

Our Ref: 13S1532000

18 December 2013

Cubelic Holdings Pty Ltd  
 20 Bonnefin Road  
 HUNTERS HILL NSW 2110

**Attention: Mr. Paul Cubelic**

Dear Paul

## **RE: FERNHILL ESTATE CENTRAL PRECINCT - TRAFFIC AND PARKING ASSESSMENT**

Cubelic Holdings engaged GTA Consultants to provide transport advice as it relates to the Fernhill Central Precinct Masterplan, located on Mulgoa Road, Mulgoa. This relates in particular to an assessment of proposed special event uses and recommendations for site access treatments and the requirement for mitigating measures.

Fernhill Estate is located at 1041 Mulgoa Road, Mulgoa, approximately 1.5 kilometres north of Mulgoa Township and 10 kilometres south of Penrith. Mulgoa Road travels in a north-south direction along the eastern boundary of the site, with access provided via two separate driveways. The southern driveway forms the main site access, with the northern driveway considered a secondary access and is generally referred to as the 'tradesman's' access.

The main southern access is shown in Figure 1 and provides a wide apron and manoeuvring capacity. The tradesman's access is shown in Figure 2 and presents a more constrained area with restricted sight distances in each direction.

**Figure 1: Main Southern Access**

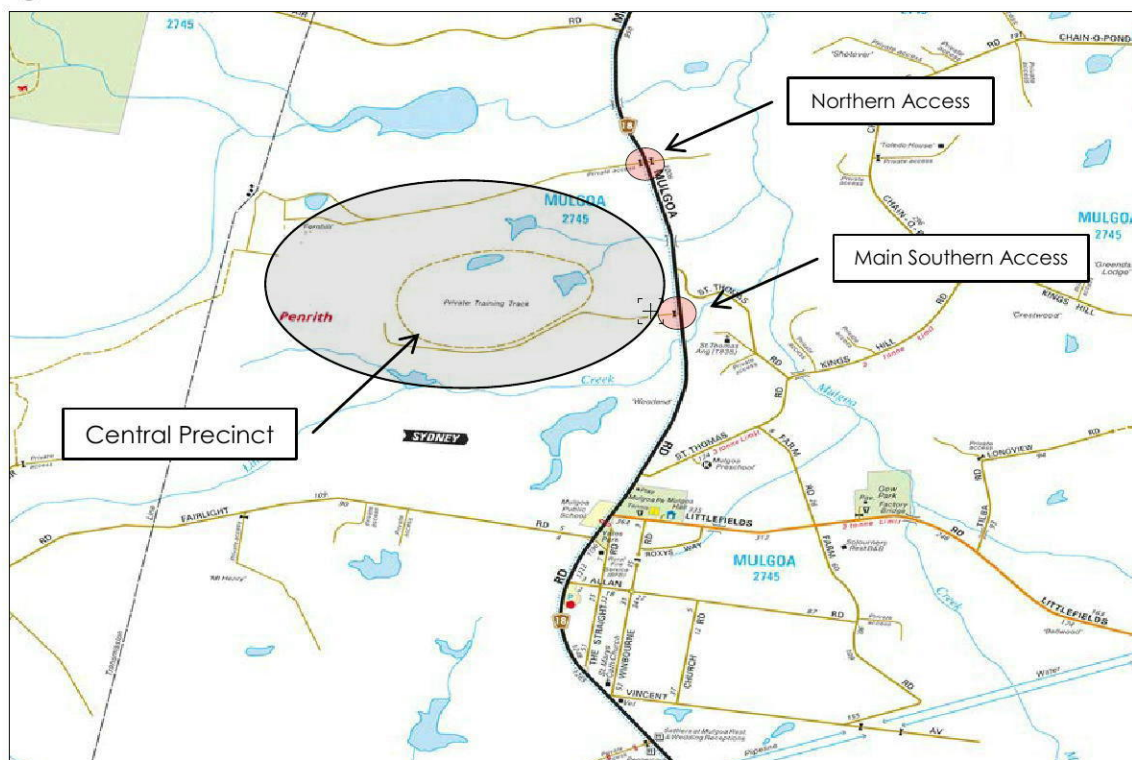


**Figure 2: Secondary Northern Access**



It is understood that as part of the broader Fernhill Working Heritage Masterplan, Fernhill Estate is proposed to be developed in three precincts; comprising the Eastern, Western and Central Precincts. The Central Precinct, shown in Figure 3, occupies the majority of the site fronting Mulgoa Road and includes the main house, farm buildings, hayshed, horse racetrack and a number of large paddocks. The two access driveways bisect the central precinct.

Figure 3: Fernhill Estate Central Precinct



It is also noted that the Eastern Precinct is proposing to provide 54 Torrens title residential subdivided lots, with access proposed via two intersections with Mulgoa Road in the vicinity of St Thomas Road (south). The northern intersection will be located approximately 450 metres south of the main southern access with each having no impact on the other.

The Central Precinct Masterplan proposes to use existing and temporary structures on Fernhill Estate to host the following activities:

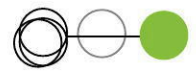
- events
- functions
- Equestrian Centre comprising agistment, riding training and riding events
- sporting activities
- outdoor entertainment
- camping
- markets (ancillary to the above uses).

An outline of the Central Precinct site access and internal roads is included in Attachment 1.

In line with the above, Fernhill Estate has already hosted two large special events. These include the recent Picnic Race Day held on Saturday 9 November 2013 and the Tough Mudder athletic endurance event in April 2013. Both events were considered a success with the Tough Mudder event being the larger of the two.

This special event attracted approximately 15,000 participants and spectators over a two day weekend. A Special Event Traffic Management Plan and associated overview Traffic Control Plans was developed by GTA Consultants and included both external and internal traffic and parking management procedures.





The event proved to be well organised, with traffic managed and controlled both on approach and departure and in combination with effective on-site parking arrangements. Key stakeholders, including RMS, Council and particularly the Police were generally impressed with the outcomes with no known local resident/ community complaints.

## Site Access Provision

GTA Consultants has reviewed the existing Mulgoa Road access driveways, together with an assessment of their suitability with respect to safety and efficiency during such special events. This assessment includes discussion of traffic volumes associated with various events, sight distances and intersection geometry.

The suitability of a possible alternative access driveway, to be located approximately 75-80 metres south of the secondary (northern) access has also been assessed. The intention of this alternative access is to improve accessibility during special events, provide direct and efficient access to on-site parking facilities for a range of differing events and has been designed to accommodate the majority of site generated traffic. A dedicated right turn bay would also allow full turning movements. This access would also be under traffic control during larger events.

A concept layout of the alternative access driveway and the right turn bay is included as Attachment 2 with further discussion below.

## Sight Distances

Austroroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections sets out the Approach Sight Distance (ASD) requirements for intersections. ASD is the desirable extent of sight distance for major roads to ensure that drivers are aware of the layout and associated linemarking within the upstream intersection. The ASD requirement for both access driveways on approach along Mulgoa Road is approximately 40 metres, measured from the driver's eye height (1.1 metres) to the pavement level at the centre of the intersection.

The minimum sight distance required for a major road on approach to an intersection is defined by Safe Intersection Sight Distance (SISD). The SISD requirement for Mulgoa Road at the main access driveway is 195 metres, 171 metres for the secondary access driveway and 175 metres for the alternative access driveway. This is measured from the driver's eye height (1.1 metres) to the top of a car (1.25 metres) approaching on the major road or stopped at the intersection of the side road and is based on the existing posted 80km/h speed zone.

The variation in the SISD is due to the differing road geometry in the vicinity of each driveway. That is, the main access driveway is located at a low point and the secondary access driveway on a crest, with the approach grades affecting the stopping distance of vehicles.

GTA Consultants historical knowledge of the site and surrounds, together with a desktop assessment have been used to determine approximate sight distances at each location, as set out in Table 1 and illustrated in Figure 4 to Figure 9.

**Table 1: Sight Distance Measurements**

Driveway Location	On approach to Mulgoa Road	Mulgoa Road Northern Approach	Mulgoa Road Southern Approach
Main Access (south)	More than 100m	200m	220m
Secondary Access (north)	90m	90m	200m
Alternative Access Driveway	90m	140m	180m

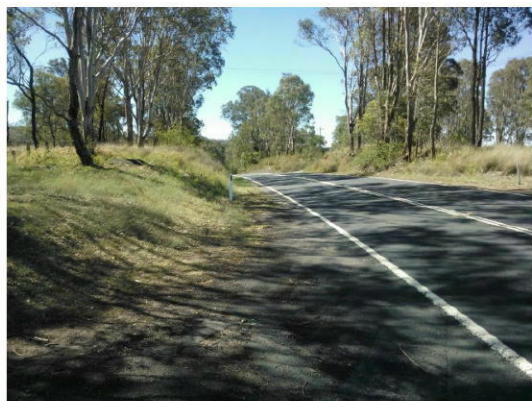
**Figure 4: Main Access Driveway (looking north)**



**Figure 5: Main Access Driveway (looking south)**



**Figure 6: Secondary Access Driveway (looking north)**



**Figure 7: Secondary Access Driveway (looking south)**





**Figure 8: Alternative Access Driveway (looking north)**



**Figure 9: Alternative Access Driveway (looking south)**



As shown above, a crest in Mulgoa road is located approximately 110 metres north of the secondary driveway access. This restricts the sight distance to less than what is required under Austroads Guidelines. The alternative access driveway meets the requirements to the south though is also constrained to the north as a result of the crest. The main access driveway meets the minimum ASD and SISD requirements as set out in the Austroads Guidelines.

### Speed Zone

It is noted that the speed limit on Mulgoa Road along the frontage of the site is proposed to be reduced from 80km/h to 60km/hr. These future special event uses and greater traffic activity associated with the Eastern Precinct residential subdivision would strengthen the justification for this proposal.

This would involve extending the existing 60km/h speed limit currently present in Mulgoa township further north to end at Mayfair Road, approximately 620 metres north of the site's northern boundary. This would ensure that the secondary access and the proposed alternative access driveway would also be within a lower speed environment with corresponding road safety benefits for all users.

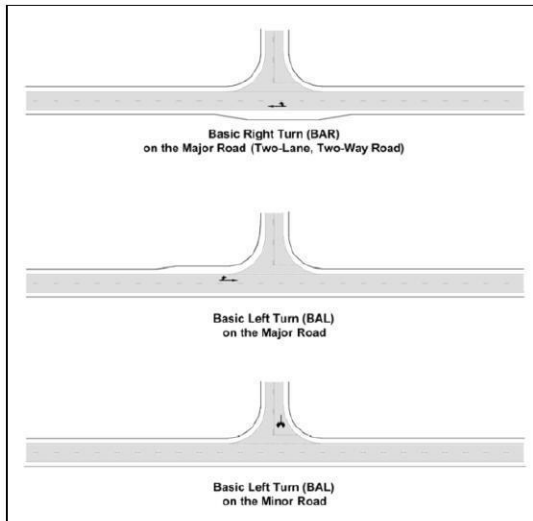
Although there are obvious safety benefits, the SISD requirement for the secondary access driveway would be 117 metres and 120m for the alternative access driveway. Based on this, the sight distance measurements for the alternative access driveway as detailed in Table 1 are in excess of the requirements detailed in the Austroads Guidelines for safe turning movements.

### Intersection Treatments

The Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections outline standard intersection treatments and warrants for urban and rural roads. The three basic road turn treatments are as follows and illustrated in Figure 10 and Figure 11.

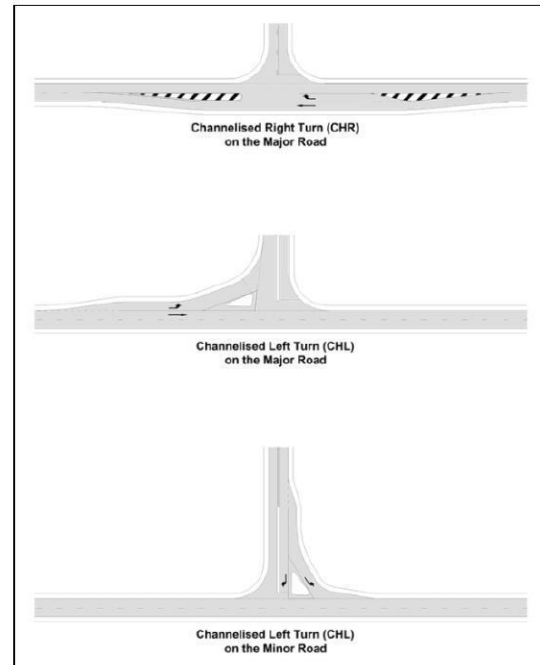
- Basic Turn Treatments [BA]
- Channelised Turn Treatment Short [CH(s)]
- Channelised Turn Treatment [CH].

Figure 10: Basic Turn Treatments (BA)



Source: Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, Figure 4.1

Figure 11: Channelised Turn Treatment (CH)

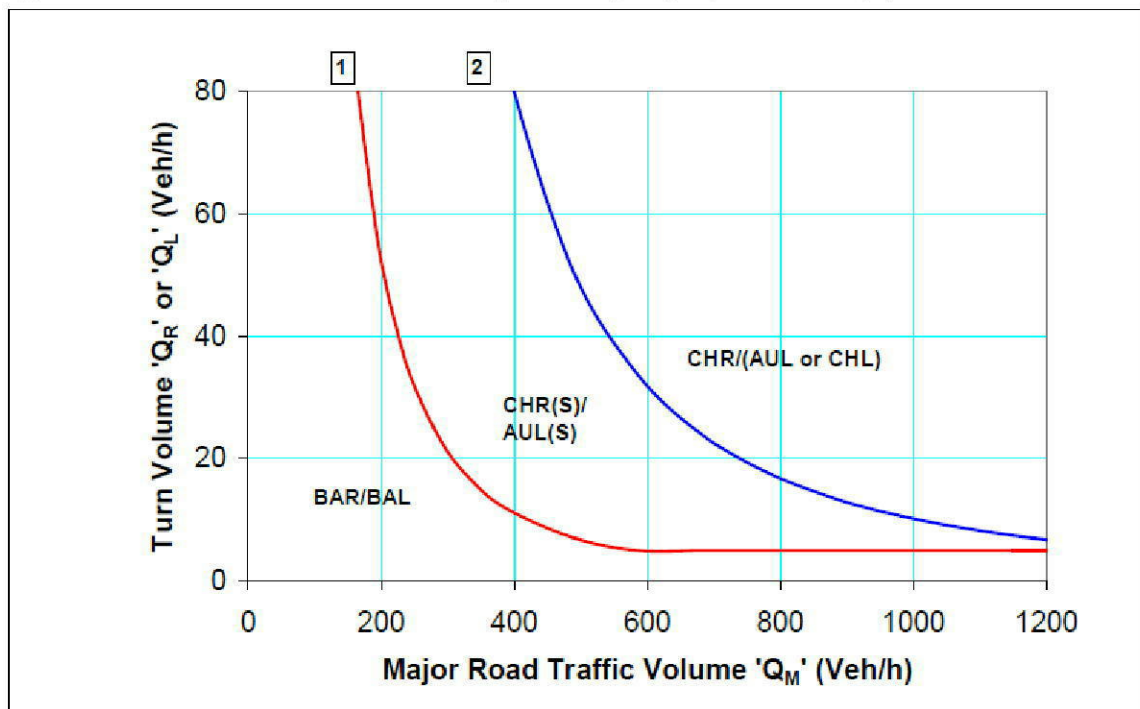


Source: Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, Figure 4.7

The current layouts at both access driveways provide basic turn treatments for the left turn in and out of each driveway, however no treatment is provided for right turns into the driveways from Mulgoa Road. This means vehicles waiting to turn right into the site block southbound traffic on Mulgoa Road until they have made the turn.

Warrants for each turn treatment are based on the measured safety performance of each treatment and a cost benefit ratio whereby the benefits of providing a higher level treatment are made equal to a proportion of the additional construction costs. The warrants are based on a ratio of through traffic volumes and turning vehicle volumes and are illustrated in Figure 12.

Figure 12: Warrants for Turn Treatments on Major Roads (Design Speed <100km/h)



Source: Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, Figure 4.9

Roads and Maritime Services (RMS) traffic data for Mulgoa Road indicate an average peak hour volume of up to 800 vehicles. Reviewing Figure 12 with reference to the peak hour traffic volumes determines a range for an appropriate turn treatment based on increasing right turning volumes, as follows:

- 0 – 5 right turning vehicles per hour - Basic Right Turn Treatment
- 6 – 23 right turning vehicles per hour - Channelised Turn Treatment Short
- 23+ right turning vehicles per hour - Channelised Turn Treatment.

Based on the above assessment, more than 5 vehicles per hour turning right into the site on a regular/ semi-regular basis would trigger a requirement for the installation of a channelised right turn treatment.

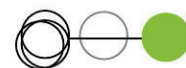
The safety requirements for this treatment are discussed in further detail below.

## Traffic Assessment

Due to the variable size of the proposed special events, an assessment of the traffic volumes and broader intersection operation implications has been completed as part of this assessment.

The directional distribution and assignment of traffic generated by the proposed events will be influenced by a number of factors, including the locations of main arterial roads, GPS navigation and scale of event. For the purposes of estimating vehicle movements, it has been assumed that the arrival profile will be split 60:40 north: south.





Given that small and medium size events are likely to have pre-determined and specific start and finish times, this assessment is based on the assumption that all guests will arrive and depart in the hour before and after such times.

GTA Consultants has completed modelling using SIDRA INTERSECTION 5.1 to gain an accurate understanding of the site access arrangements and triggers for treatment works. Several assumptions and parameters have been made and include the following:

- Mulgoa Road under 60km/h speed zones
- Mulgoa Road traffic volumes of 400 vehicles per hour in each direction<sup>1</sup>
- all guests arrive during the hour period immediately before the event start time
- average vehicle occupancy of 2.5 people for each event (Tough Mudder is 2.7 to 2.8 people per vehicle)
- 60:40 north: south arrival profile
- 110 metre long right turn bay on Mulgoa Road at the alternative access driveway.

The detailed outputs have been included in Attachment 3 with Table 2 providing an overview. The treatment works are generally required as a result of the safety implications for Mulgoa Road, particularly the sight distances and the need to maintain safety.

**Table 2: Alternative Access Driveway – Operation and Treatment**

Event Type	# of Guests	# of Vehicles	Queue Length		Channelised Right Turn	External Traffic Management
			Cars	Metres		
Mulgoa Road 60km/h						
Small	300	150	4	24	No	No
Medium	2500	1000	16	108	Yes	No
Large	2500+	-	-	-	Yes	Yes

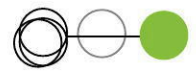
Assuming Mulgoa Road is under a 60km/h speed zone, a Channelised Right Turn treatment at the alternative access driveway would be required for any event larger than a small event (more than 300 guests) with external traffic management required for any large event (more than 2,500 guests). Fernhill Estate remains committed to providing such an intersection treatment to accommodate such events and maintain Mulgoa Road safety.

A concept layout to accommodate a channelised right turn treatment at the alternative access driveway is included as Attachment 2. This design is for discussion purposes only and makes no adjustment for existing services, drainage culverts and batters. The design is based on the requirements as specified in Austroads Guide to Road Design (Part 4A: Unsignalised and Signalised Intersections).

Consultation with Penrith City Council and RMS confirms that such an access arrangement is the preferred approach and will appropriately deal with future site access demands during event times. This also addresses Council and community concerns relating to safety and impacts on the surrounding local road network.

<sup>1</sup> Based on an annual traffic growth rate of 1% applied to RMS AADT data from 2005 and assuming a peak to daily ratio of 10% (peak hour traffic representing 10% of the daily traffic).





It is expected that a detailed design will be provided following stakeholder consultation and with the understanding that the turn bay is to accommodate demand associated with medium sized events, rather than large special events which will be under traffic control.

## Traffic Management Measures

### Small Events

Regular small events are proposed to be held on an ongoing basis up to twice a week. These events would typically cater for up to 300 people and could include functions/ dinners/ charity and community events. These events are anticipated to run over several hours with a defined start and finish time and are anticipated to generate approximately 100-150 vehicles.

These small events assume access via the alternative access driveway, however would not require provision of a channelised right turn bay.

### Medium Events

Medium sized special events are proposed to be held up to twice a month and likely to include local community events such as Carols by Candlelight, smaller concerts, moonlight cinema and equestrian events. These events would be up to a day in length and/ or over several competition days where guests attend repeatedly over the duration of the event.

These occasional events are split into two classifications as follows:

- Up to 2,500 guests (1-2 per month)
- 2,500 to 10,000 guests (1-2 per month)

As discussed, the alternative access driveway design and associated channelised right turn bay would allow for events up to 2,500 people (1,000 vehicles) to be held without the need for external traffic control. Traffic modelling for such events indicates that queues of right turning vehicles would not exceed the right turn storage capacity and there would be sufficient gaps in northbound traffic to allow the intersection to operate at a satisfactory level.

The installation of prominent static directional signage on approach and at the alternative access driveway would be beneficial to provide guidance to event guests. Static internal signage would also be sufficient to direct guests to the appropriate on-site location.

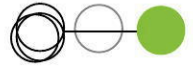
Events attracting between 2,500 and 10,000 guests would require further assessment to determine the effectiveness of the proposed access arrangements and conditioned for submission of a Traffic Management Plan, with the need for such submissions reviewed thereafter.

### Large Events

Large special events are proposed to be hosted up to six times a year and may include music concerts and race picnic days. These types of events could also cover several days and have significant set-up requirements. A maximum of 15,000 guests are anticipated at these events, potentially equating to up to 5,000 vehicles.

This is based on an average of 2.5 people per car and assumes up to 30% arrival by public transport. Dedicated staff parking has also been considered.

The inclusion of public transport services will be a key consideration during any large special event, as was the case for the recent Picnic Race Day. This may include, though not necessarily



limited to shuttle buses, coaches, limousines and taxis. Incentive programs could also promote greater public transport use and may include access to free public transport services, cheap off-site parking and package deals to include transport to/ from the site. When combined with higher priced on-site parking and discounted parking rates for cars with four or more people, this approach would ensure sustainable transport mode choice, with traffic volumes able to be managed and controlled throughout each event.

An on-site car parking and bus circulation plan has been developed and included as Attachment 1.

Large events would require the development of an event specific Special Event Traffic Management Plan (with associated Traffic Control Plans) and would include measures to manage the arrival of guests and limit the number of vehicles required to access to site. Such management practices may include the following:

- event specific event site access arrangements (including details of the intended use of each of the three site access driveways)
- external road network traffic control
- extensive external signage (combination of static signs and Visual Message Signs)
- local/ regional event notification (local papers, radio etc)
- on-site pedestrian and vehicle management
- shuttle bus loop services via Penrith Railway Station
- paid parking arrangements and free parking for higher occupant vehicles.

## GPS Navigation

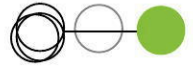
At present, there are some minor discrepancies with publicly available navigation systems when approaching Mulgoa via the M4. The primary travel routes are as follows:

- M4/ The Northern Road/ Kings Hill Road/ St Thomas Road (southern section) to Mulgoa Road
- M4/ Mulgoa Road.

It is worth noting that the Google maps switch point for the above routes is immediately north of where St Thomas Road (northern section) intersects with Mulgoa Road. This, of course, depends on the trip origin and assumes approach along the M4.

Given the need to reduce traffic related impacts on local roads in the vicinity of the site, further assessment of this detail is recommended and to be completed following further consultation with Council.

Littlefields Road has been successfully used as the primary route for the two large special events already held. It is located south of Kings Hill Road/ St Thomas Road and links The Northern Road with Mulgoa Road. It may be considered as the preferred main approach and departure route in conjunction with vehicles using Mulgoa Road to/ from the north.



I trust this provides the information you require. Naturally, should you have any questions or require any further information, please do not hesitate to contact me in our Sydney office on (02) 8448 1800.

Yours sincerely

**GTA CONSULTANTS**

**Rhys Hazell**  
**Associate**

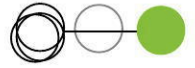
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Attachment 1: Fernhill – Central Precinct Site Analysis and Car Parking Plan

Attachment 2: Alternative Access Driveway and Channelised Right Turn– Concept Layout

Attachment 3: SIDRA INTERSECTION Results

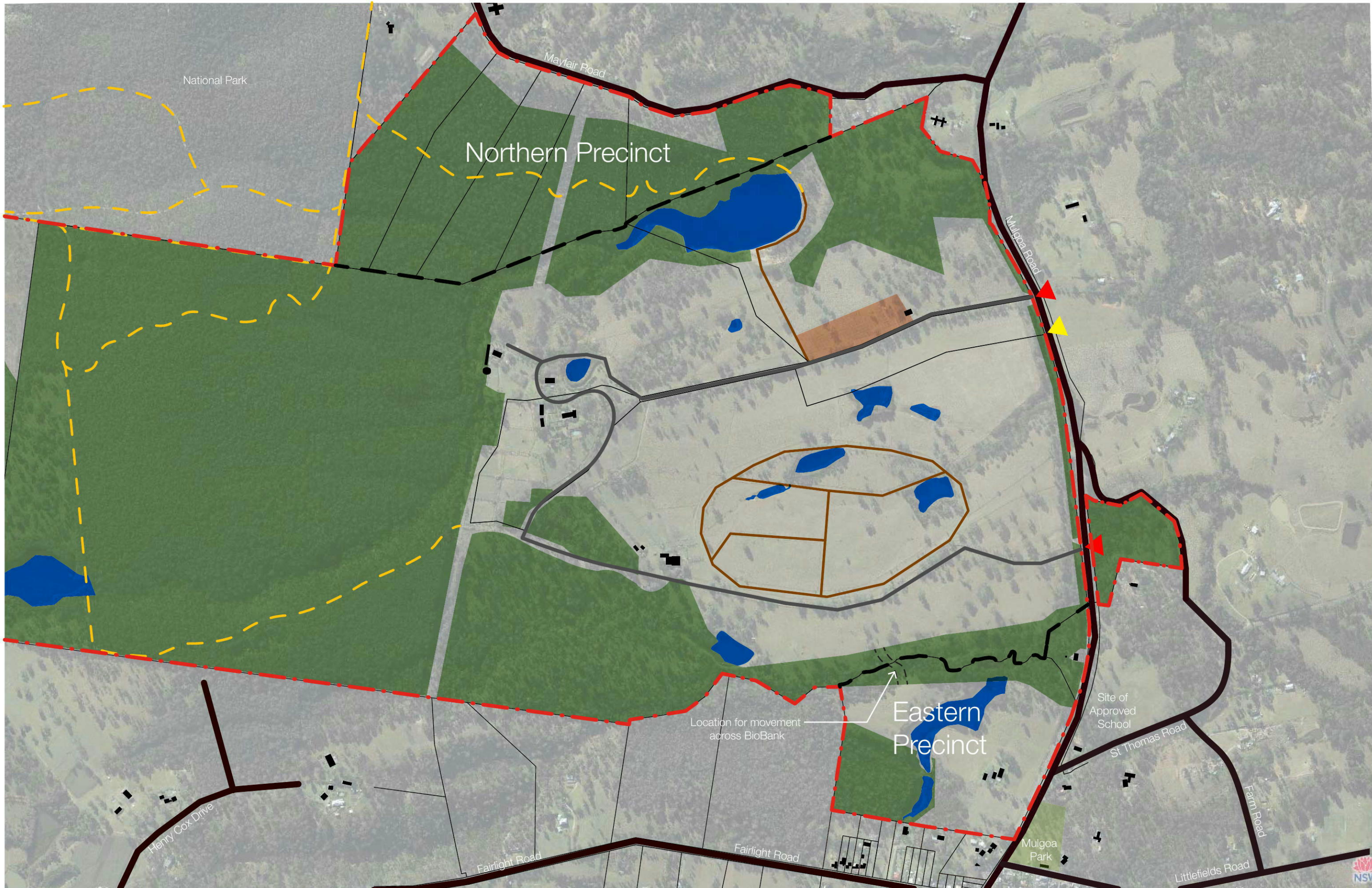




## Attachment 1

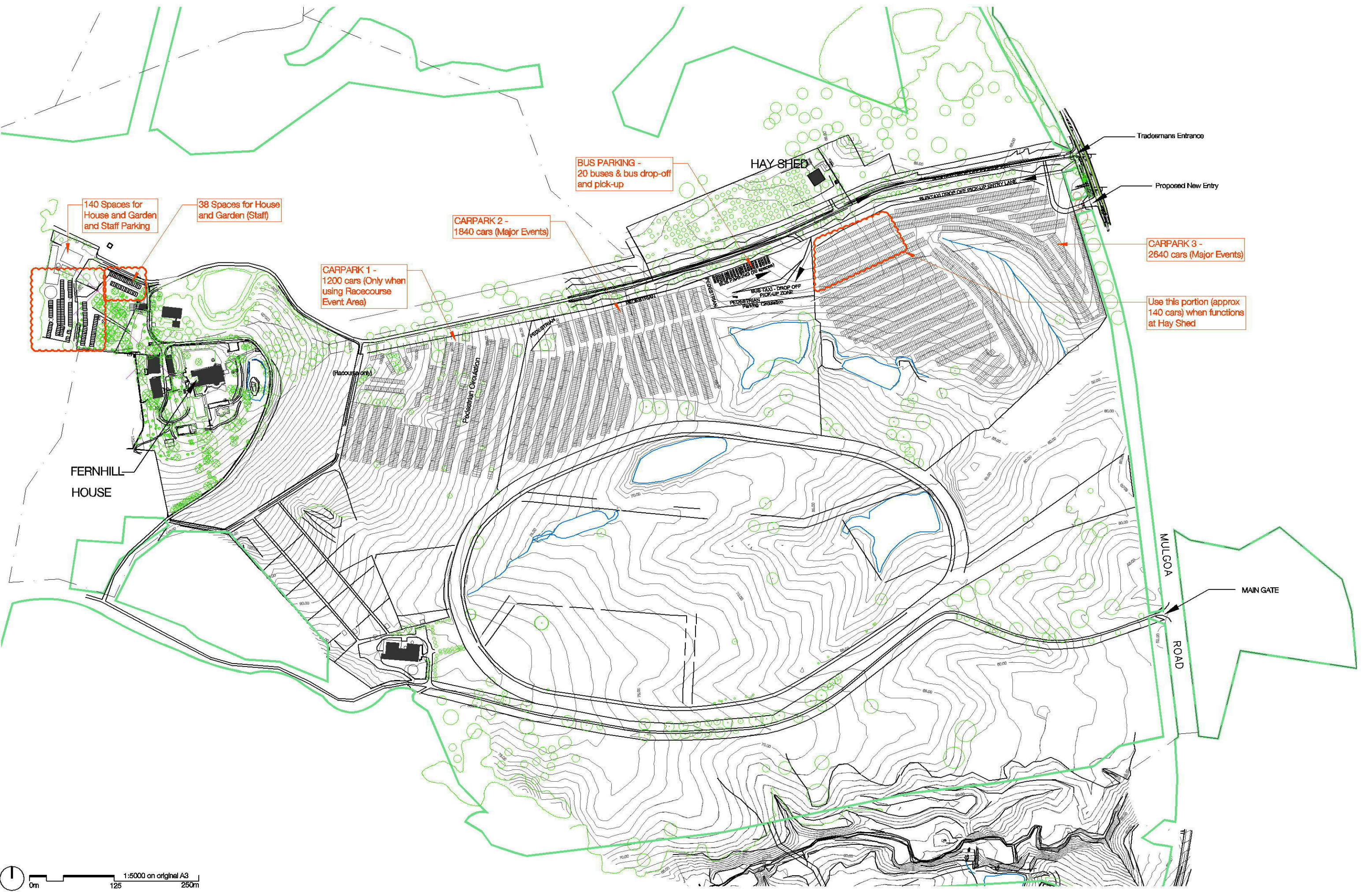
### Fernhill – Central Precinct Site Analysis and Car Parking Plan



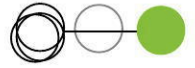


project Fernhill Estate	client Cubelic Holdings	ae design partnership architecture + environment	legend - - - Fernhill Estate Boundary - - - Precinct Boundary - Tracks Dirt	Public Road On Site Road Fire Trail	Indicative BioBanking Area Existing Building Lake/Dam	Pecan Grove Existing Vehicle Entrance Potential Location for Third Entrance	dwg title Central Precinct Site Analysis drawn JD checked	dwg no. DA 101 date 03/12/13 issue A
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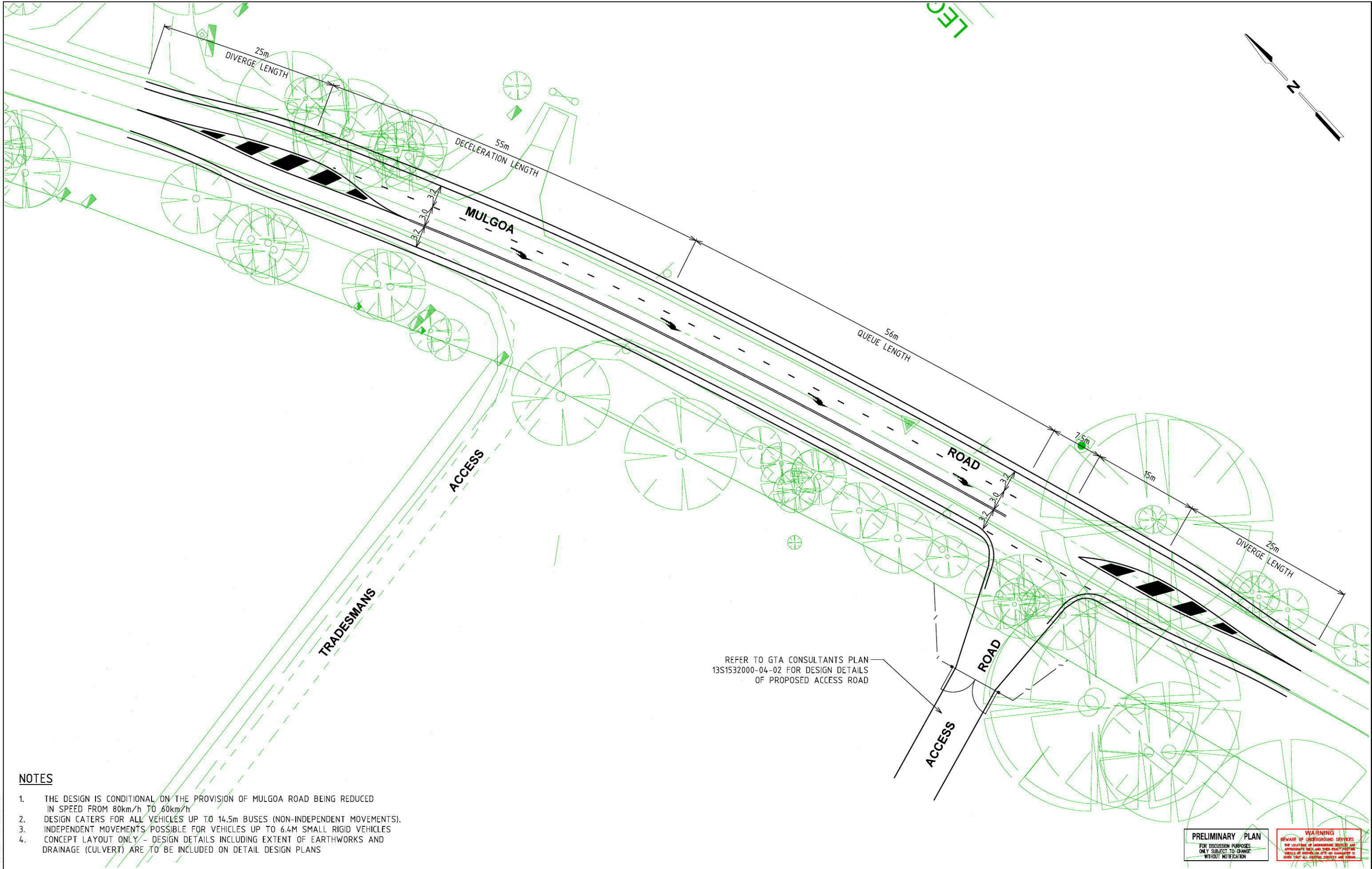






## Attachment 2

### Alternative Access Driveway and Channelised Right Turn– Concept Layout



NOTES

1. THE DESIGN IS CONDITIONAL ON THE PROVISION OF MULGOA ROAD BEING REDUCED IN SPEED FROM 80km/h TO 60km/h
2. DESIGN CATER FOR ALL VEHICLES UP TO 14.5m BUSES (NON-INDEPENDENT MOVEMENTS).
3. INDEPENDENT MOVEMENTS POSSIBLE FOR VEHICLES UP TO 6.4M SMALL RIGID VEHICLES
4. CONCEPT LAYOUT ONLY - DESIGN DETAILS INCLUDING EXTENT OF EARTHWORKS AND DRAINAGE (CULVERT) ARE TO BE INCLUDED ON DETAIL DESIGN PLANS

ON 17/12/2013 AT 12:38:10 PM  
PLOTTED BY : Cameron Ward

AMENDMENTS						
ISSUE	DATE	DESCRIPTION	BY	CHK	APP	
P2	17.12.13	INITIAL ISSUE	CDW	RHM	BDH	
P1	16.12.13	PRELIMINARY DRAFT ISSUE	CDW	RHM	BDH	

- GENERAL NOTES
1. ALL DIMENSIONS AND RADII ARE IN METRES.
  2. BASE INFORMATION OBTAINED FROM FEATURE AND LEVEL SURVEY FROM CUBELIC HOLDINGS PTY LTD DATED DECEMBER 2013
  3. GTA CONSULTANTS DOES NOT TAKE ANY RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING CONDITIONS BASE ON WHICH THE SETOUT DETAIL IS BASED. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE EXISTING CONDITIONS INCLUDING UNDERGROUND SERVICES SHOULD BE VERIFIED ON SITE.

DESIGNED C. WARD	DESIGN CHECK R. HAZELL
DRAWN C. WARD	DRAFTING CHECK R. HAZELL
APPROVED BY B. MAYNARD	DATE APPROVED FOR INITIAL ISSUE 16 DECEMBER '13
SCALE A3 Hor. 0 5 10 Ver.	CAD FILE NO. 13S1532000-04-P2.dgn

  
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CLIENT	CUBELIC HOLDINGS PTY LTD		
	FERNHILL ESTATE MULGOA ROAD, MULGOA ALTERNATIVE ACCESS DRIVEWAY CHANNELISED RIGHT TURN TREATMENT CONCEPT LAYOUT		
SYDWAY REF.	DRAWING NO. 13S1532000-04-01	SHEET 01 OF 02	ISSUE P2

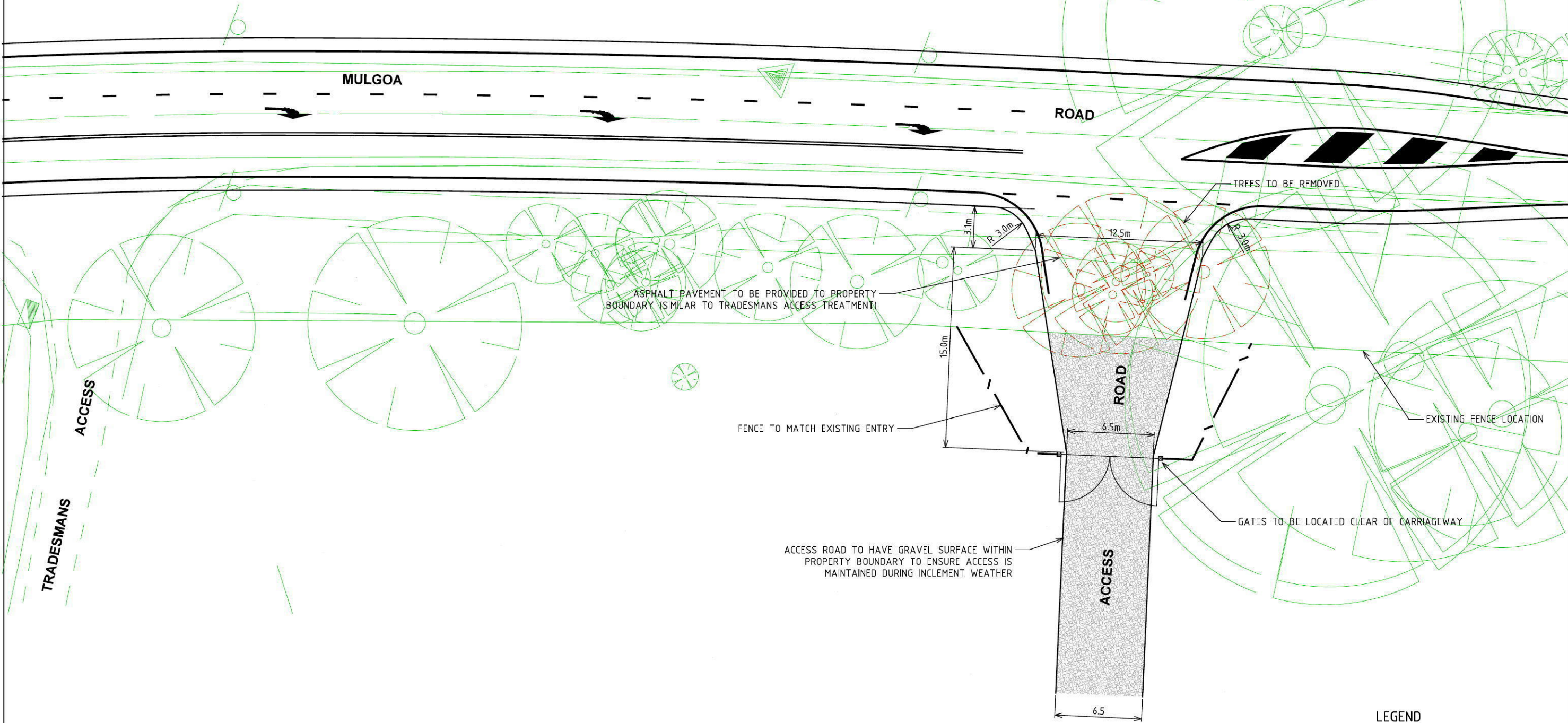
PRELIMINARY PLAN  
FOR DISCUSSION PURPOSES  
ONLY. SUBJECT TO CHANGE  
WITHOUT NOTIFICATION

WARNING  
BEWARE OF UNDERGROUND SERVICES  
THE LOCATION OF UNDERGROUND SERVICES AND APPROXIMATE DEPTH AND TYPE IS SHOWN FOR INFORMATION ONLY. IT IS THE RESPONSIBILITY OF THE USER TO VERIFY THE LOCATION AND DEPTH OF ALL SERVICES PRIOR TO CONSTRUCTION.



NOTES

1. THE DESIGN IS CONDITIONAL ON THE PROVISION OF MULGOA ROAD BEING REDUCED IN SPEED FROM 80km/h TO 60km/h
2. DESIGN CATERS FOR ALL VEHICLES UP TO 14.5m BUSES TO TURN LEFT ON ENTRY, AND LEFT AND RIGHT ON EXIT
3. INDEPENDENT MOVEMENTS POSSIBLE FOR VEHICLES UP TO 6.4M SMALL RIGID VEHICLES
4. CONCEPT LAYOUT ONLY - DESIGN DETAILS INCLUDING EXTENT OF EARTHWORKS AND DRAINAGE (CULVERT) ARE TO BE INCLUDED ON DETAIL DESIGN PLANS



LEGEND

GRAVEL SURFACE

**PRELIMINARY PLAN**  
FOR DISCUSSION PURPOSES  
ONLY SUBJECT TO CHANGE  
WITHOUT NOTIFICATION

**WARNING**  
BEWARE OF UNDERGROUND SERVICES  
THE LOCATION OF UNDERGROUND SERVICES ARE  
APPROXIMATE ONLY AND THEIR EXACT POSITION  
SHOULD BE VERIFIED ON SITE. NO GUARANTEE IS  
GIVEN THAT ALL EXISTING SERVICES ARE CORRECT.

ON 17/12/2013 AT 12:38:54 PM  
PLOTED BY : Cameron Ward

AMENDMENTS						
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P2	17.12.13	INITIAL ISSUE	CDW	RMH	BDH	
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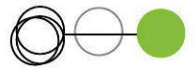
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DRAWN C. WARD	DRAFTING CHECK R. HAZELL
APPROVED BY B. MAYNARD	DATE APPROVED FOR INITIAL ISSUE 16 DECEMBER '13
SCALE A3 Hor. 0 2.5 5 Ver. 1:250	CAD FILE NO. 13S1532000-04-P2.dgn



CLIENT CUBELIC HOLDINGS PTY LTD	SHEET 02 OF 02	ISSUE P2
FERNHILL ESTATE MULGOA ROAD, MULGOA ALTERNATIVE ACCESS DRIVEWAY CHANNELISED RIGHT TURN TREATMENT ACCESS ROAD DETAIL		
SYDWAY REF. -	DRAWING NO. 13S1532000-04-02	





## Attachment 3

### SIDRA INTERSECTION Results

# MOVEMENT SUMMARY

Site: MR/ Fernhill - Existing -  
60km/h - Small

Mulgoa Road and Fernhill Estate Alternative Access Driveway  
Channelised Right Turn - 60km/h  
Small Event - 300  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Road											
1	L	63	0.0	0.239	7.2	LOS A	0.0	0.0	0.00	1.09	48.7
2	T	395	2.0	0.239	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		458	1.7	0.239	1.0	NA	0.0	0.0	0.00	0.15	58.3
North: Mulgoa Road											
8	T	395	2.0	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	95	0.0	0.083	9.1	LOS A	0.4	2.5	0.49	0.71	46.4
Approach		489	1.6	0.205	1.8	NA	0.4	2.5	0.09	0.14	57.0
West: Fernhill Estate Alternative Access											
10	L	1	0.0	0.001	7.6	LOS A	0.0	0.0	0.45	0.56	36.5
12	R	1	0.0	0.003	14.4	LOS A	0.0	0.1	0.69	0.74	32.7
Approach		2	0.0	0.003	11.0	LOS A	0.0	0.1	0.57	0.65	34.5
All Vehicles		949	1.7	0.239	1.4	NA	0.4	2.5	0.05	0.14	57.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 17 December 2013 3:43:52 PM

SIDRA INTERSECTION 5.1.12.2089

Project: P:\13S1500-1599\13S1532000 - Fernhill Estate Traffic and Parking Management\Modelling

\1312176sid-13S1532000 - Mulgoa RD-Site Access.sip

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# MOVEMENT SUMMARY

Site: MR/ Fernhill - CHR - 60km/h -  
Medium

Mulgoa Road and Fernhill Estate Alternative Access Driveway  
Channelised Right Turn - 60km/h  
Medium Event - 2500  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Road											
1	L	421	0.0	0.432	7.2	LOS A	0.0	0.0	0.00	0.84	48.7
2	T	395	2.0	0.432	0.0	LOS A	0.0	0.0	0.00	0.00	63.5
Approach		816	1.0	0.432	3.7	NA	0.0	0.0	0.00	0.43	55.7
North: Mulgoa Road											
8	T	395	2.0	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	63.5
9	R	632	0.0	0.930	33.1	LOS C	16.4	114.5	0.96	2.01	29.7
Approach		1026	0.8	0.930	20.4	NA	16.4	114.5	0.59	1.23	38.8
West: Fernhill Estate Alternative Access											
10	L	1	0.0	0.001	8.9	LOS A	0.0	0.0	0.54	0.60	35.7
12	R	1	0.0	0.011	39.3	LOS C	0.0	0.2	0.91	0.97	23.7
Approach		2	0.0	0.011	24.1	LOS B	0.0	0.2	0.72	0.78	28.5
All Vehicles		1844	0.9	0.930	13.0	NA	16.4	114.5	0.33	0.88	44.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 17 December 2013 2:10:19 PM  
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