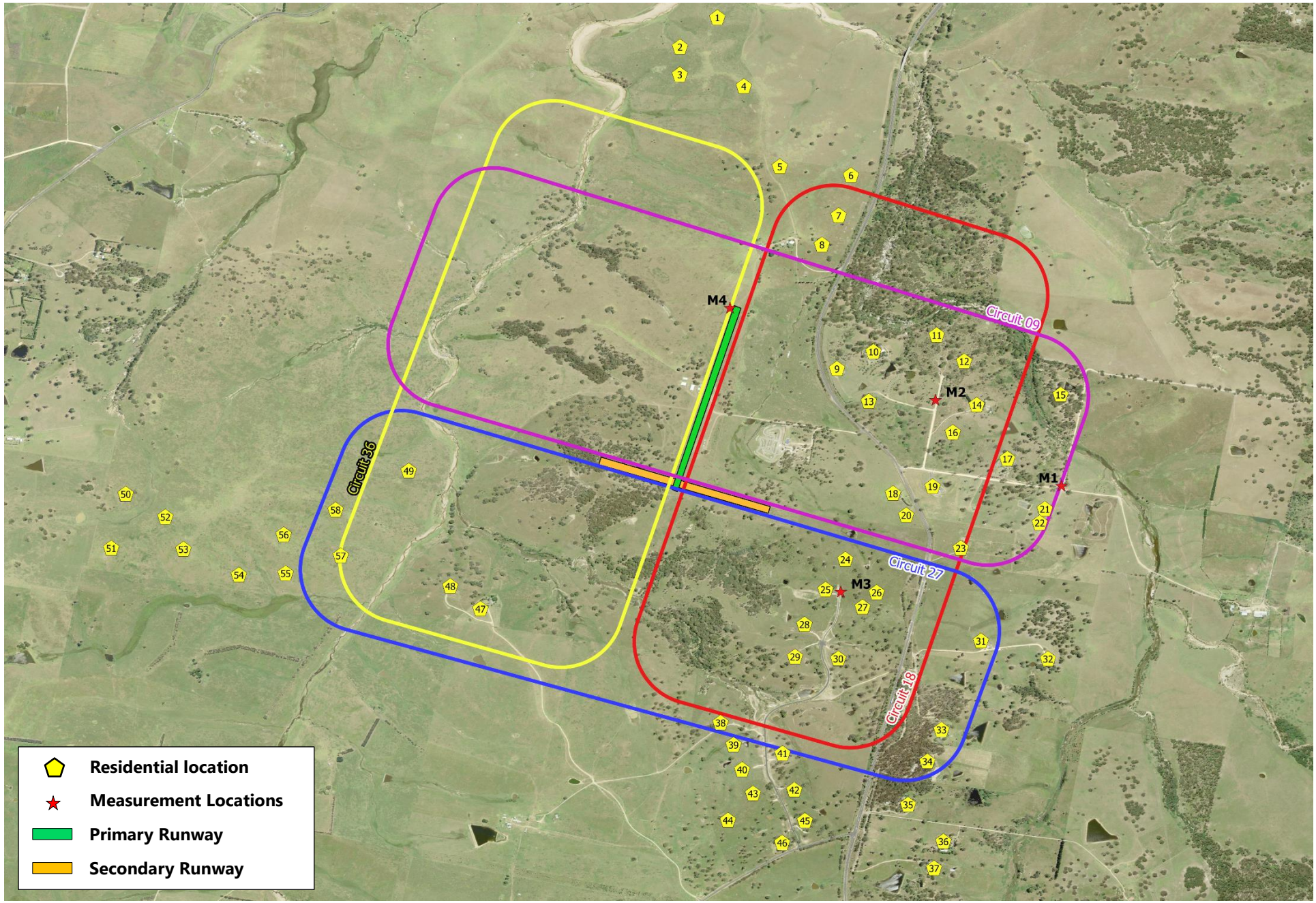


Figure 1 - Land to be acquired by SAFCA

Figure 2 – Site, Designated Flight Circuits, Identified Residential Locations and Measurement Locations



3 Existing Noise Environment

Noise measurements are ideally carried out at the nearest or most potentially affected locations surrounding a development to determine the existing noise environment of receivers surrounding a subject site. Alternatively, a representative location should be established in the case of access restrictions or a safe and secure location cannot be identified. Furthermore, representative locations may be established in the case of multiple receivers as it is usually impractical to carry out measurements at all locations surrounding a site.

Short-term attended noise measurements were undertaken at locations determined to have ambient noise environments similar to the nearest affected receivers. The short-term measurement locations are outlined in Table 1 and shown in Figure 2.

Table 1 – Noise Measurement Locations

ID	Address	Description
M1	25 Frogs Hollow Lane, Frogs Hollow	Noise measurements were undertaken on the roadside of Frogs Hollow Lane adjacent to the driveway entrance to this property and in the free-field.
M2	33 Moorlands Lane, Frogs Hollow	Noise measurements were undertaken on the roadside of Moorlands Lane and in the free-field. Representative of nearest receivers to the primary runway.
M3	14 Newlyns Place, Frogs Hollow	Noise measurements were undertaken at the driveway entrance to the property and in the free-field. Representative of nearest receivers to the secondary runway.

Short-term background and ambient noise measurements were undertaken between 12:00pm and 1:30pm on Monday 18th September 2017, in order to quantify the existing surrounding noise environment.

The equipment used for noise measurements was an NTi Audio Type XL2 precision sound level analyser which is a class 1 instrument having accuracy suitable for field and laboratory use. The instrument was calibrated prior and subsequent to measurements using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with IEC 61672 (parts 1-3) 'Electroacoustics - Sound Level Meters' *and IEC 60942* 'Electroacoustics - Sound calibrators' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

A summary of the short-term background and ambient noise measurement results is presented in Table 2 below.

Table 2 – Measured Background L_{A90} and Ambient L_{Aeq} Noise Level Results, dB(A)

Location	Measured Noise Level		Comments on measured noise levels
	L_{A90}	L_{Aeq}	
Monday 18 September 2017			
M1 – 25 Frogs Hollow Lane	29	39	Noise environment dominated by natural sounds (e.g. birds, insects, etc.).
M2 – 33 Moorlands Ln	35	41	Noise environment dominated by natural sounds (e.g. birds, insects, etc.) and traffic noise from the Princes Highway and considered representative of nearest receivers to the primary runway.
M3 – 14 Newlyns Place	36	40	Noise environment dominated by natural sounds (e.g. birds, insects, etc.) and traffic noise from the Princes Highway and considered representative of nearest receivers to the secondary runway.

Table 2.1 (page 10) of the NPfI presents the minimum assumed RBL for the day, evening and night periods. For the day period the minimum assumed RBL is set at 35dB(A) and for the evening and night periods, it is set at 30dB(A). Therefore, where background noise levels are less than the minimum assumed RBLs from the NPfI, then the minimum assumed RBLs are implemented.

Based on the short-term noise measurements presented in Table 2, minimum assumed RBL of 35dB(A) for the day period has been adopted for the Location M1, where the background L_{A90} noise level was measured to be 29dB(A). The background LA90 noise level was measured to be 36dB(A) at Location M3; however, to provide a conservative estimate and in accordance with NPfI, a minimum RBL of 35dB(A) has been adopted for day period instead.

Therefore, for a conservative assessment the minimum assumed RBL of 35dB(A) for the day period has been applied to all the identified receivers surrounding the subject site.

Furthermore, for the evening and night periods, the minimum assumed RBL of 30dB(A) has been used for a conservative assessment.

4 Operational Noise Assessment

4.1 Operational Noise Criteria

4.1.1 Flight Activities

In accordance with noise assessment guidance provided by AirService Australia, the Department of Infrastructure and Regional Development & Cities and EPA NSW, the noise impact from the flight operation of aircraft associated with the proposed flight school is assessed against Australian Standard AS 2021:2015 'Acoustics – Aircraft noise intrusion – Building siting and construction'. The Australian Noise Exposure Forecast (ANEF) study was developed in the early 1980's following a major socio-acoustic investigation undertaken by the National Acoustics Laboratories (NAL) to assess the impact of aircraft noise on residential communities in Australia. The NAL study led to the development of a dose-response curve to identify the response of the community to the ANEF exposure level leading to an acceptable aircraft noise exposure defined in AS 2021 as being less than ANEF-20, and an unacceptable level of aircraft noise exposure above ANEF-25.

An AirServices Australia-endorsed ANEF chart is not in place for the Frogs Hollow airfield as they are only required for commonwealth owned or operated airports; and/or an airport that services commercial flights. However, the ANEF and AS 2021 framework can be utilised to assess the proposed development. According to advice from AirServices Australia, the Department of Infrastructure, Regional Development & Cities and EPA NSW, this framework is the most appropriate means of assessing the impact of aircraft movement. In the absence of an adopted ANEF chart for Frogs Hollow, a difference of 35dB is used to translate between ANEF levels and $L_{Aeq,24hr}$ dB(A). Further, the ANEF 20 contour is generally accepted as equivalent to $L_{Aeq,24hr}$ 55 dB(A).

Moreover, many acoustic studies have confirmed that there is a direct relationship with the $L_{Aeq,24hr}$ parameter and people's reaction to aircraft noise, with one study in the UK (The Aircraft Noise Index Study - 1985) identified a step in people's reaction at a $L_{Aeq,24hr}$ noise level of 57dB(A). Based on this report, the UK Government adopted the $L_{Aeq,24hr}$ parameter as a measure of aircraft noise and used 57dB(A) as the approximate value where there is general community annoyance from aircraft noise. Evidence from the study showed that people become moderately disturbed at $L_{Aeq,24hr}$ 65dB(A) and were considered highly disturbed at $L_{Aeq,24hr}$ 70dB(A).

Furthermore, the World Health Organisation (WHO) recommends that the $L_{Aeq,24hr}$ noise descriptor can be used for the measurement of aircraft noise exposure and recommends an external level of 55dB(A) as the value where people start to become annoyed with aircraft noise during the daytime.

In accordance with AS2021, the following is stated:

> *"Some experience has shown that communities that are newly-exposed to aircraft noise (e.g. as a result of the construction of new runways, or the redesign of flight paths near an aerodrome) tend to be more sensitive to such noise than communities that are accustomed to it".*

Therefore, it is generally accepted and suggested by acoustic experts to adopt a more conservative ANEF level of ANEF 13 [equivalent to $L_{Aeq,24hr}$ 48dB(A)] limit as the noise criterion for people newly exposed to aircraft operations.

The additional supplementary parameter, L_{Amax} metric, has been used to further describe aircraft noise in Australia. The L_{Amax} noise level criteria provided in Table E1 of AS 2021 can be directly used to assess in-air activities of small aerodromes. This table recommends a L_{ASmax} < 70dB(A) limit for more than 30 flights per day. The results presented in this report has been based on an assessment against the L_{ASmax} 70dB(A) threshold,.

Summary of Noise Criteria for Flight Activities

Both the $L_{Aeq,24hr}$ and L_{ASmax} noise descriptors and the corresponding limits have been utilised in this assessment as follows:

- **$L_{Aeq,24hr}$ 48 dB(A)**, which is equivalent to ANEF-13
- **L_{ASmax} < 70dB(A)**, for more than 30 flights per day

4.1.2 Mechanical Plant and Equipment

Noise impact from mechanical plant and equipment associated with proposed flight school is assessed against the NSW 'Noise Policy for Industry' (NPfI) which is the most appropriate method of assessing this component of noise generated by the proposed development. This approach is confirmed in the referral response provided by EPA NSW. The assessment procedure in terms of the NPfI has two components:

- Controlling intrusive noise impacts in the short-term for residences; and
- Maintaining noise level amenity for residences and other land uses.

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise levels and project amenity noise levels.

4.1.3 Project Intrusiveness Noise Levels

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the $L_{Aeq,15min}$ descriptor) does not exceed the background noise level measured in the absence of the source by more than 5dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$L_{Aeq,15minute}$ Intrusiveness noise level = Rating Background Level (RBL) plus 5dB(A)

Given that mechanical plant and equipment associated with the flight school are likely to operate continuously 24 hours per day, seven days a week, the assessment of intrusiveness is undertaken for the

night time period as the night time trigger levels are more stringent than the daytime trigger levels. Based on the minimum assumed RBL of 30dB(A) for the night time period, as discussed in Section 3, the project intrusiveness noise level for the nearest sensitive residential receivers is presented in Table 3 below.

Table 3 – Intrusiveness Noise Criteria, dB(A)

Receivers	Project Intrusiveness Noise Level – $L_{Aeq, 15\ min}$ [RBL + 5dB(A)][1]
All Affected Residential Receivers	30 + 5 = **35**

Notes: 1. In accordance with the Table 2.1 of the NPfI, the minimum project intrusiveness noise level for the night period is 35dB(A)

4.1.4 Project Amenity Noise Levels

The NPfI amenity noise levels are designed to maintain noise level amenity for particular land uses, including residential and other land uses. The project amenity noise levels for different time periods of a day are determined in accordance with Section 2.4 of the NSW NPfI. The NPfI recommends amenity noise levels ($L_{Aeq, period}$) for various receivers including residential, commercial and industrial receivers; and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area, "project amenity noise levels" apply.

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

$L_{Aeq,period}$ Project amenity noise level = $L_{Aeq,period}$ Recommended amenity noise level – 5dB(A)

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$$L_{Aeq,15minute} = L_{Aeq,period} + 3dB(A)$$

In accordance with the NPfI, an adjustment of (+3 dB) is applied to recommended noise levels ($L_{Aeq, period}$) in order to standardise the time periods for the intrusiveness and amenity noise levels. The project amenity noise levels ($L_{Aeq, 15min}$) applied for this project are reproduced in Table 4 below.

It is noted that the residential receivers in the vicinity of the subject site have been categorised as being in a 'rural' area in accordance with Table 2.3 of the NPfI. This is consistent with the prescribed land use zoning for the surrounds and the prevailing settlement pattern.

Table 4 – NPfI Project Amenity Noise Levels, dB(A)

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended Noise Level	
			$L_{Aeq, Period}$	$L_{Aeq, 15min}$
Residence	Rural	Day	50 – 5 = 45	45 + 3 = **48**
		Evening	45 – 5 = 40	40 + 3 = **43**
		Night	40 – 5 = 35	35 + 3 = **38**

Notes: 1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.

4.1.5 Summary of Project Noise Trigger Levels

In accordance with the NPfI methodology the project noise trigger level, being the lower (i.e. more stringent) value of the project intrusiveness noise level and project amenity noise level, has been determined and reproduced in Table 5 below for the nearest affected residential receivers.

Table 5 – Project Noise Trigger Levels, dB(A)

Receiver Location	Type of Receiver	$L_{Aeq, 15min}$ Project Noise Trigger Levels[1]
All the identified receivers	Residence	35

Notes: 1. Based on the night time period – 10.00 pm to 7.00 am

4.2 Meteorology

Meteorological conditions could influence the propagation of noise in the atmosphere. Meteorological data referenced in this report was sourced from the Bureau of Meteorology (BOM) Bega Automatic Weather Station (AWS).

4.2.1 Wind Effects

The NPfI specifies a procedure for assessing the significance of wind effects. The procedure requires that wind effects be assessed where wind is a feature of the assessment area. According to the NPfI, wind is considered to be a feature where source-to-receiver wind speeds (at 10 m height) of 0.5 to 3 m/s occur for 30% of the time or more in any assessment period (day, evening and/or night) in any season. Winds with velocities less than 0.5 m/s (calm conditions) and greater than 3 m/s (at 10 m height), are not included in the calculations of wind occurrence in accordance with the NPfI methodology.

Where there is 30% or more occurrence of wind speeds between 0.5 m/s and 3 m/s (source-to-receiver component), then the highest wind speed is used (below 3 m/s) instead of the default. Where there is less than a 30% occurrence of wind between 0.5 m/s and 3 m/s (source-to-receiver component), wind is not included in the noise calculations.

Analysis of the wind data from the Bega automatic weather station (located approximately 10km north of the subject site) for the period between 2th January 2017 and 25th December 2017 was undertaken using the EPA's Noise Enhancement Wind Analysis (NEWA) program to determine if wind is a 'feature' of the area as defined by the NPfI. The program determines whether there are prevailing source-to-receiver wind conditions. The results of the analysis are presented in Table 6 below:

Table 6 – Percentage of Wind Records (up to 3 m/s) from Subject Site to Receiver, %

Direction[1]	Summer			Autumn			Winter			Spring		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
0	8.9	12.8	15.8	11.0	13.6	13.2	9.2	11.4	14.1	7.0	8.0	18.7
45	5.0	10.6	17.6	9.7	16.5	17.3	10.4	17.3	18.6	3.6	12.4	19.5
90	1.6	7.4	10.1	5.2	11.3	10.5	7.0	11.9	9.5	1.4	8.8	7.7
135	1.4	5.9	8.1	3.9	11.3	7.4	4.8	12.1	9.5	1.5	9.3	8.6
180	4.9	13.6	11.0	12.5	12.0	7.8	12.1	10.5	10.4	6.1	19.3	12.1
225	18.5	19.6	10.2	21.8	9.5	7.4	19.2	7.3	7.3	15.0	21.0	8.8
270	19.7	20.2	6.7	17.7	6.5	4.1	14.5	4.2	3.4	14.2	10.9	3.8
315	16.1	14.3	5.4	11.4	4.7	3.0	8.6	3.0	3.2	10.6	6.2	4.5

Notes: 2. Clockwise from north

The results above indicate that winds between 0.5 m/s and 3 m/s (source-to-receiver component) do not occur for more than 30% of the time during the year in all directions. Therefore, the wind is not found to be a feature of the area and the effect of wind is assessed to be insignificant.

4.3 Operational Noise Sources

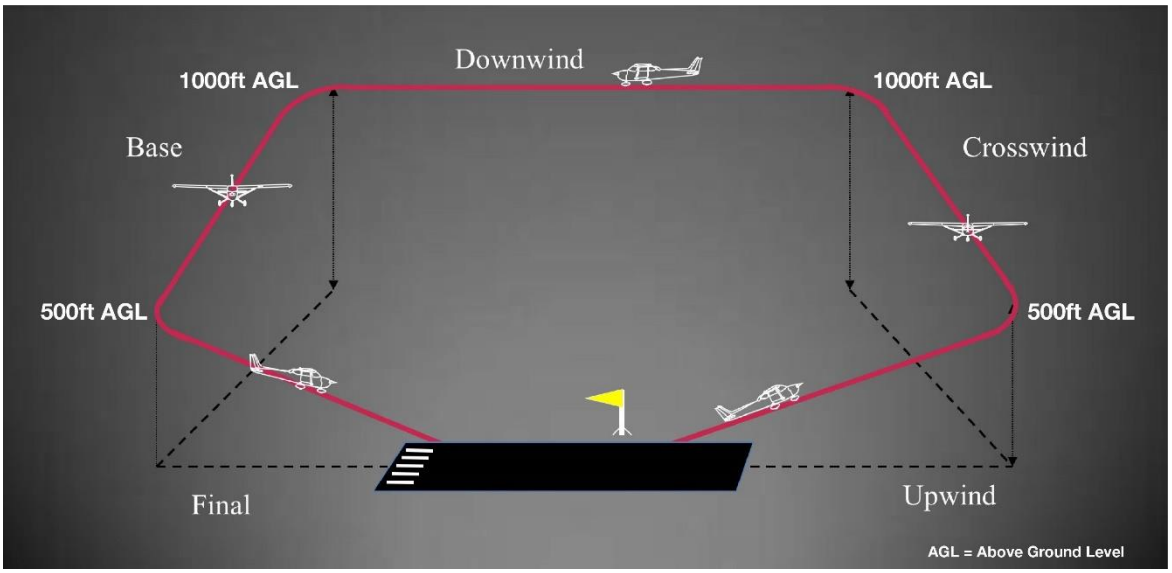
4.3.1 Flight Activities

It is proposed that the recreational flight school would use the existing runways (i.e. the Primary and the Secondary runways) for circuit training and for standard training flights in the Designated Training Area (an area extending in a 25 nautical mile radius around the airfield).

- **Circuit training** – Four (4) designated flight circuits, as shown in Figure 2, are proposed to be utilised for the purpose of circuit training. Each proposed flight circuit will have a predetermined designated flight profile, as detailed in Figure 3. Although the use of a circuit(s) depends on the wind direction, conflicting circuits would not be undertaken for safety reasons – e.g. Circuit 27 and 36 would not be used simultaneously.

- **Standard flight training** – Standard flight training will comprise the bulk of training at the flight school. A flight departs the Frogs Hollow airfield by following the start of a "circuit profile" before exiting the profile typically before extending out from the crosswind movement once it has reached 1000 feet. The training flight is undertaken to a pre-determined location in the Designated Training Area, extending in a 25 nautical mile radius around Frogs Hollow. The aircraft then returns to the Frogs Hollow airfield, by joining the 'end' of a circuit profile generally on the downwind leg and approaching the airfield from there.

Figure 3 – Designated Flight Profile



The flight school will be using three (3) different types of aircraft for training purposes, namely the 'Bantam', 'Trike' and 'Brumby'. The aircraft that will be used predominantly throughout the flight training will be the 'Bantam'.

The test aircraft used in this assessment was fitted with a Rotax Type 912/ 80hp (UL/A/F) engine which is considered to be the most powerful and loudest engine to be used in the proposed aircraft. Standard aircraft handling was observed, with full power on take off and ascending to a height of 1,000 ft, with cruising (half-power) for the remainder of the circuit. Therefore, the measurement results used in this assessment are considered to be conservative and represent a worst-case scenario.

Attended noise measurements were undertaken on Monday 18th September 2017, in order to quantify the aircraft noise at each measurement location (M1, M2 and M3) in accordance with the NPfI. Three (3) test flights were completed for each designated flight circuit (see Figure 2); and the noise generated by the aircraft flybys during each flight circuit were measured at all the monitoring locations (M1, M2 and M3). The measurements were conducted under suitable weather conditions in accordance with the NPfI.

Table 7 – Aircraft Noise Measurement Results

Location	Circuit ID	Measurement No.	LASmax	LAeq,24hr
M1	Circuit 18	1	51	<20
	Circuit 18	2	54	<20
	Circuit 09	1	57	21
	Circuit 09	2	58	22
	Circuit 09	3	62	25
	Circuit 27	1	41	<20
	Circuit 27	2	39	<20

	Taxiing on The Runway		Noise inaudible	
M2	Circuit 18	1	47	<20
	Circuit 18	2	47	<20
	Circuit 09	1	55	<20
	Circuit 09	2	55	<20
	Circuit 09	3	53	<20
	Circuit 27	2	40	-<20
	Taxiing on The Runway		Noise inaudible	
M3	Circuit 18	1	52	<20
	Circuit 18	2	49	<20
	Circuit 36	2	43	<20
	Circuit 09	3	57	<20
	Circuit 27	1	48	<20
	Circuit 27	2	46	<20
	Cruise at 500 ft	1	58	<20
	Climb at 200 ft	1	73	31
	Taxiing on The Runway		Noise inaudible	

When departing or approaching the airfield, standard training flights within the wider training area use the designated "circuit profile" as a template. Standard training flights enter and leave the profile at a minimum height of 1,000 ft. Outside of the departure and approach manoeuvres, the standard training flights are conducted between 4,000 ft and 10,000 ft above ground level. Given that standard training flights also follow the circuit profile at approach and departure, the most-affected receiver locations would be those located directly under the circuit path. Therefore, aircraft within circuit profile are considered to have the greatest noise impact on the receiver locations.

As a conservative estimate, the highest measured noise level for an aircraft following the designated circuit profile, as presented in Table 7, has also been used for the assessment of the standard training flights.

4.3.2 Mechanical Plant and Equipment

The details and noise emission levels of mechanical plant items to be installed are yet to be finalised at this early stage of the project. Noise emissions from these sources are therefore dealt with in a general manner in Section 4.4.2 of this report.

4.4 Operations Noise Assessment

4.4.1 Flight Activities

Based on the measured L_{ASmax} and calculated equivalent $L_{Aeq,24hr}$ noise levels for a single aircraft presented in Table 7, the equivalent $L_{Aeq,24hr}$ noise level for each flight circuit are assessed against the established noise criteria presented in Section 4.1.1.

Table 8 – Assessment of Aircraft Noise Levels, dB(A)

Location	Circuit ID	Measurement No.	L_{ASmax} Noise Levels			$L_{Aeq,24hr}$ Noise Levels				
			Criteria	Measured	Comply?	Criteria	Noise level for one flight/24hr	Comply?	Noise level for 200 flights[1] per 24hr	Comply?
M1	Circuit 18	1	*70*	51	Yes	*48*	<20	Yes	38	Yes
	Circuit 18	2	*70*	54	Yes	*48*	<20	Yes	37	Yes
	Circuit 09	1	*70*	57	Yes	*48*	21	Yes	44	Yes
	Circuit 09	2	*70*	58	Yes	*48*	22	Yes	45	Yes
	Circuit 09	3	*70*	62	Yes	*48*	25	Yes	48	Yes
	Circuit 27	1	*70*	41	Yes	*48*	<20	Yes	27	Yes
	Circuit 27	2	*70*	39	Yes	*48*	<20	Yes	24	Yes
M2	Circuit 18	1	*70*	47	Yes	*48*	<20	Yes	33	Yes
	Circuit 18	2	*70*	47	Yes	*48*	<20	Yes	33	Yes
	Circuit 09	1	*70*	55	Yes	*48*	<20	Yes	38	Yes
	Circuit 09	2	*70*	55	Yes	*48*	<20	Yes	42	Yes
	Circuit 09	3	*70*	53	Yes	*48*	<20	Yes	41	Yes
	Circuit 27	2	*70*	40	Yes	*48*	<20	Yes	22	Yes
M3	Circuit 18	1	*70*	52	Yes	*48*	<20	Yes	42	Yes
	Circuit 18	2	*70*	49	Yes	*48*	<20	Yes	38	Yes
	Circuit 36	2	*70*	43	Yes	*48*	<20	Yes	30	Yes
	Circuit 09	3	*70*	57	Yes	*48*	<20	Yes	42	Yes
	Circuit 27	1	*70*	48	Yes	*48*	<20	Yes	32	Yes
	Circuit 27	2	*70*	46	Yes	*48*	<20	Yes	32	Yes
M4	Cruise at 500 ft	1	*70*	58	Yes	*48*	<20	Yes	42	Yes
	Climb at 200 ft	1	*70*	**73**	**No**	*48*	31	Yes	**54**	**No**

Notes: 1. A flight accounts for both a departure and landing movement

2. **Bold** font represents exceedance of the applicable noise criteria

Presented in Table 8, two hundred flights per day (i.e. 24 hours) has been selected as a nominal upper limit. A review of the proposed flight operations concludes that this upper limit would be complied with the applicable noise criteria at Locations M1, M2 and M3; and at Location M4 when aircraft are cruising at approximately 500 feet directly above this location. However, the L_{ASmax} and equivalent $L_{Aeq,24hr}$ noise levels would not comply with the applicable noise criteria at Location M4 when aircraft are climbing and approximately 200 feet directly above the location.

Therefore, provided that during any type of training (i.e. Circuit or Standard training) an aircraft reaches an elevation of at least 500 feet before flying over a dwelling, compliance of the L_{ASmax} and $L_{Aeq,24hr}$ criteria would be achieved.

A summary of the noise assessment results for flight activities is as follows:

Cruise, decent approach and landing scenarios

- The measured L_{ASmax} noise levels for all the test flights are found to be less than 70 dB(A).
- By limiting the number of flights to 200 per day (i.e. 24 hours), the $L_{Aeq,24hr}$ noise level is determined to comply with the criterion of 48dB(A).

Take-off and climb scenarios

- An aircraft should reach an elevation of at least 500 feet before flying over any dwelling in order to comply with L_{ASmax} 70 dB(A) and $L_{Aeq,24hr}$ 48dB(A).

4.4.2 Mechanical Plant and Equipment

Details of mechanical plant and equipment are not available at this stage of the development. Therefore, assuming a minimum distance of 520 metres from mechanical plant to the nearest residential receivers, it is estimated that the maximum combined source sound power level of all the mechanical plant and equipment at the proposed site should not exceed **97dB(A)** in order to achieve compliance with the project-specific noise trigger levels established in Section 4.1.2.

4.5 Recommendations and Management Measures

The following recommendations provide in-principle noise control solutions to maintain noise compliance at the residential receivers. This information is presented for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant. The assistance of an acoustic consultant must be sought at the detailed design phase of these works to provide the necessary design details and specifications.

Before committing to any form of construction or committing to any contractor, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the design and form of construction.

The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

4.5.1 Flight Activities

In order to maintain compliance of the applicable noise criteria established in Section 4.1, the following noise management measures should be implemented as part of the noise management plan to be prepared for the facility.

- The total number of flights (combined circuit and Standard flight training) per 24 hour period should be limited to 200 flights.
- An aircraft should reach an elevation of at least 500 feet before flying over any residential properties during take-off and climb scenarios.
- An aircraft should fly at a minimum elevation of 500 feet when flying over any residential properties during cruise, decent approach and landing scenarios.

Due to the relatively large distances of the nearest affected receivers to the subject site, aircraft noise during taxiing and movement around the airfield was observed to be inaudible at the closest receivers during the on site noise measurements. Therefore, various aircraft activities on the ground at the airfield are not expected to impact the nearest affected receivers and as such, no further mitigation measures are required for these scenarios.

4.5.2 Mechanical Plant and Equipment

As details for the mechanical plant are not available at this stage of the development, the following in-principle noise mitigation measures are provided for mechanical plant servicing the proposed facility. It is recommended that a more detailed assessment be undertaken during the detailed design stage of the project when schedules of the mechanical plant and equipment are known.

- The maximum combined Sound Power Level of **97dB(A)** should be considered when designing and preparing the mechanical plant and equipment schedules, in order to achieve compliance with the project-specific noise trigger levels established in Section 4.1.2.
- Acoustic assessment of mechanical services equipment will need to be undertaken during the detail design phase of the development to ensure that they shall not either singularly or in total emit noise levels which exceed the noise limits specified in Section 4.
- Mechanical plant noise emission can be controlled by appropriate mechanical system design and implementation of common engineering methods that may include any of the following:
  - procurement of 'quiet' plant;
  - strategic positioning of a plant away from sensitive neighbouring premises, maximising the intervening shielding between the plant and sensitive neighbouring premises;

  - commercially available silencers or acoustic attenuators for air discharge and air intakes of a plant;
  - acoustically lined and lagged ductwork;
  - acoustic screens and barriers between plant and sensitive neighbouring premises; and/or
  - partially enclosed or fully enclosed acoustic enclosures over a plant.

- Mechanical plant and equipment shall have their noise specifications and their proposed locations checked prior to their installation on site.

5 Conclusion

Renzo Tonin & Associates has completed an assessment of environmental noise impact from the proposed flight school to be located at Frogs Hollow in the Bega Valley in Southern NSW. Noise impact from the proposed flight school upon potentially affected receivers have been quantified and compared to Australian Standard AS 2021:2015 which is consistent with the approach recommended by the Department of Infrastructure, Regional Development & Cities, AirServices Australia and EPA NSW. Moreover, a project-specific noise criterion to address the noise impact on receivers newly exposed to aircraft operations is established in this study. Conservative inputs have been incorporated which provides for a conservative estimate that overestimates the likely noise impacts on surrounding receivers.

Two hundred flights per day (i.e. 24 hours) has been selected as a nominal upper limit Operational noise during aircraft flight movements was assessed against the relevant noise criteria. A review of the proposed flight operations concludes that this upper limit would be complied with. However, exceedance of the noise criteria during the climbing stage was determined for a measurement location 200 feet directly under a flight path. Therefore, in-principle noise management measures were recommended.

Furthermore, in-principle noise mitigation measures for mechanical plant servicing the proposed flight school were also recommended in order to achieve compliance with the established NSW NPfI project trigger levels.

APPENDIX A Glossary of Terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Site Plans

NOTES:

1. Survey map was prepared by Caddey Searl and Jarman Consulting Surveyors

2. The title boundaries as shown hereon were not marked at the time of survey and have been determined by plan dimensions only or by field survey.

3. Services shown hereon have been located where possible by survey prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

4. The relationship of improvements to boundaries is diagrammatic only. Where offsets are critical they should be confirmed by further survey.

5. The survey drawing shall be read in conjunction with all architectural drawings and specifications, all other consultant's drawings and specifications, all other contract documents, the requirements of relevant authorities and any other documentation relating to this project. Any discrepancy shall be referred immediately to Tasman Engineering Consultants Engineers.

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.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Detailed Survey

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:2000

Sheet No.	Rev
S518-01	.

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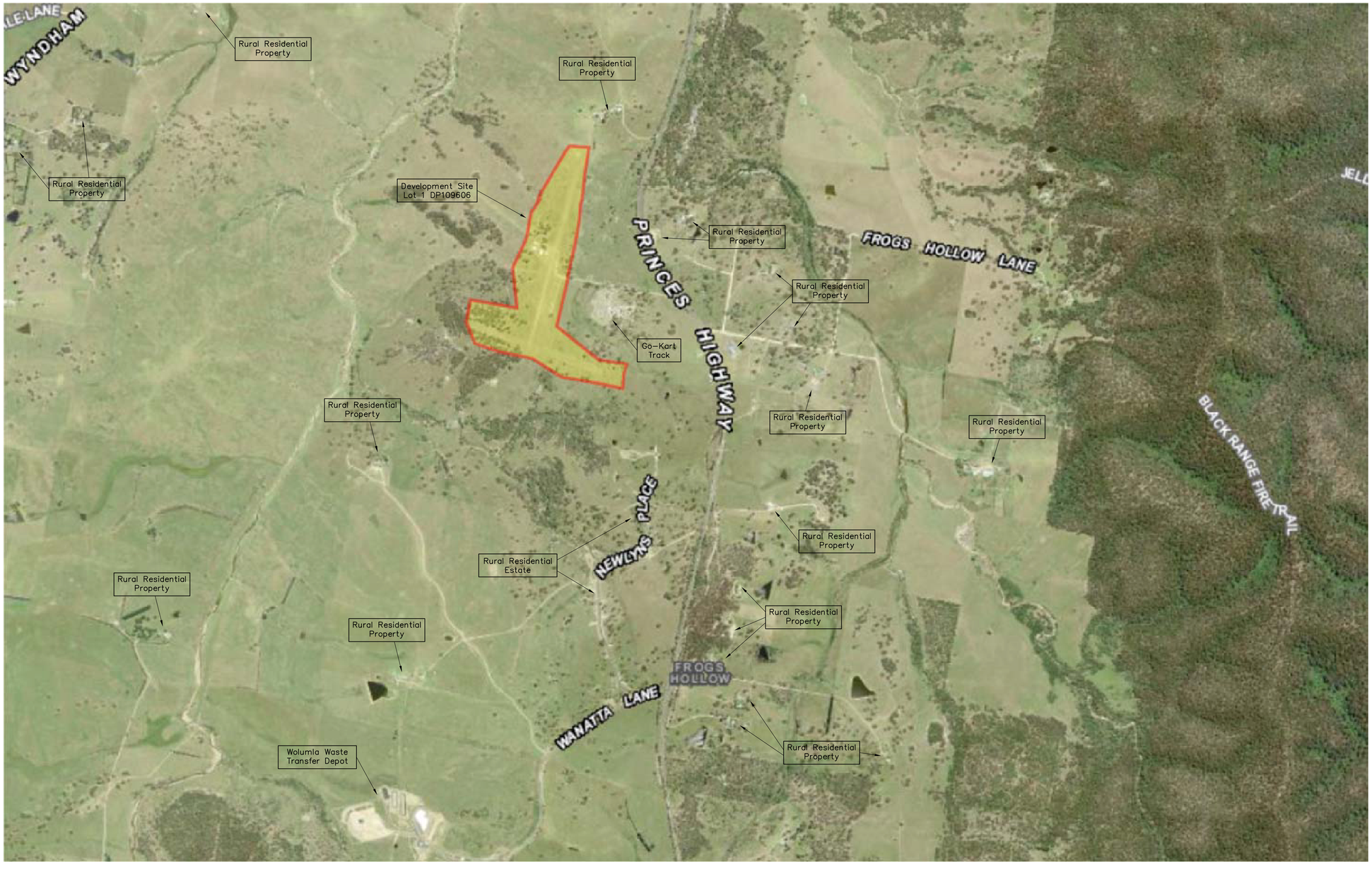

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.	16.10.17	ISSUED FOR CONSTRUCTION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Localisation Plan

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AJH	AJH	Oct 2017	NTS

Sheet No.	Rev
S518-02	.

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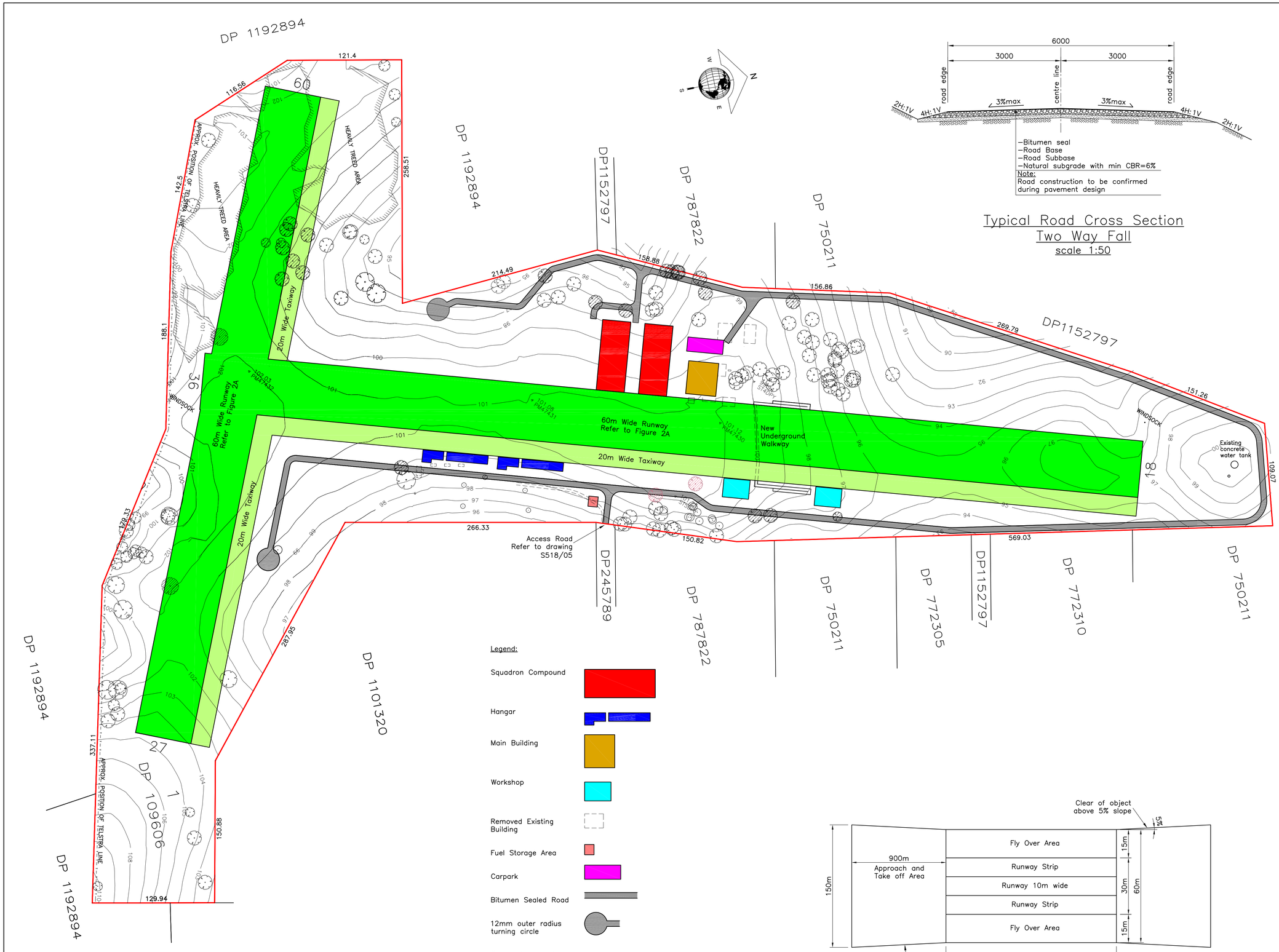

Typical Road Cross Section
Two Way Fall
scale 1:50

Legend:

- Squadron Compound
- Hangar
- Main Building
- Workshop
- Removed Existing Building
- Fuel Storage Area
- Carpark
- Bitumen Sealed Road
- 12mm outer radius turning circle
- Removed tree other than Broad Leaf Peppermint Tree and Hollow Bearing Tree
- Removed Peppermint Tree
- Removed Hollow Bearing Tree

Figure 2A – Single Engined and Centre–Line Thrust Aeroplanes not Exceeding 2000kg MTOW (Day Operation)

Development Description Notes:

1. The proposed development consists of:

1a. Construction of 10 separate squadron compounds. All buildings within the compounds will be single storey. Each compound will provide accommodation and infrastructure for 36 students at the same time.

1b. Construction of 10 single storey hangars. Each hangar consists of two separate units.

1c. Construction of 1 single storey main building containing kitchen and to be used for showroom, offices and diner.

1d. Construction of 2 single storey workshop buildings used for maintenance of planes.

1e. Construction of roads including new intersection between Princes Highway and the access road.

1f. Construction of new bridge located along the right of way access road.

1g. Construction of required infrastructure and services.

2. The development will be completed in 9 separate stages. First stage will consist of construction of the main building, workshops, two squadron compounds, two sets of hangars, roads and bridge. The following 8 stages will be spread over 4 years period. Each stage will be carried out every six months until the development is completed.

3. Existing intersection between Princes Highway and the access road will be reconstructed at stage 1 of the development. Refer to Traffic Assessment Report.

4. The development will comply with guidance and requirements of Planning for Bush Fire Protection 2006

5. The development will be carried out and operated in accordance with guidelines, requirements and specifications provided by Recreational Aviation Australia. Refer to Operational Manual Issue 7.1–August 2016.

6. This drawing to be read in conjunction with all relevant Architects, Engineers & Specialist drawings, sketches and specifications.

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION
A	05.04.18	GENERAL AMENDMENTS TO COUNCIL COMMENTS

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Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Development Plan Showing Proposed Infrustructure Stage 1

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S518–03	A

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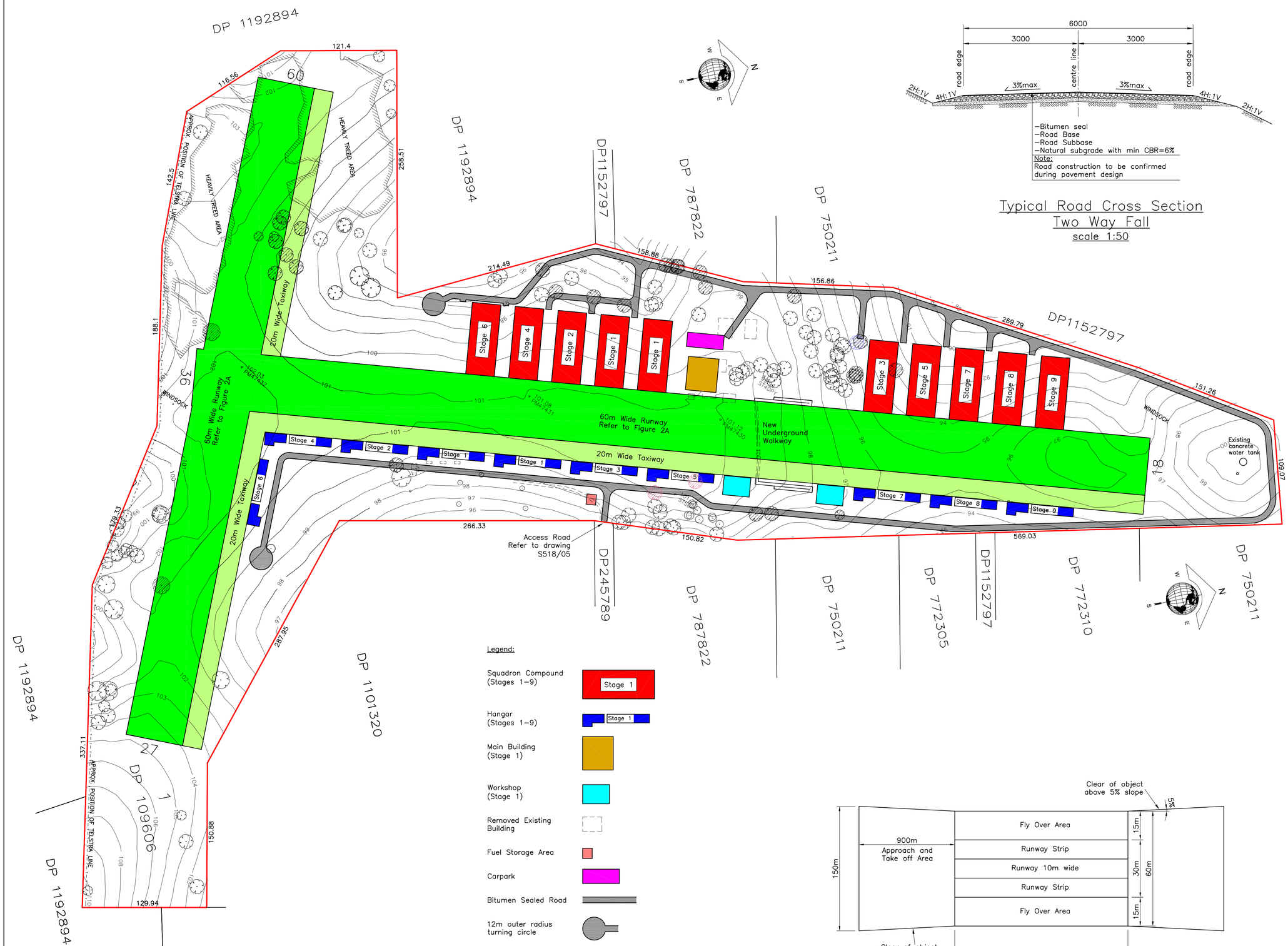

Typical Road Cross Section
Two Way Fall
scale 1:50

Legend:

- Squadron Compound (Stages 1–9) — Stage 1
- Hangar (Stages 1–9) — Stage 1
- Main Building (Stage 1)
- Workshop (Stage 1)
- Removed Existing Building
- Fuel Storage Area
- Carpark
- Bitumen Sealed Road
- 12m outer radius turning circle
- Removed tree other than Broad Leaf Peppermint Tree and Hollow Bearing Tree
- Removed Peppermint Tree
- Removed Hollow Bearing Tree

Figure 2A – Single Engined and Centre–Line Thrust Aeroplanes not Exceeding 2000kg MTOW (Day Operation)

Development Description Notes:

1. The proposed development consists of:

1a. Construction of 10 separate squadron compounds. All buildings within the compounds will be single storey. Each compound will provide accommodation and infrastructure for 36 students at the same time.

1b. Construction of 10 single storey hangars. Each hangar consists of two separate units.

1c. Construction of 1 single storey main building containing kitchen and to be used for showroom, offices and diner.

1d. Construction of 2 single storey workshop buildings used for maintenance of planes.

1e. Construction of roads including new intersection between Princes Highway and the access road.

1f. Construction of new bridge located along the right of way access road.

1g. Construction of required infrastructure and services.

2. The development will be completed in 9 separate stages. First stage will consist of construction of the main building, workshops, two squadron compounds, two sets of hangars, roads and bridge. The following 8 stages will be spread over 4 years period. Each stage will be carried out every six months until the development is completed.

3. Existing intersection between Princes Highway and the access road will be reconstructed at stage 1 of the development. Refer to Traffic Assessment Report.

4. The development will comply with guidance and requirements of Planning for Bush Fire Protection 2006.

5. The development will be carried out and operated in accordance with guidelines, requirements and specifications provided by Recreational Aviation Australia. Refer to Operational Manual Issue 7.1–August 2016.

6. This drawing to be read in conjunction with all relevant Architects, Engineers & Specialist drawings, sketches and specifications.

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.	16.10.17	ISSUED FOR DA SUBMISSION
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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Development Plan Showing Proposed Infrustructure Stages 1–9

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AJH	AJH	Oct 2017	1:2000

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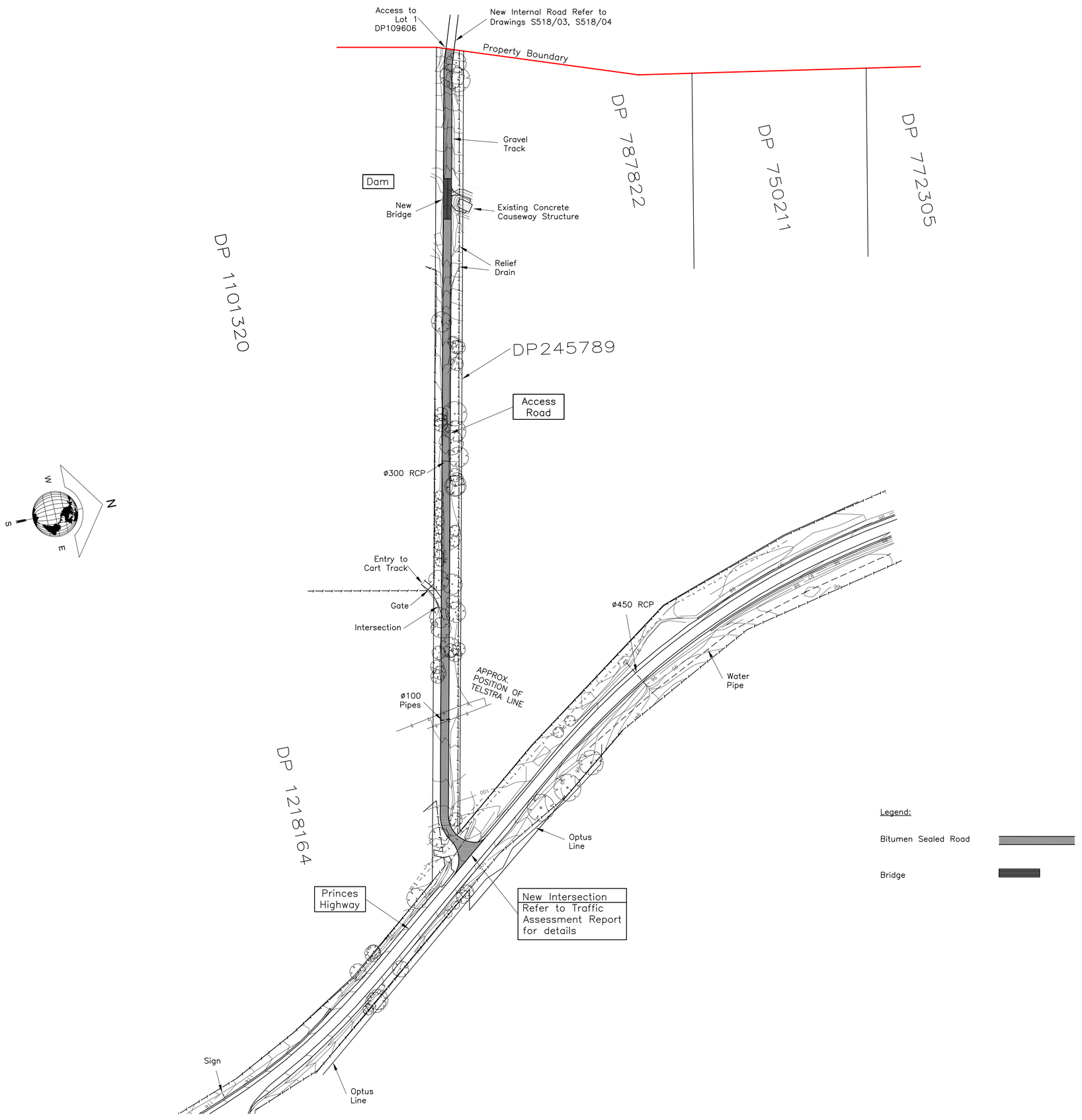

Legend:

Bitumen Sealed Road

Bridge

Development Description Notes:

1. The proposed development consists of:

1a. Construction of 10 separate squadron compounds. All buildings within the compounds will be single storey. Each compound will provide accommodation and infrastructure for 36 students at the same time.

1b. Construction of 10 single storey hangars. Each hangar consists of two separate units.

1c. Construction of 1 single storey main building containing kitchen and to be used for showroom, offices and diner.

1d. Construction of 2 single storey workshop buildings used for maintenance of planes.

1e. Construction of roads including new intersection between Princes Highway and the access road.

1f. Construction of new bridge located along the right of way access road.

1g. Construction of required infrastructure and services.

2. The development will be completed in 9 separate stages. First stage will consist of construction of the main building, workshops, two squadron compounds, two sets of hangars, roads and bridge. The following 8 stages will be spread over 4 years period. Each stage will be carried out every six months until the development is completed.

3. Existing intersection between Princes Highway and the access road will be reconstructed at stage 1 of the development. Refer to Traffic assessment report.

4. The development will comply with guidance and requirements of Planning for Bush Fire Protection 2006.

5. The development will be carried out and operated in accordance with guidelines, requirements and specifications provided by Recreational Aviation Australia. Refer to Operational Manual Issue 7.1–August 2016.

6. This drawing to be read in conjunction with all relevant Architects, Engineers & Specialist drawings, sketches and specifications.

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.	16.10.17	ISSUED FOR DA SUBMISSION
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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Access Road Plan

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Sheet No.	Rev
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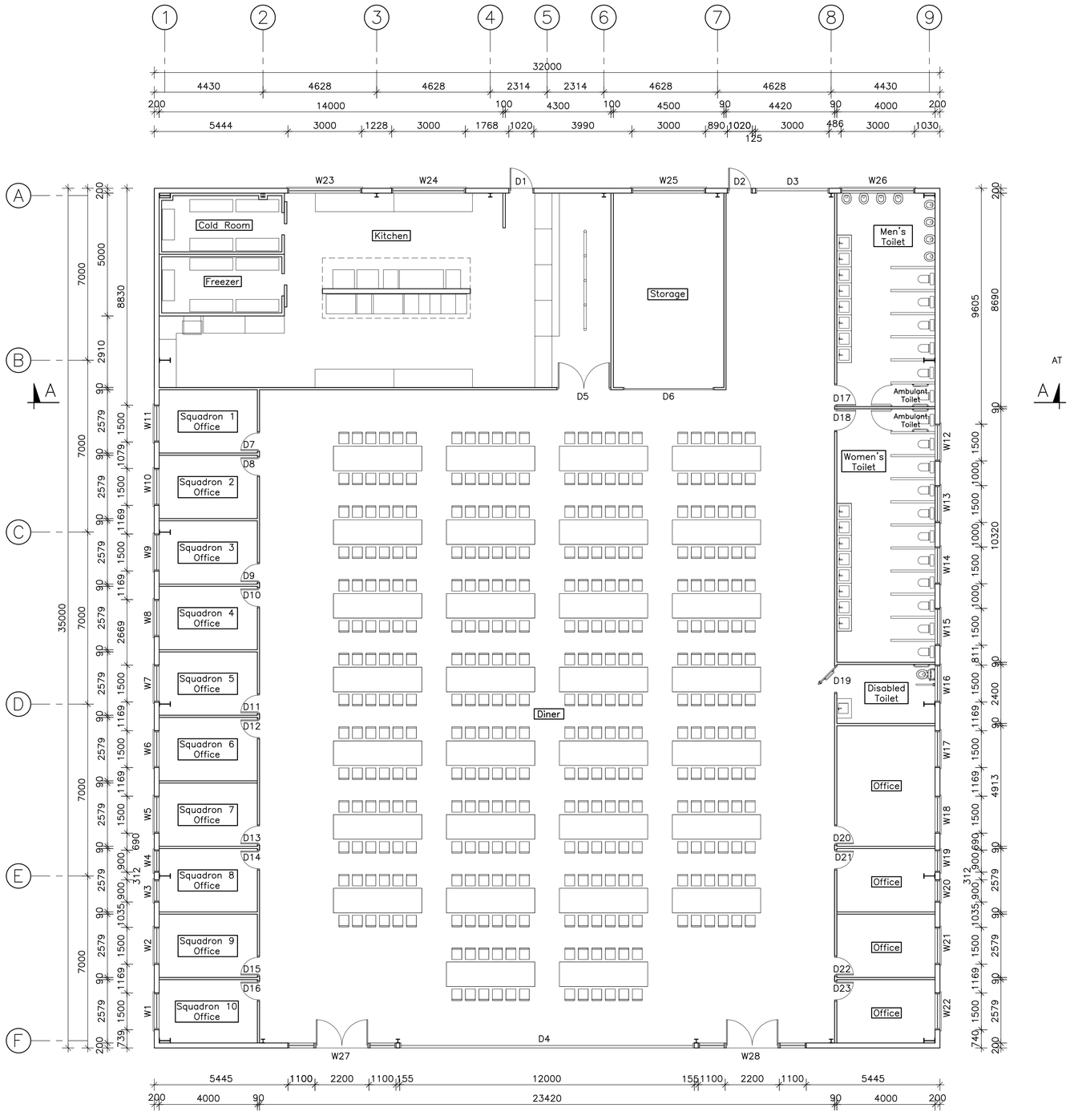

Window and Door Schedule			
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W1	Window	800	1500
W2	Window	800	900
W3	Window	800	900
W4	Window	800	1500
W5	Window	800	1500
W6	Window	800	1500
W7	Window	800	1500
W8	Window	800	1500
W9	Window	800	1500
W10	Window	800	1500
W11	Window	800	1500
W12	Window	800	1500
W13	Window	800	1500
W14	Window	800	1500
W15	Window	800	1500
W16	Window	800	1500
W17	Window	800	1500
W18	Window	800	1500
W19	Window	800	900
W20	Window	800	900
W21	Window	800	1500
W22	Window	800	1500
W23	Window	800	3000
W24	Window	800	3000
W25	Window	800	3000
W26	Window	800	3000
W27	Glazed Panel with 2200 wide x 2100 high door	3600	4400
W28	Glazed Panel with 2200 wide x 2100 high door	3600	4400
D1	External Emergency Door	2100	1020
D2	External Emergency Door	2100	1020
D3	External Roller Door	3600	1100
D4	External Roller Door	3600	12000
D5	Internal Door	2100	2200
D6	Internal Roller Door	2100	3700
D7	Internal Door	2100	820
D8	Internal Door	2100	820
D9	Internal Door	2100	820
D10	Internal Door	2100	820
D11	Internal Door	2100	820
D12	Internal Door	2100	820
D13	Internal Door	2100	820
D14	Internal Door	2100	820
D15	Internal Door	2100	820
D16	Internal Door	2100	820
D17	Internal Door	2100	920
D18	Internal Door	2100	920
D19	Internal Door–Disabled Toilet	2100	1120
D20	Internal Door	2100	820
D21	Internal Door	2100	820
D22	Internal Door	2100	820
D23	Internal Door	2100	820

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.	16.10.17	ISSUED FOR DA SUBMISSION
A	05.04.18	AMBULANT TOILETS ADDED

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Main Building
Ground Floor Plan

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AJH	AJH	Oct 2017	1:100

Sheet No.	Rev
S518–06	A

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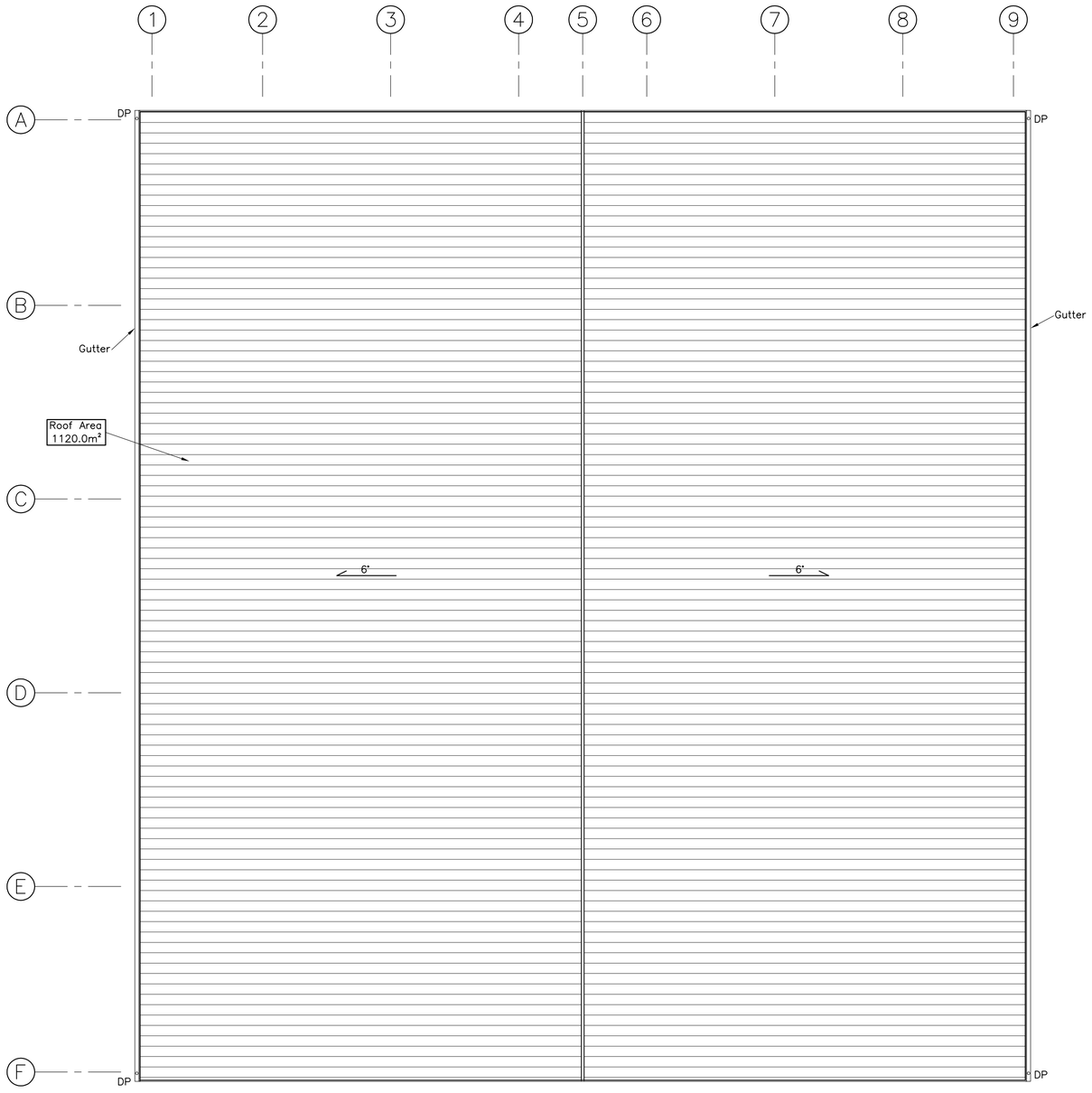

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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

Title

Main Building
Roof Plan

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100

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S518-07	.

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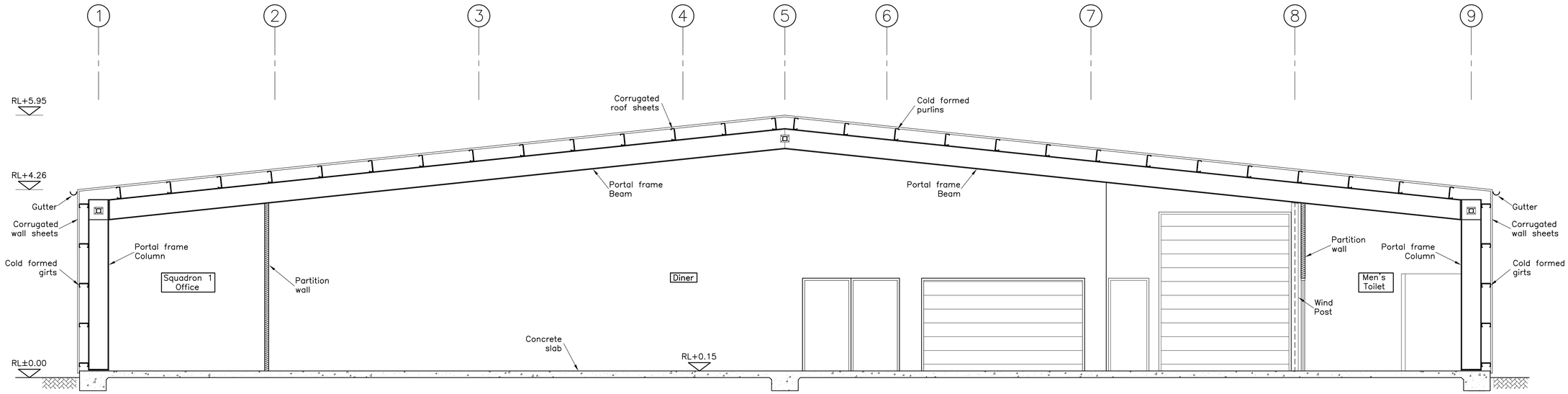

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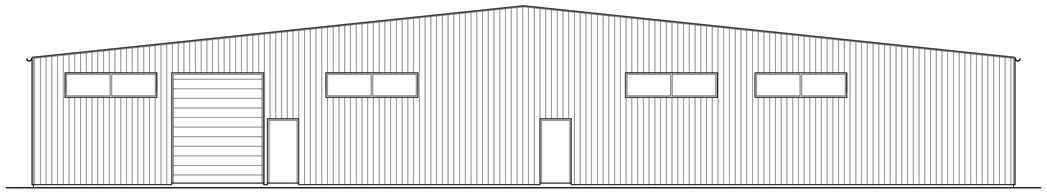

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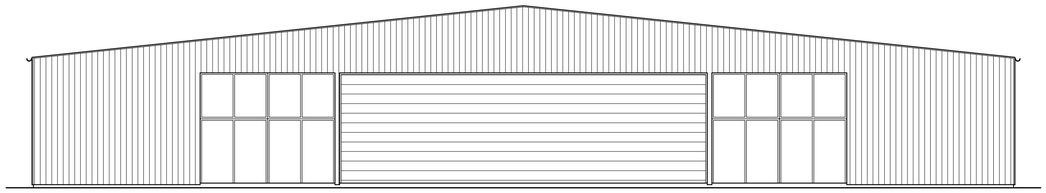

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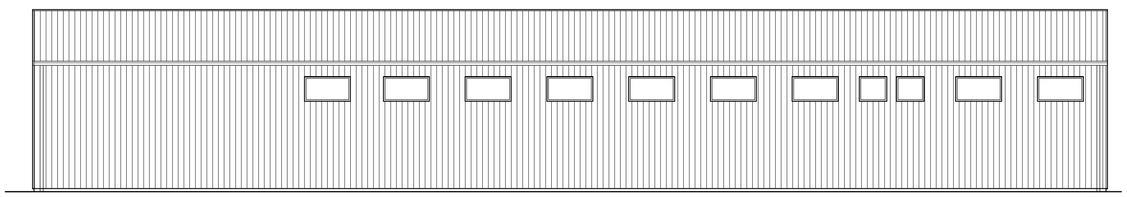

Southern Elevation
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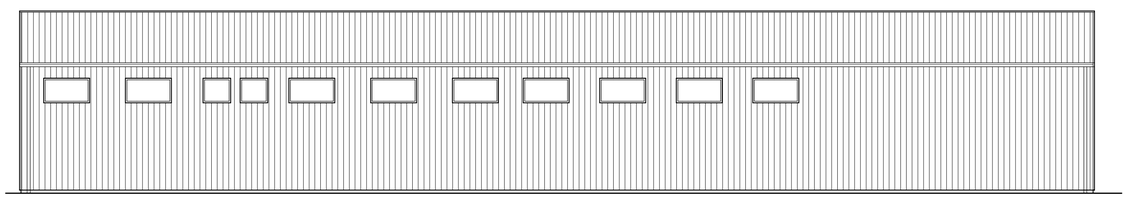

Nothern Elevation
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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Main Building
Section and Elevations

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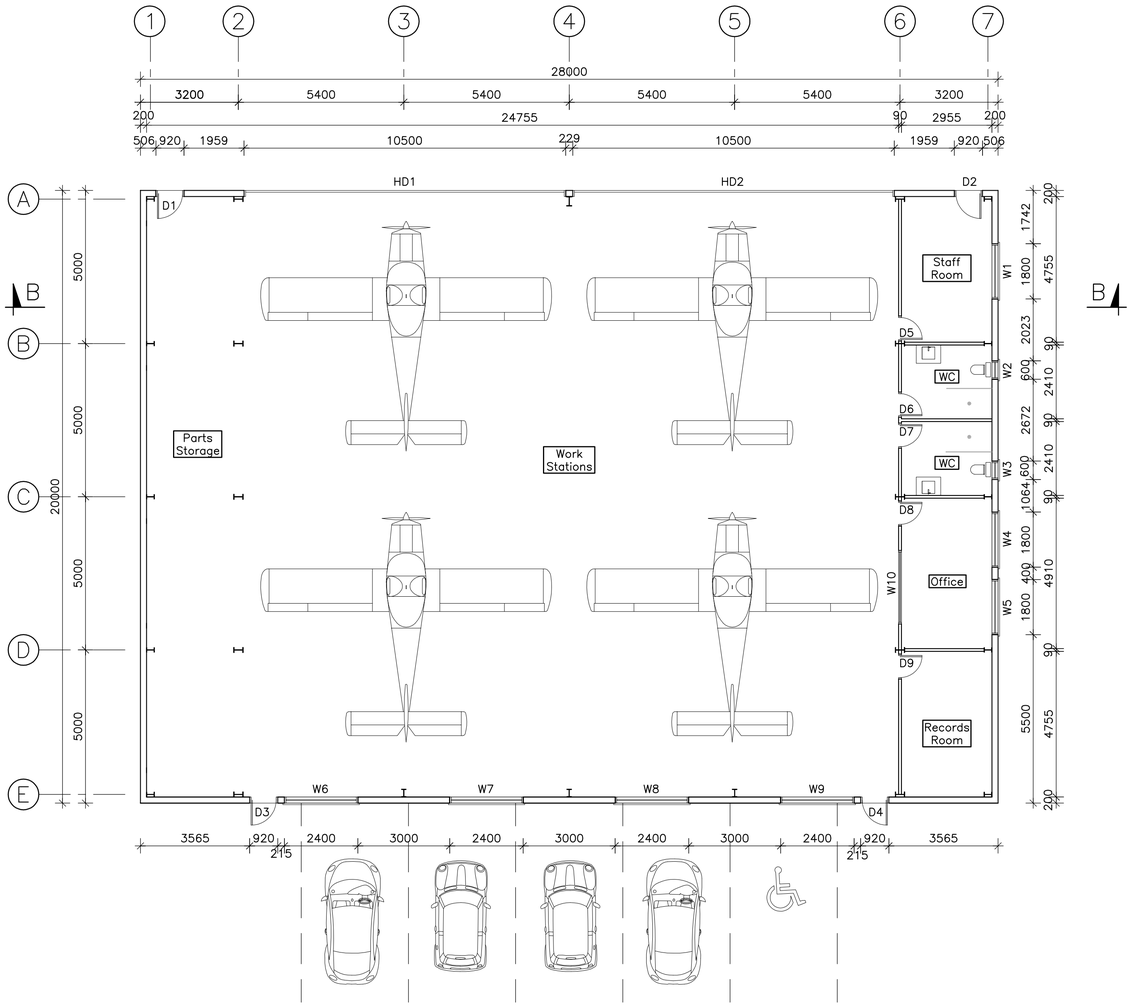

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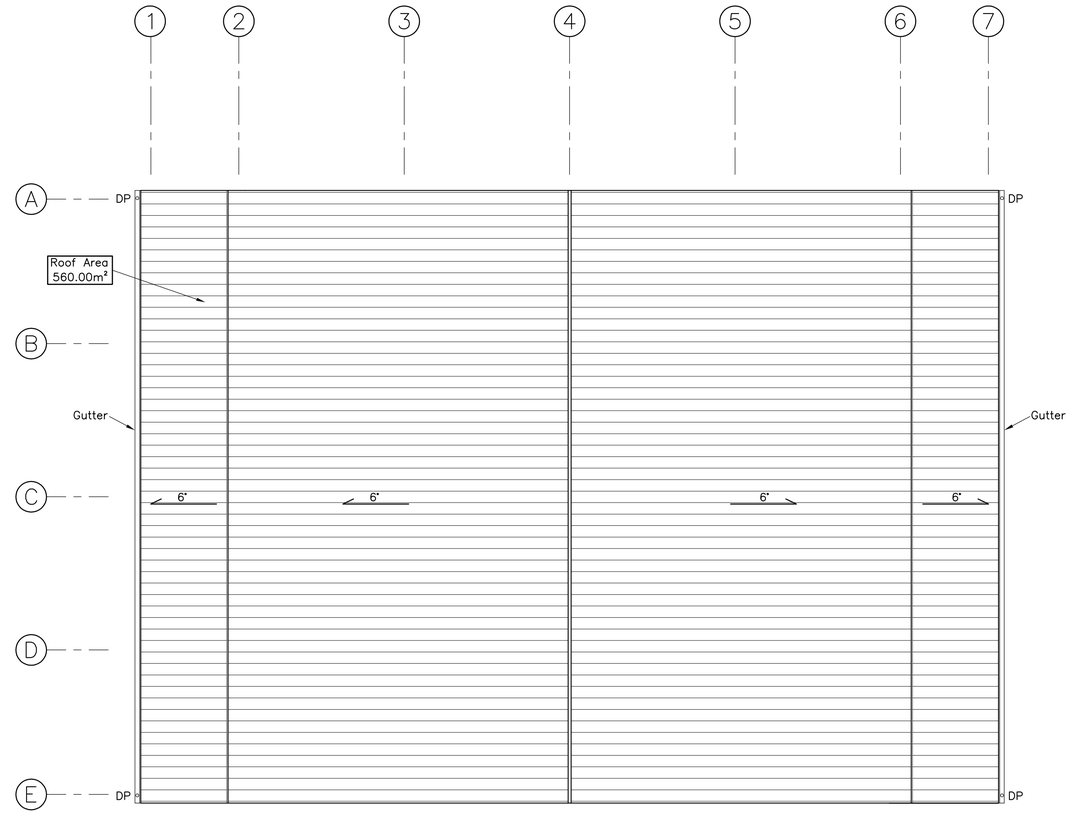

Roof Plan
scale 1:100

Window and Door Schedule			
Name	Description	Height	Width
W1	Window	900	1800
W2	Window	900	600
W3	Window	900	600
W4	Window	900	1800
W5	Window	900	1800
W6	Window	800	2400
W7	Window	800	2400
W8	Window	800	2400
W9	Window	800	2400
W10	Window	800	2400
D1	External Door	2100	920
D2	External Door	2100	920
D3	External Door	2100	920
D4	External Door	2100	920
D5	Internal Door	2100	820
D6	Internal Door	2100	820
D7	Internal Door	2100	820
D8	Internal Door	2100	820
D9	Internal Door	2100	820
HD1	External Main Door	3600	10500
HD2	External Main Door	3600	10500

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

Title

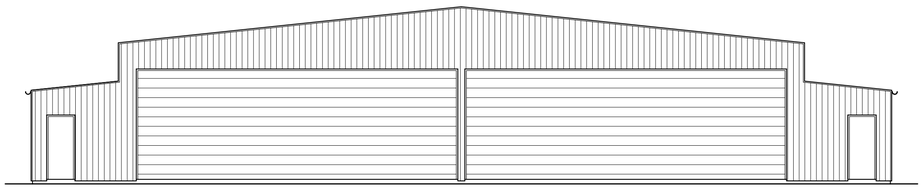
Workshop
Ground Floor Plan
Roof Plan

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100

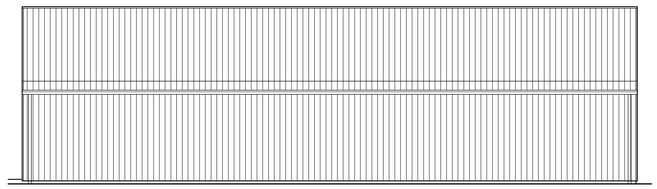
Sheet No. S518–09

Rev .

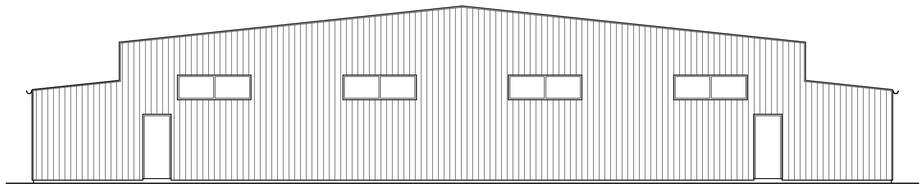
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



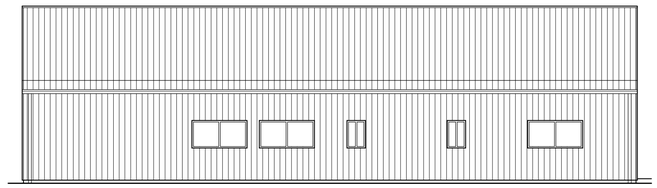
Western Elevation
scale 1:100



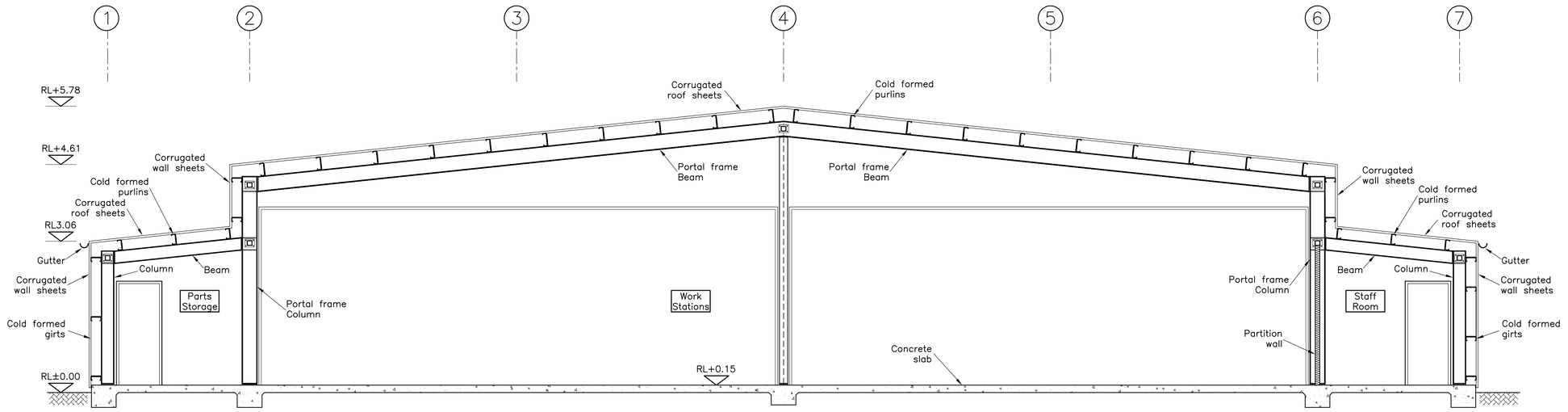
Southern Elevation
scale 1:100



Eastern Elevation
scale 1:100



Northern Elevation
scale 1:100



Section B–B
scale 1:50

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

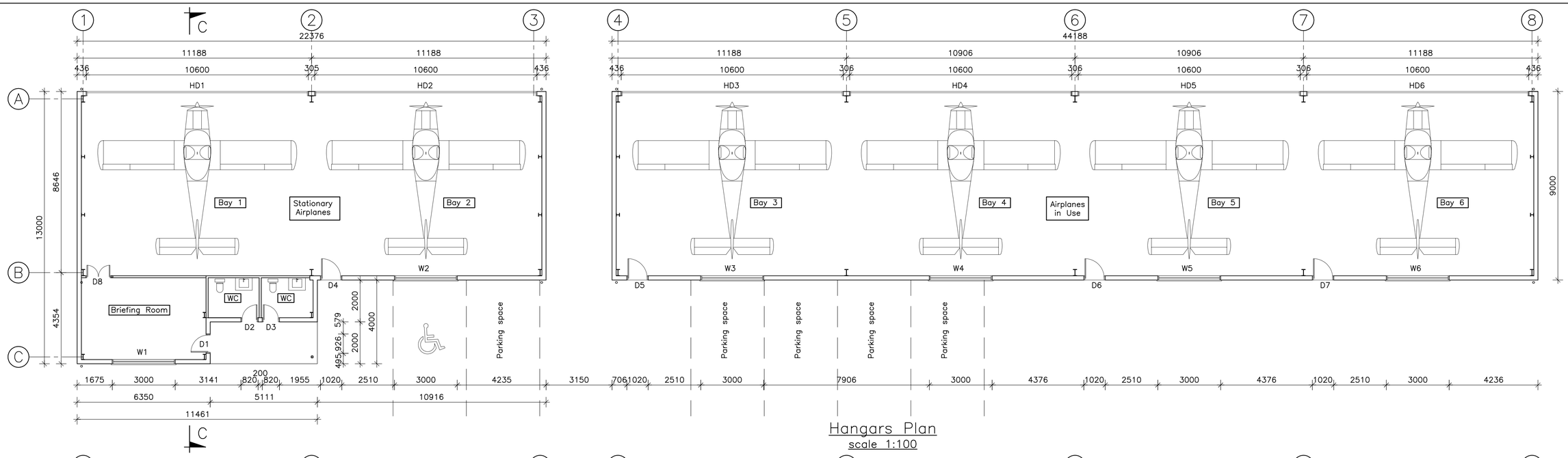
Title

Workshop
Section and Elevations

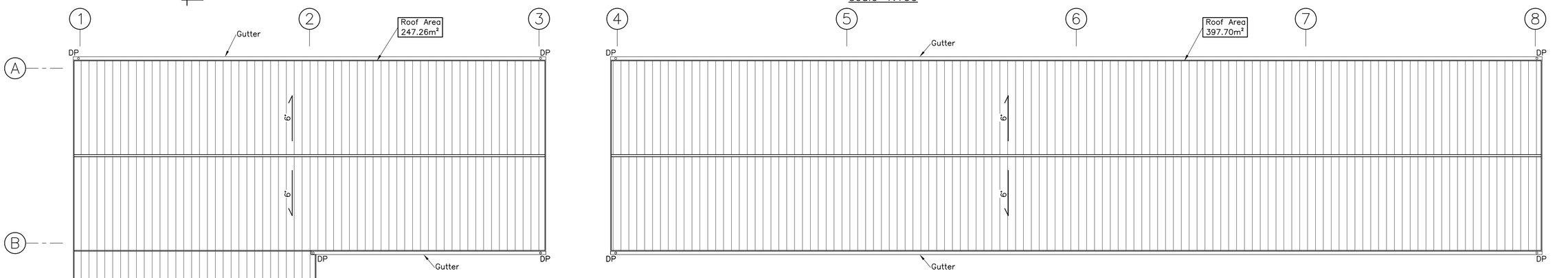
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100,1:50

Sheet No.	Rev
S518–10	.

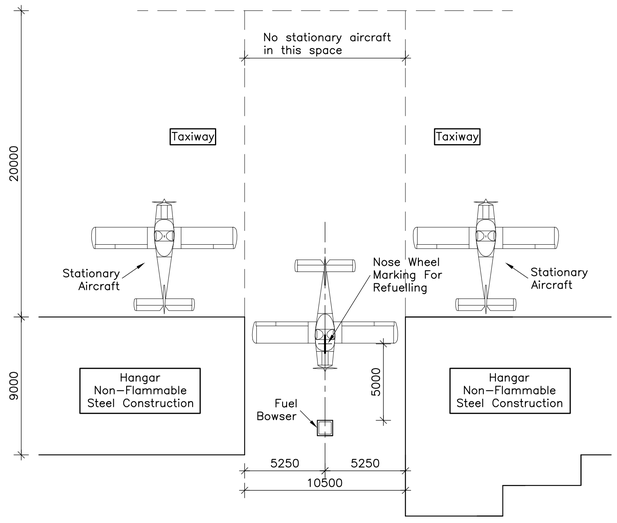
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



Hangars Plan
scale 1:100



Roof Plan
scale 1:100



Typical Plan Showing Fuel Bowser Location and Refuelling Procedure
scale 1:200

Window and Door Schedule:			
Name	Description	Height	Width
W1	Window	1100	3000
W2	Window	1100	3000
W3	Window	1100	3000
W4	Window	1100	3000
W5	Window	1100	3000
W5	Window	1100	3000
D1	External Door	2100	920
D2	External Door	2100	820
D3	External Door	2100	820
D4	External Door	2100	1020
D5	External Door	2100	1020
D6	External Door	2100	1020
D7	External Door	2100	1020
D8	Internal Door	1100	1200
HD1	External Main Door	3600	10600
HD2	External Main Door	3600	10600
HD3	External Main Door	3600	10600
HD4	External Main Door	3600	10600
HD5	External Main Door	3600	10600
HD6	External Main Door	3600	10600

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

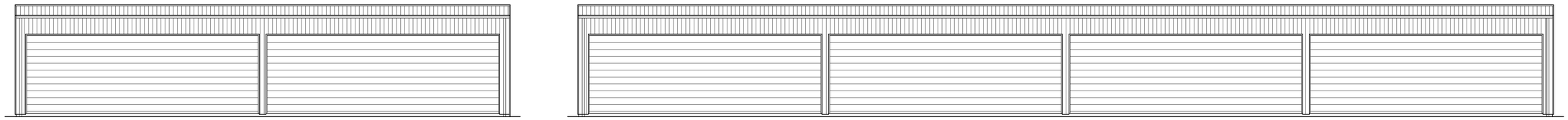
Hangars
Ground Floor Plan, Roof Plan and Bowser Location Plan

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100;1:200

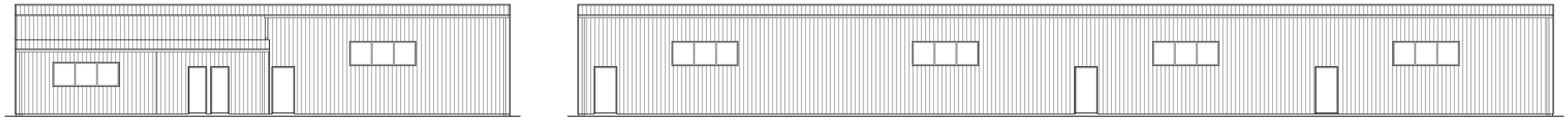
Sheet No. S518–11

Rev .

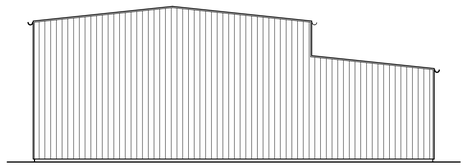
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



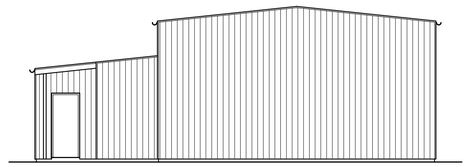
Western Elevation
scale 1:100



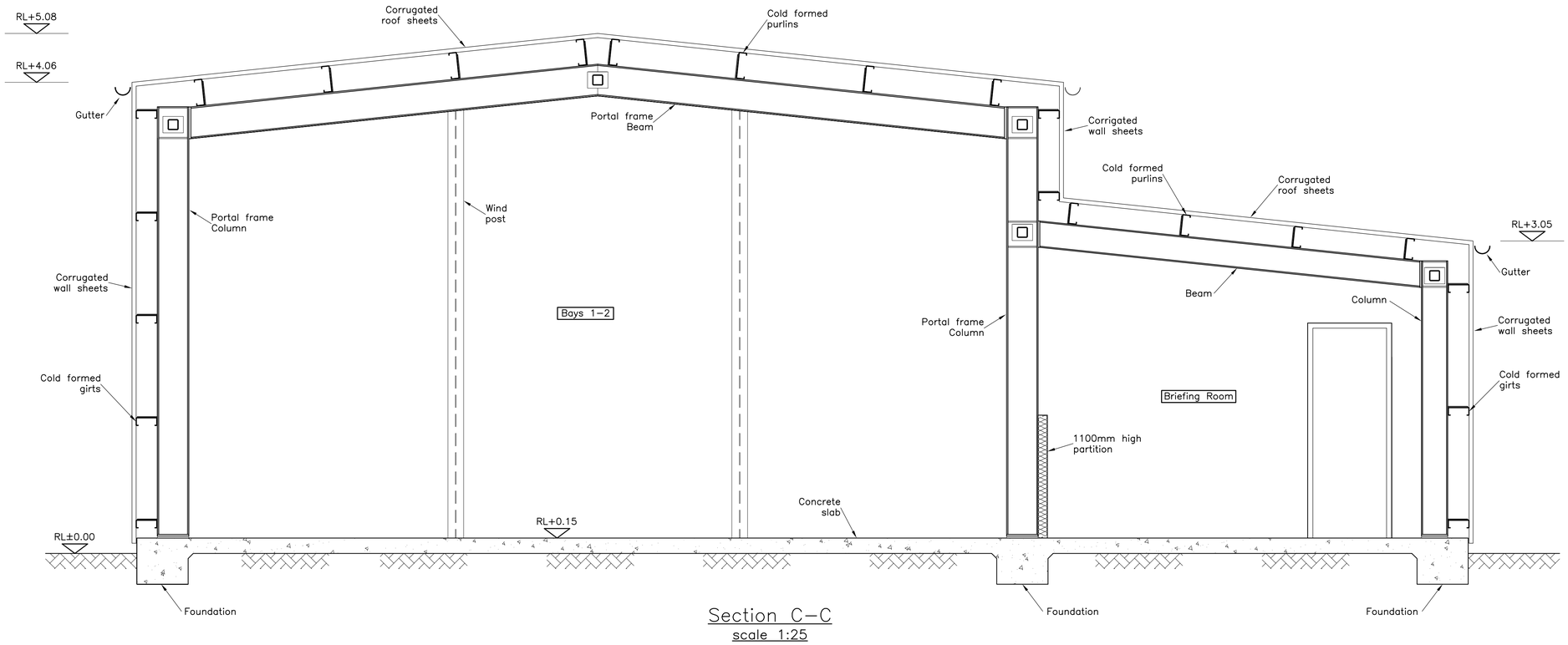
Eastern Elevation
scale 1:100



Southern Elevation
scale 1:100



Northern Elevation
scale 1:100



Section C–C
scale 1:25

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

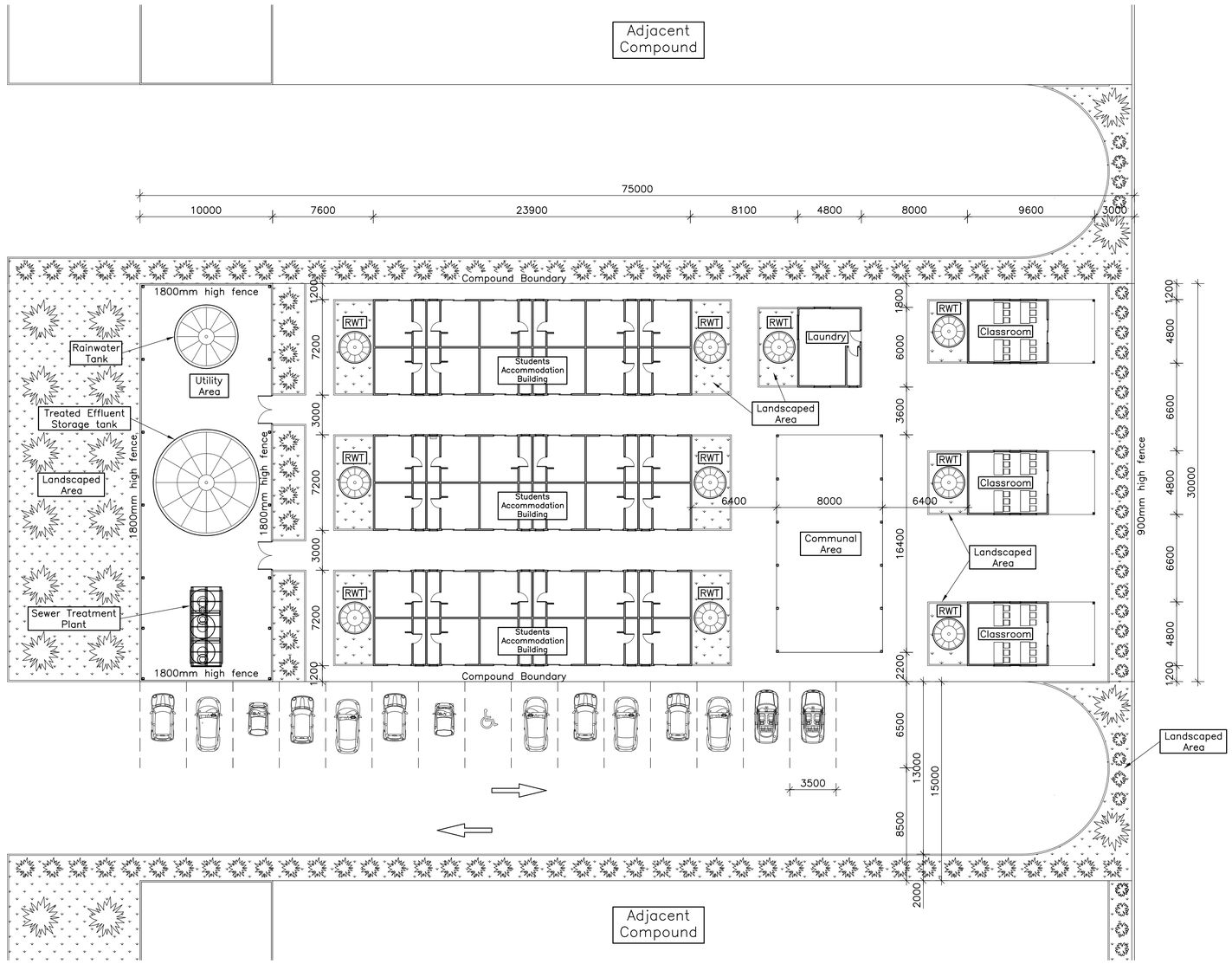
Title

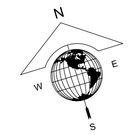
Hangars
Section and Elevations

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100,1:25

Sheet No.	Rev
S518–12	.

Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC





General Notes:

1. For detailed structure design refer to following drawings:
   – Drawings 518/14, 518/15 for Students Accommodation Building
   – Drawings 518/16 for Laundry
   – Drawings 518/17 for Class Room
   – Drawings 518/18 for Canopy Over Utility Area
   – Drawings 518/19 for Communal Area

2. This drawing to be read in conjunction with all relevant Architects, Engineers & Specialist drawings, sketches and specifications.

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION
A	05.04.18	LANDSCAPED AREA ADDED

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

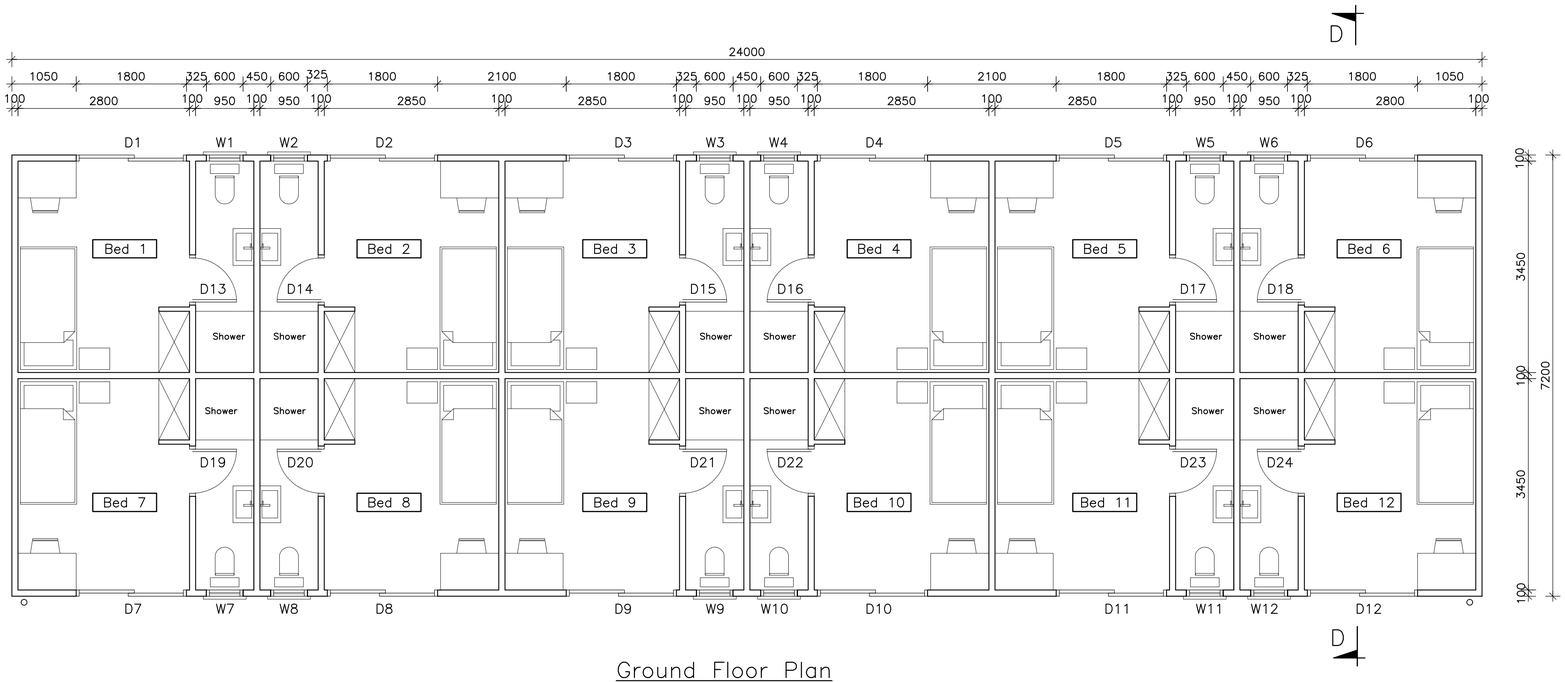
Title

Squadron Compound
Ground Floor Plan

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:200

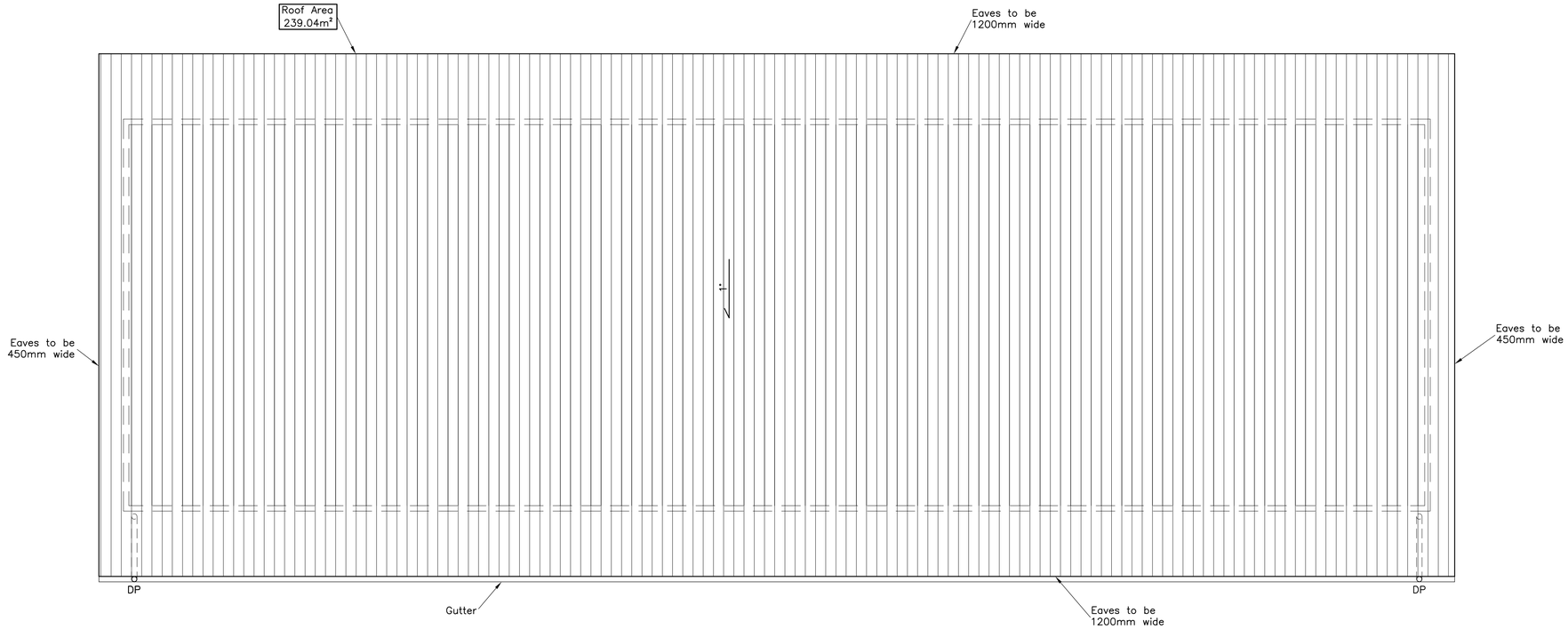
Sheet No.	Rev
S518–13	A

Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



Ground Floor Plan
scale 1:50

Window and Door Schedule			
Name	Description	Height	Width
W1	Window	600	600
W2	Window	600	600
W3	Window	600	600
W4	Window	600	600
W5	Window	600	600
W6	Window	600	600
W7	Window	600	600
W8	Window	600	600
W9	Window	600	600
W10	Window	600	600
W11	Window	600	600
W12	Window	600	600
D1	External Door	2100	1800
D2	External Door	2100	1800
D3	External Door	2100	1800
D4	External Door	2100	1800
D5	External Door	2100	1800
D6	External Door	2100	1800
D7	External Door	2100	1800
D8	External Door	2100	1800
D9	External Door	2100	1800
D10	External Door	2100	1800
D11	External Door	2100	1800
D12	External Door	2100	1800
D13	Internal Door	2100	820
D14	Internal Door	2100	820
D15	Internal Door	2100	820
D16	Internal Door	2100	820
D17	Internal Door	2100	820
D18	Internal Door	2100	820
D19	Internal Door	2100	820
D20	Internal Door	2100	820
D21	Internal Door	2100	820
D22	Internal Door	2100	820
D23	Internal Door	2100	820
D24	Internal Door	2100	820



Roof Plan
scale 1:50

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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

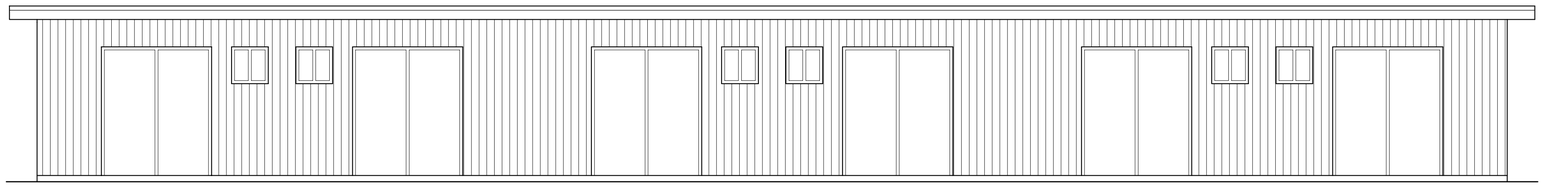
Title

Students Accommodation Building
Ground Floor Plan
and Roof Plan

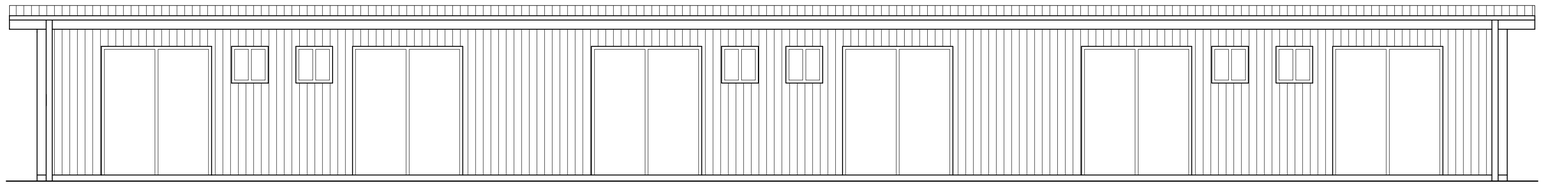
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:50

Sheet No.	Rev
S518–14	.

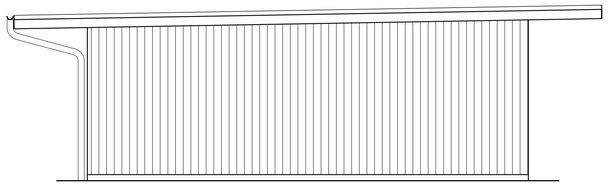
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



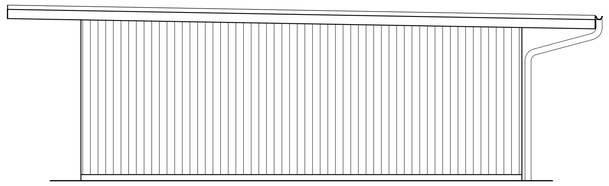
Northern Elevation
scale 1:50



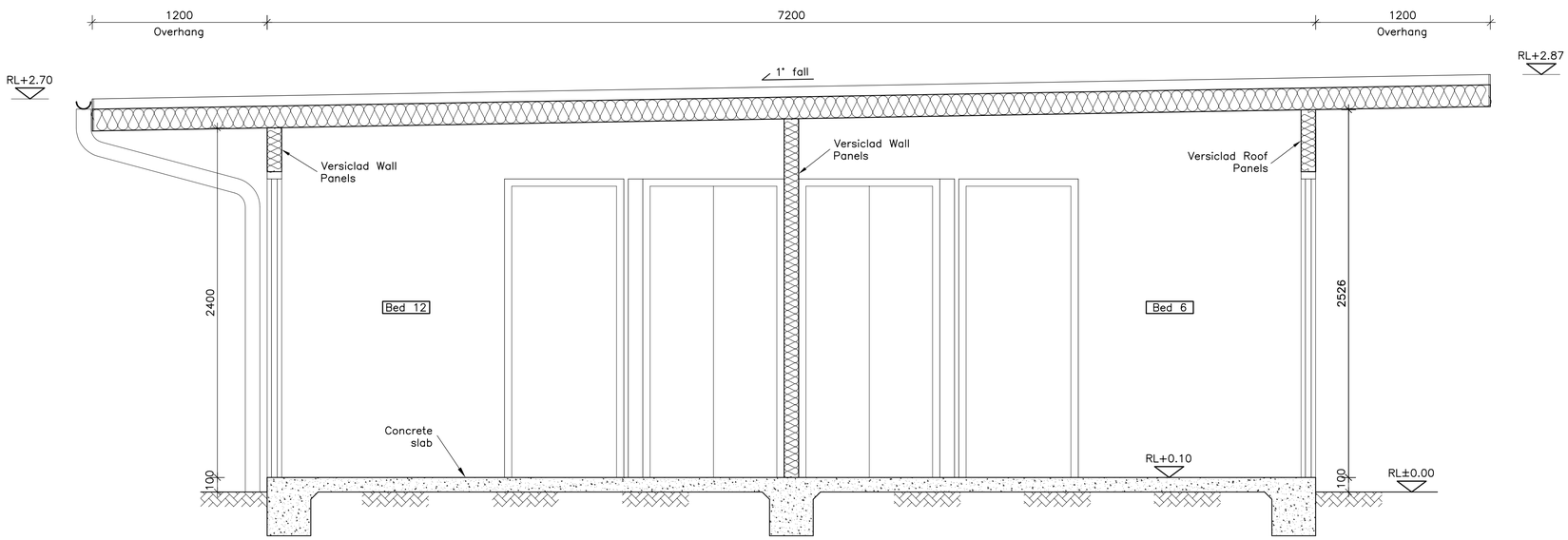
Southern Elevation
scale 1:50



Eastern Elevation
scale 1:50



Western Elevation
scale 1:50



Section D–D
scale 1:20

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Students Accommodation Building
Section and Elevations

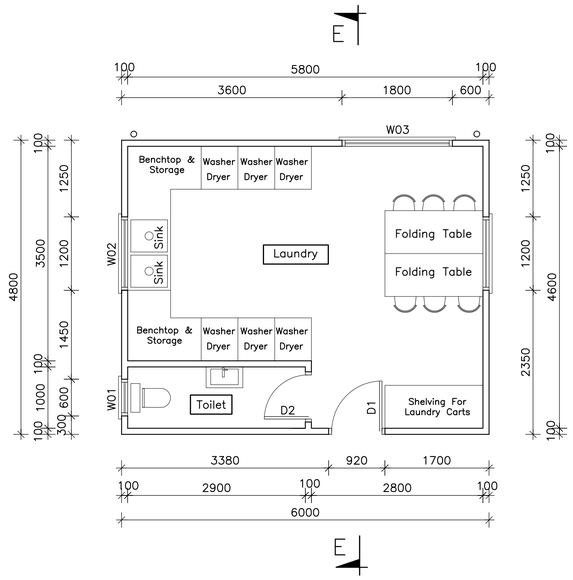
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:50;1:20

Sheet No.	Rev
S518–15	.

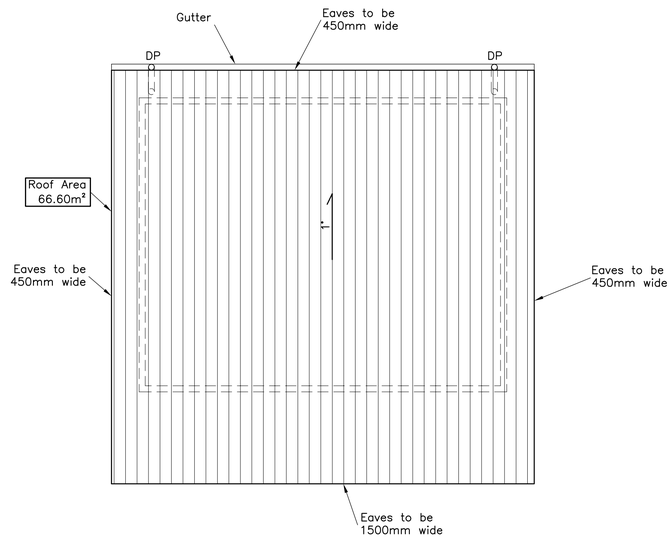
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC

Window and Door Schedule			
Name	Description	Height	Width
W1	Sliding	600	600
W2	Sliding	1100	1200
W3	Sliding	1100	1800
W4	Sliding	1100	1200
D1	External Door	2100	920
D2	Internal Door	2100	820

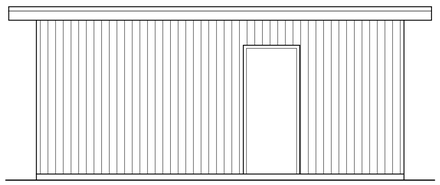
Laundry Equipment:
- Front load Washer x 6 (lower level)
- Dryer x 6 (upper level)
- Shelving
- Folding Tables x 2
- Laundry Carts x 6
- Laundry Sink x 2



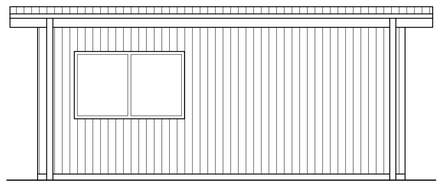
Ground Floor Plan
scale 1:50



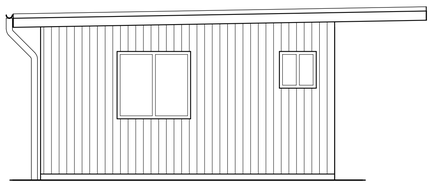
Roof Plan
scale 1:50



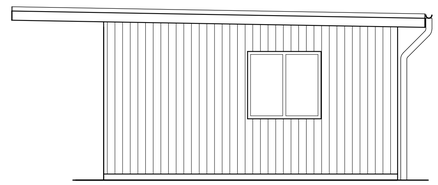
Eastern Elevation
scale 1:50



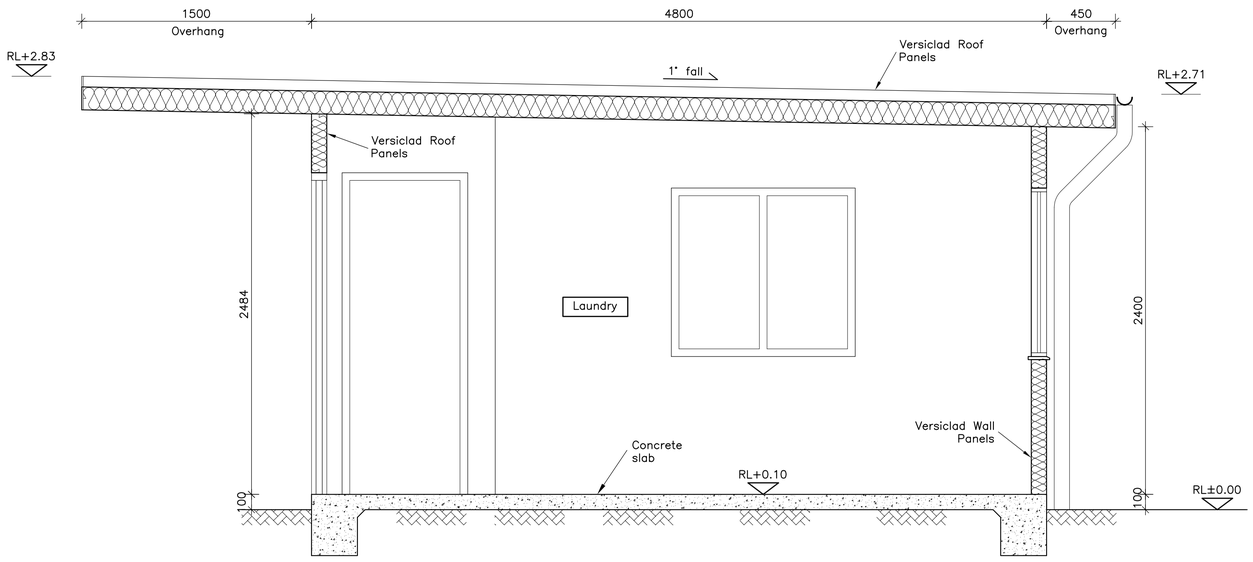
Western Elevation
scale 1:50



Southern Elevation
scale 1:50



Northern Elevation
scale 1:50



Section E–E
scale 1:20

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Laundry
Plans, Section and Elevations

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:50,1:20

Sheet No. S518–16

Rev .

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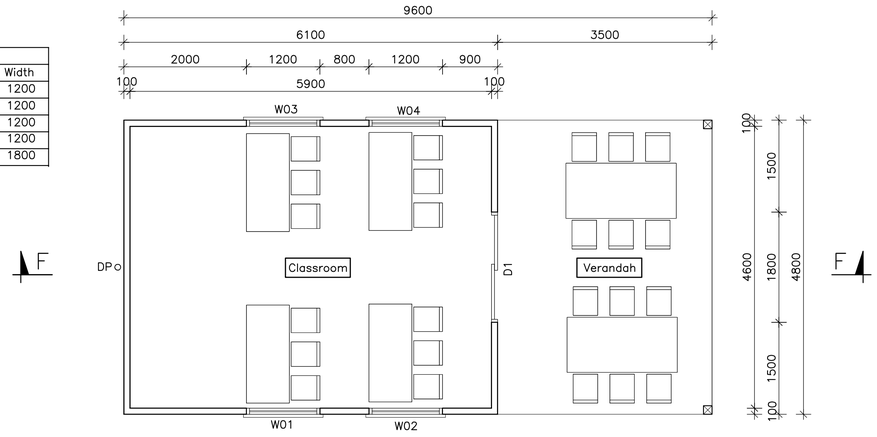
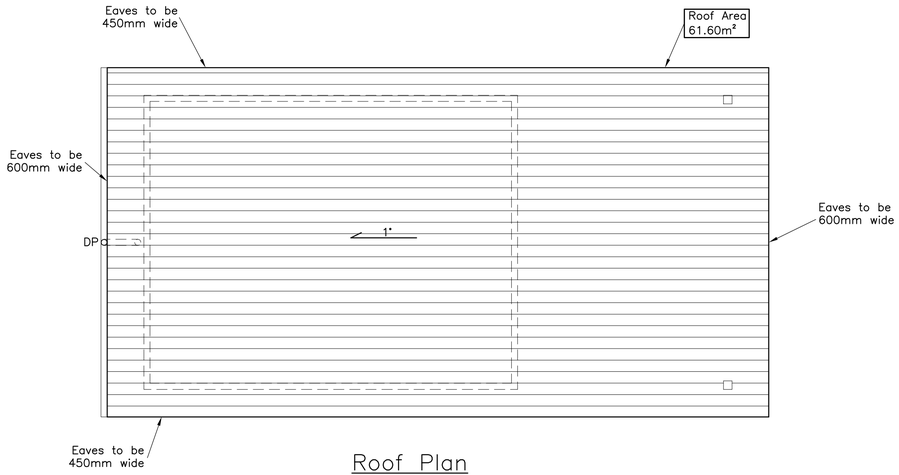
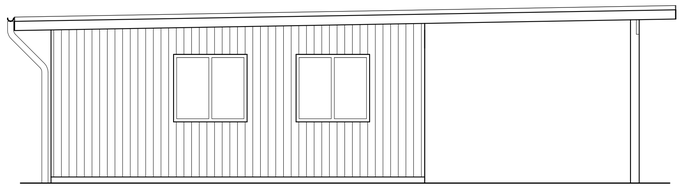
Window and Door Schedule			
Name	Description	Height	Width
W1	Window	1100	1200
W2	Window	1100	1200
W3	Window	1100	1200
W4	Window	1100	1200
D1	External Door	2100	1800



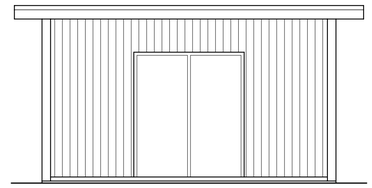
Ground Floor Plan
scale 1:50



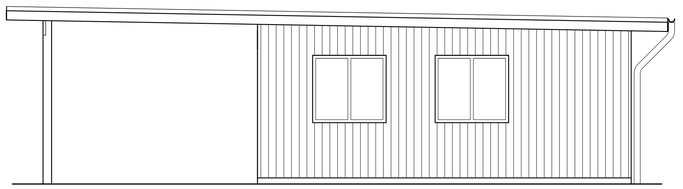
Roof Plan
scale 1:50



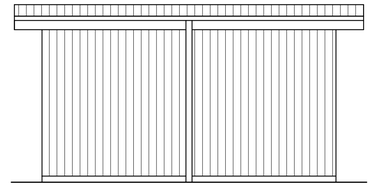
Southern Elevation
scale 1:50



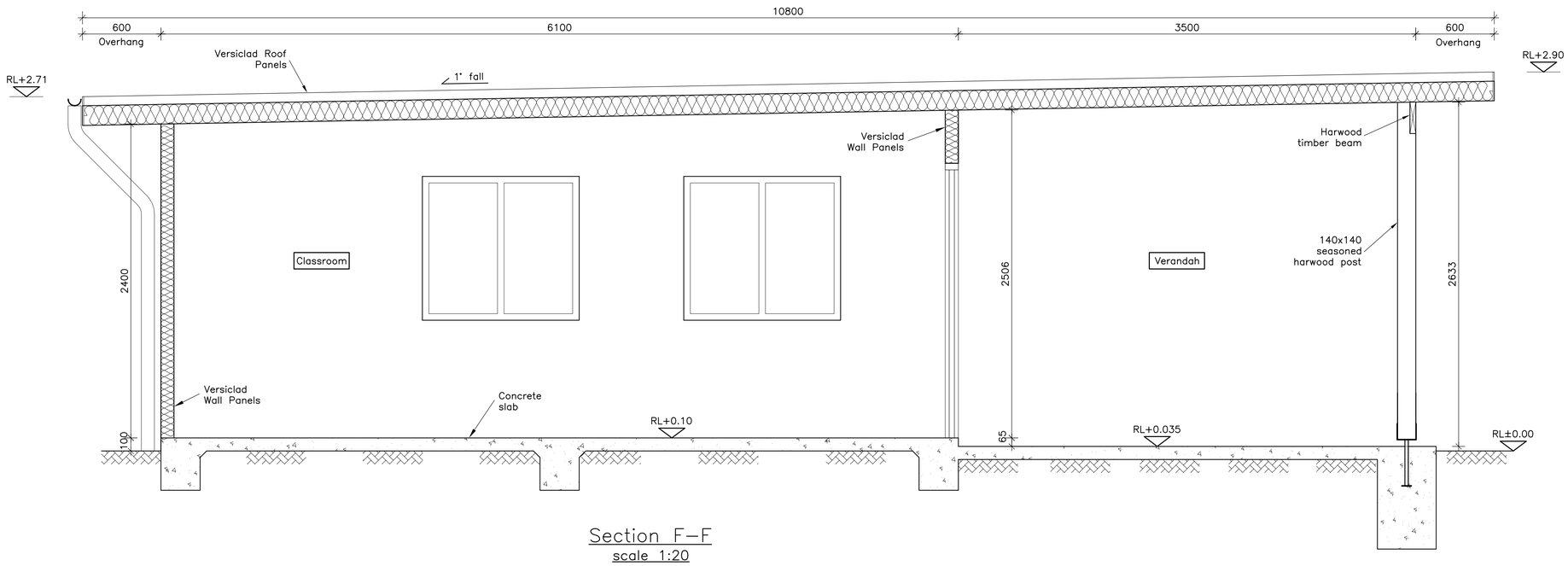
Eastern Elevation
scale 1:50



Northern Elevation
scale 1:50



Western Elevation
scale 1:50



Section F–F
scale 1:20

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

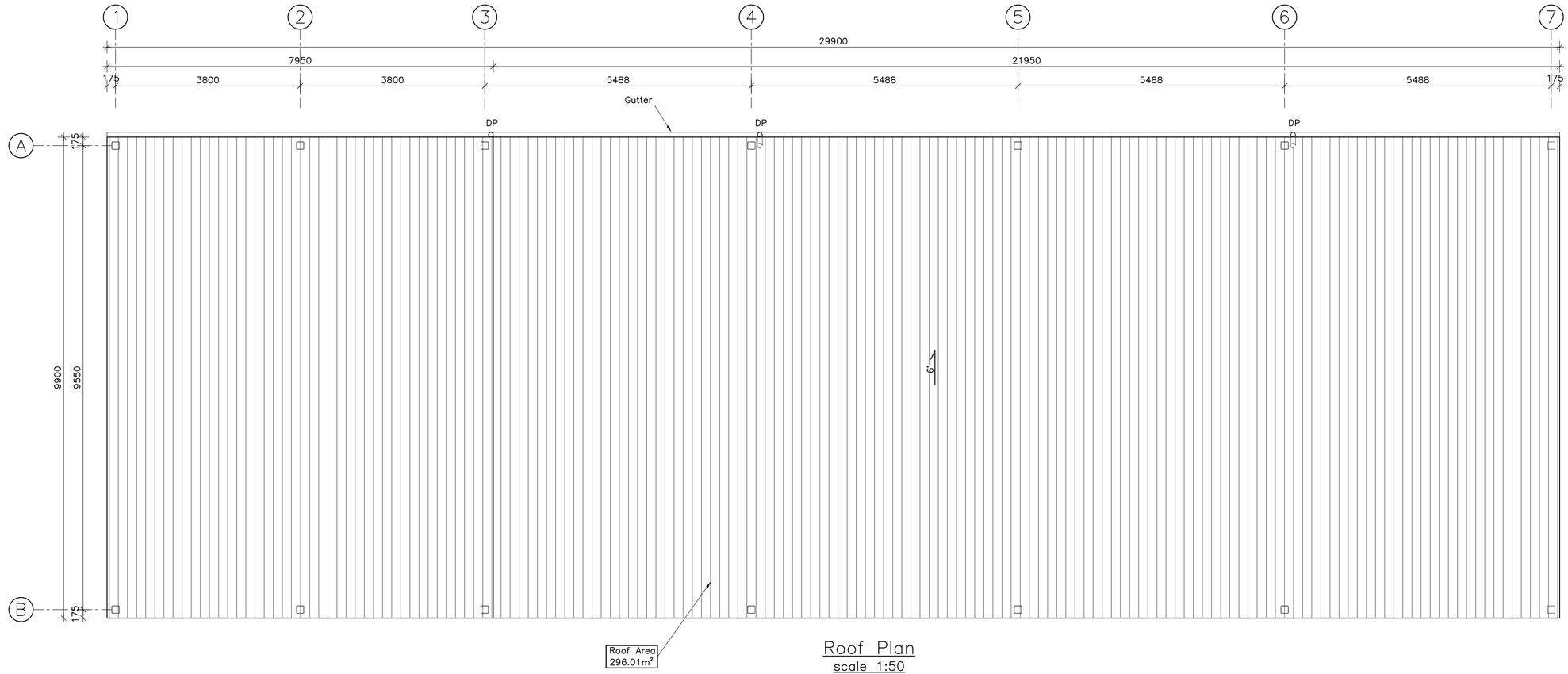
Classroom
Plans, Section and Elevations

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:50,1:20

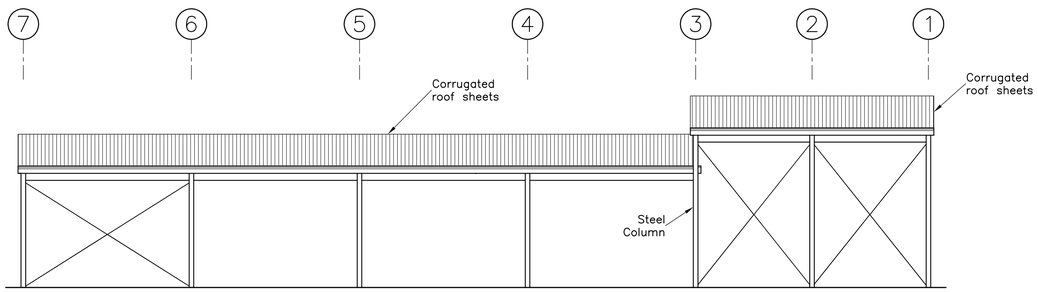
Sheet No. S518–17

Rev .

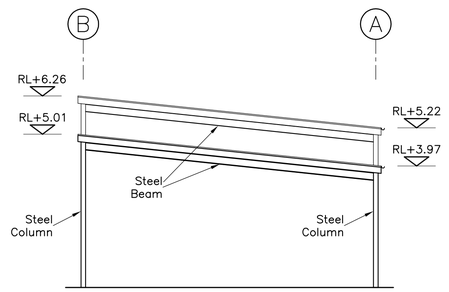
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



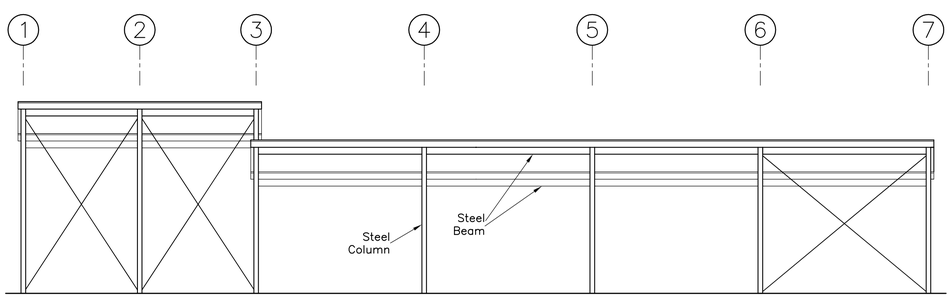
Roof Plan
scale 1:50



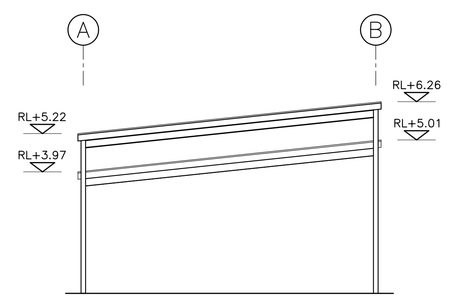
Western Elevation
scale 1:100



Northern Elevation
scale 1:100



Eastern Elevation
scale 1:100



Southern Elevation
scale 1:100

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

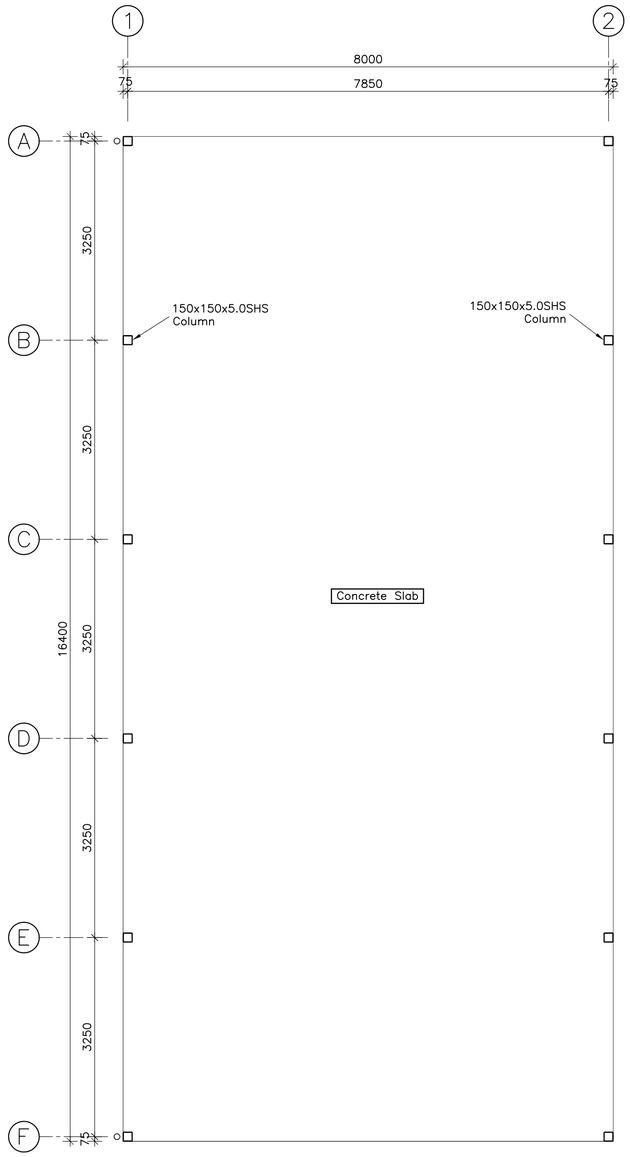
Title

Canopy Over Utility Area
Roof Plan and Elevations

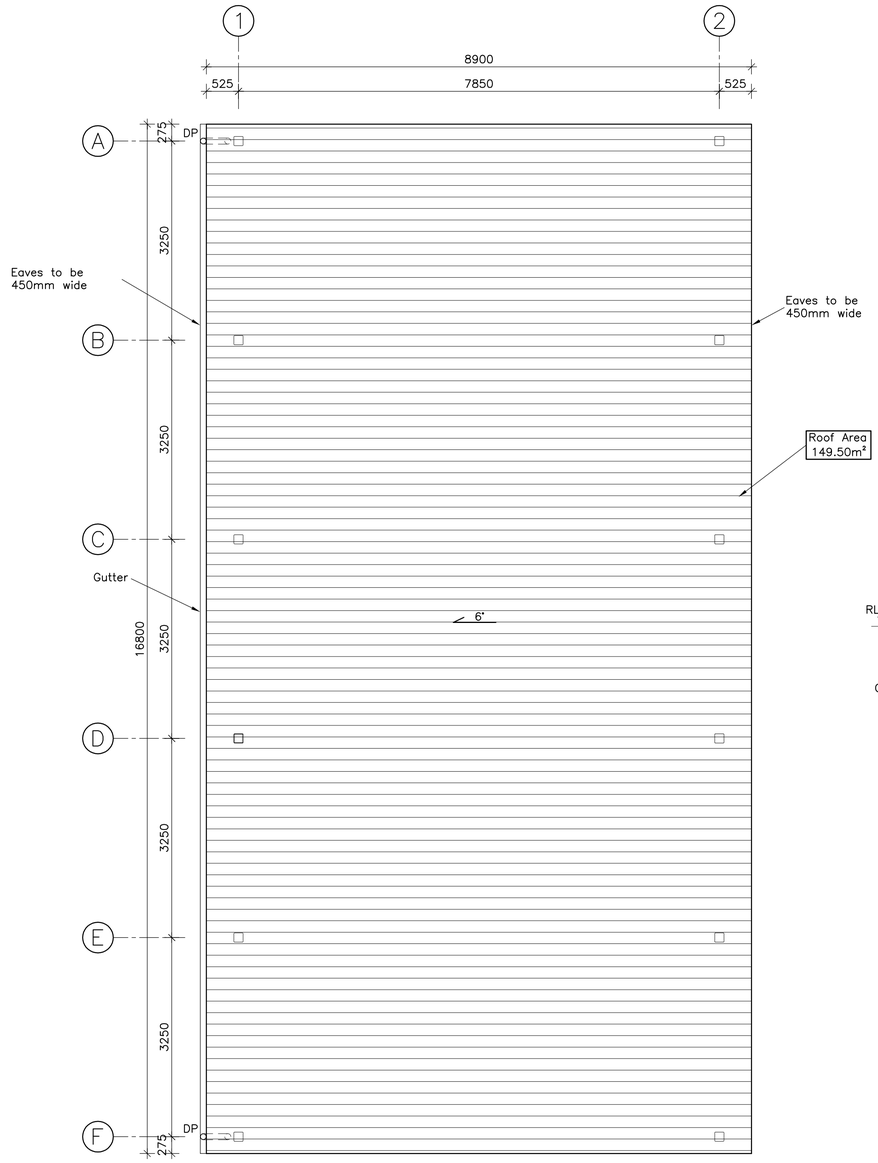
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100,1:50

Sheet No.	Rev
S518–18	.

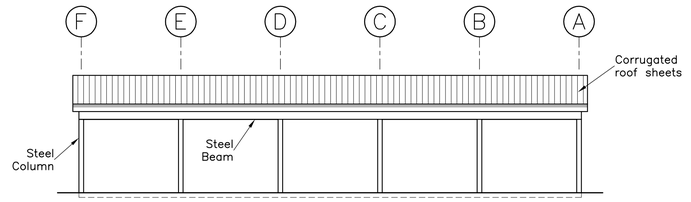
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



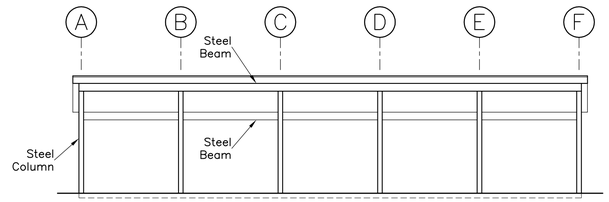
Ground Floor Plan
scale 1:50



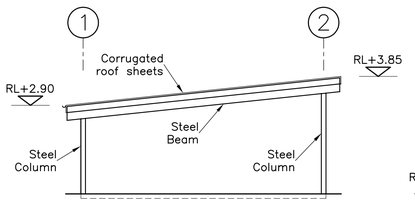
Roof Plan
scale 1:50



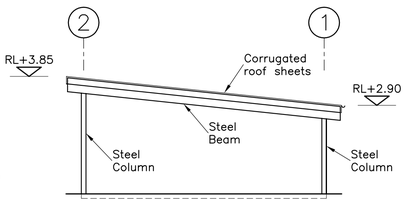
Western Elevation
scale 1:100



Eastern Elevation
scale 1:100



Southern Elevation
scale 1:100



Northern Elevation
scale 1:100

Rev	Date	Comment
.	16.10.17	ISSUED FOR DA SUBMISSION

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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

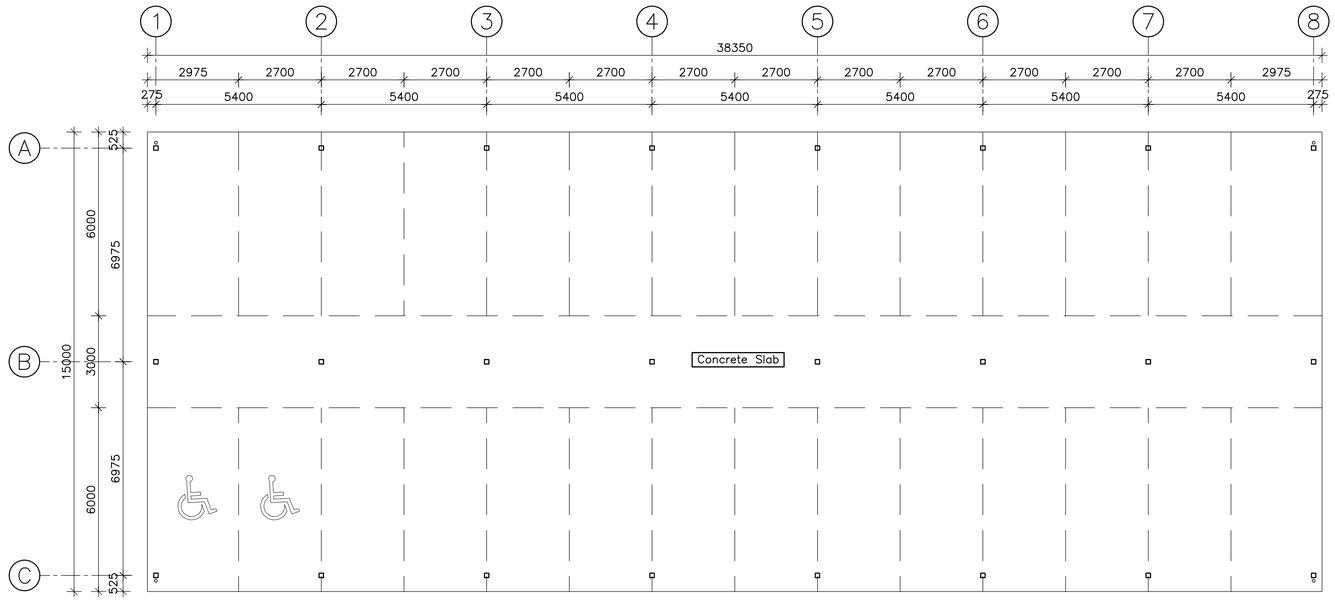
Title

Communal Area
Plans and Elevations

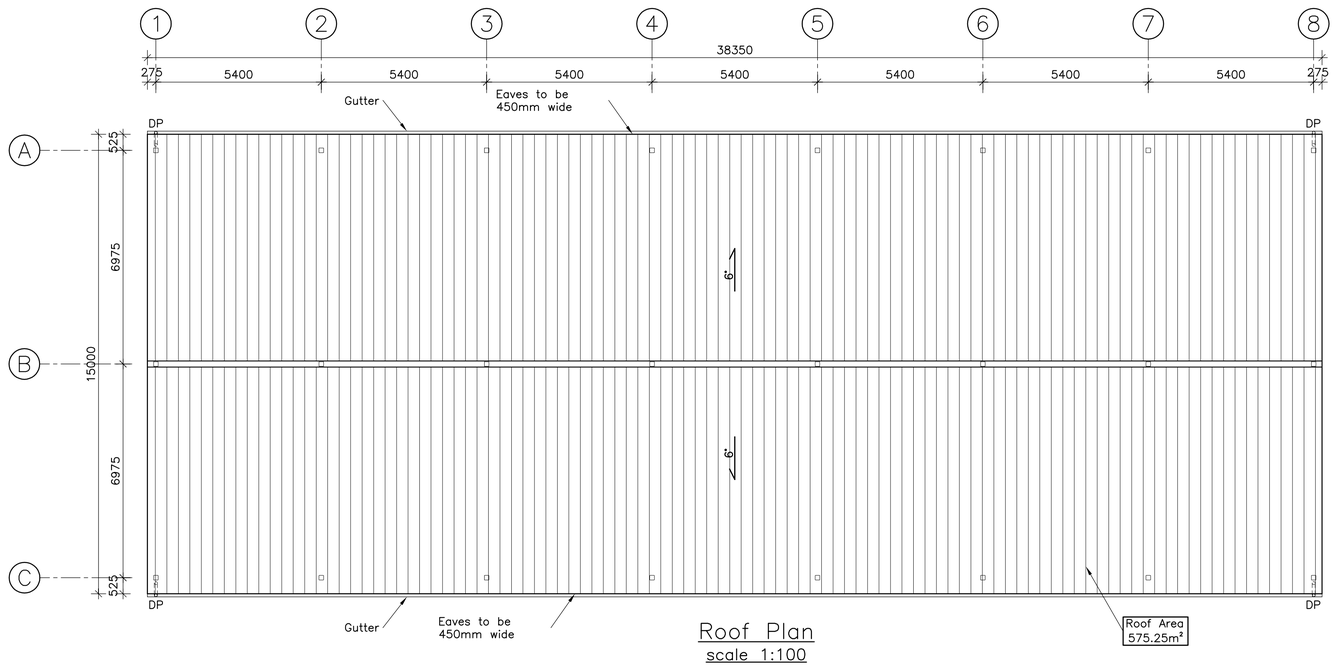
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100,1:50

Sheet No.	Rev
S518–19	.

Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



Carpark Plan
scale 1:100



Roof Plan
scale 1:100

Rev	Date	Comment
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Project

Establishment of Recreational
Flight School
Frogs Hollow, 2550, NSW

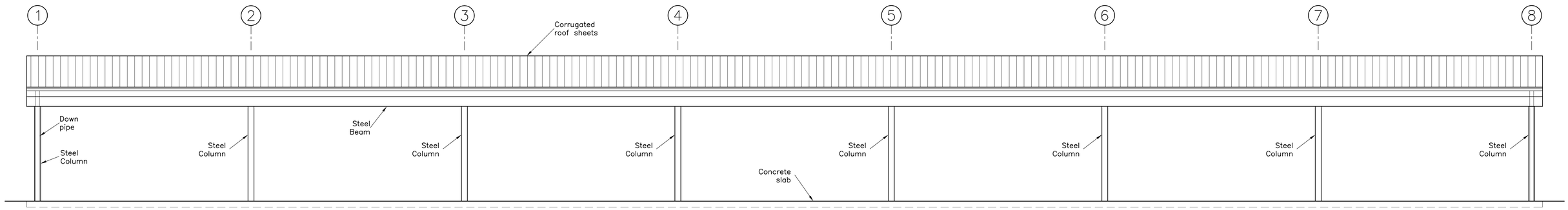
Title

Carpark
Ground Floor Plan
and Roof Plan

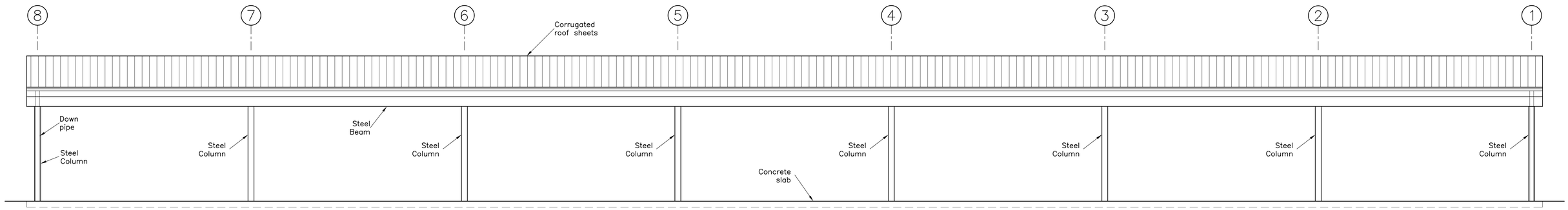
Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:100

Sheet No.	Rev
S518–20	.

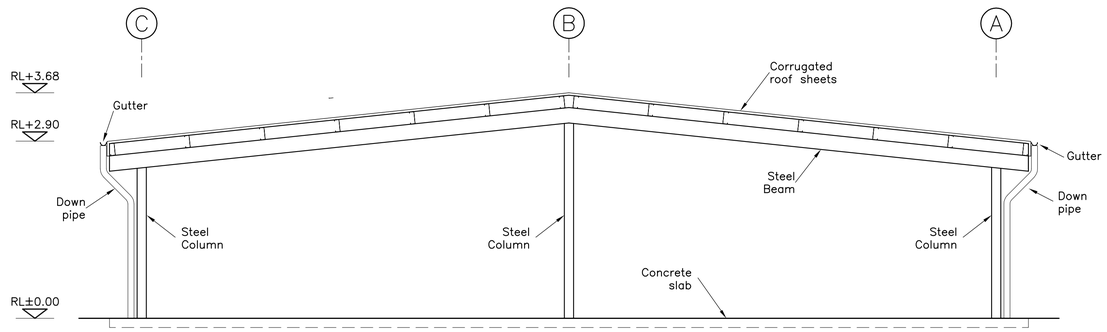
Cad File: \Network\Tasman Files\S518_Frogs Hollows_SAFC



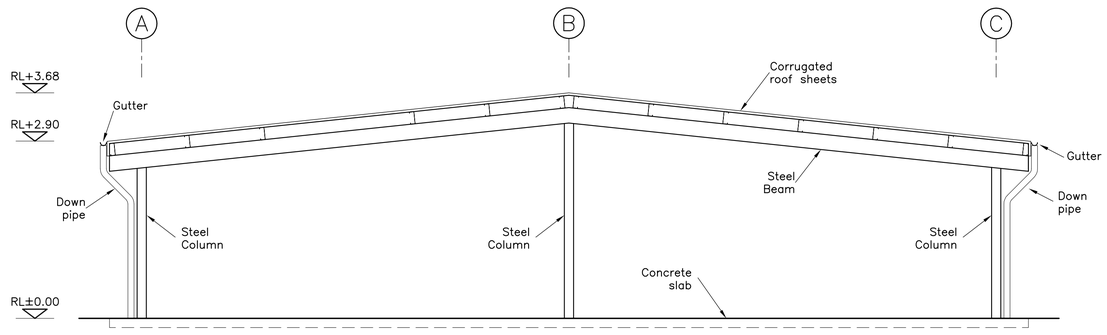
Eastern Elevation
scale 1:50



Western Elevation
scale 1:50



Northern Elevation
scale 1:50



Southern Elevation
scale 1:50

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Project

Establishment of Recreational Flight School
Frogs Hollow, 2550, NSW

Title

Carpark Elevations

Drawn by	Checked by	Date	Scale
AJH	AJH	Oct 2017	1:50

Sheet No.	Rev
S518-21	.

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