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ROAD SAFETY AUDIT REPORT

Stage 2 (Preliminary Design)

Road Widening to Accommodate Right Turn Deceleration Lane

No. 321 GREENDALE ROAD, GREENDALE

JULY 2012

CLIENT

Peter Georgopolous

Road Safety Audit Summary

Stage 2 (Preliminary Design Stage)

Road Widening to Accommodate Right Turn Deceleration Lane at No. 321 GREENDALE ROAD, GREENDALE

Report No.	RSA No. WTSLIV- 2
Audit For	Liverpool City Council
Address	Level 2, 33 Moore Street Liverpool NSW 1871
Telephone	1300 36 2170
Project Manager	Ryan John Bennett
	Pikes & Verekers Lawyers Level 2 50 King Street Sydney 2000
Audit Team	Terry Winning (WTS) Sue Park (WTS)
Audit Type	Stage 2 – Preliminary Design Stage
Commencement Meeting	Thursday 28 June 2012
Audit Date	Tuesday 3 July 2012
Completion Meeting	Monday 16 July 2012
Previous audit No.	Not Known

Summary of Audit

This audit is being undertaken at the request of Mr. Ryan Bennett (Pikes Verekers Lawyers) who acts for the client in respect of DA 1133/2010 for the construction of a multi-denominational lawn cemetery and associated works on land located at 321 Greendale Road, Greendale. This application is to be determined by the Sydney West Joint Regional Planning Committee.

The proposed project is located approximately 8.68 km north of the junction with The Northern Road (refer Appendix 1) and within an 80 km/h speed regulated environment and within the Liverpool City administrative boundaries.

This audit of the preliminary design (refer Appendix 2) that is included in the Varga Traffic Planning Pty. Ltd. Traffic and Parking Assessment Report (November 2011) addresses the physical features for the proposed road widening to accommodate right turn deceleration lane at No. 321 Greendale Road, Greendale that may impact road user safety and is sought to identify potential safety hazards. However, the auditors point out that no guarantee is made that every deficiency has been identified.

The Deficiency Log Matrix (refer Appendix 3) lists those issues that are considered need to be addressed. Of greatest concern arising from this audit:

- Located approx. 20m to the west of the proposed development boundary is a vehicle driveway accessing a rural industry and further to the west residential access is also provided.

  In addition to the east of the subject property driveway access is provided to residential properties on the northern side.

  Under NSW Traffic Regulations vehicles are prohibited from turning right across a painted median barrier.

  On this basis the proposed Preliminary Design prohibits westbound vehicles from turning right into properties impacted by the location of the painted central median proposed.
- The existing gateway access measures approx. 3m wide. Given the type of development proposed there is a high probability the opposing vehicles will meet at the driveway access. The existing driveway can not accommodate passing vehicles and should entry vehicles conflict with exit vehicles this may cause queuing onto Greendale Road.
- The proposed design is considered may bring traffic closer to non-frangible roadside furniture (poles, trees etc). All non-frangible furniture is to be located outside of the designated “clear zone” for the speed of the road or protected.

In addressing the issues of road user safety and access amenity it is considered that the type of access proposed may not be appropriate given the type of development proposed, the low traffic generation of the proposed development, existing traffic volumes and the type of road environment within the precinct.

Based on the above and should the development be approved consideration should be given to applying a reduced access for the development and a type AUR (**AU**xilliary lane **R**ight turn treatment) combined with the BAL already included is recommended (refer Appendix 5 for AUR treatment).

Taking into consideration all of the information provided and gathered to conduct this audit it is considered the submitted Preliminary Design attached to this report (refer Appendix 2) is inappropriate taking into consideration the type of facility it serves and adjoining land use access requirements. Attention is required to all road user safety issues identified and listed within the Deficiency Log Matrix (refer Appendix 3).

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ROAD SAFETY AUDIT REPORT
Stage 2 (Preliminary Design)

Road Widening to Accommodate Right Turn Deceleration Lane
No. 321 GREENDALE ROAD, GREENDALE

1 Introduction

1.1 Project Description

Winning Traffic Solutions Pty. Ltd. (WTS) has been engaged by Mr Peter Georgopolous to undertake a Stage 2 (Preliminary Design) Road Safety Audit of proposed road widening to accommodate a right turn deceleration lane along the frontage of No. 321 Greendale Road, Greendale (refer Appendix 1). This audit does not include the internal road network proposed for the site.

This audit is being undertaken at the request of Mr. Ryan Bennett (Pikes Verekers Lawyers) who acts for the client in respect of DA 1133/2010 for the construction of a multi-denominational lawn cemetery and associated works on land located at 321 Greendale Road, Greendale. This application is to be determined by the Sydney West Joint Regional Planning Committee.

Assessment of the DA application was deferred for determination on the basis of a direction from the Sydney West Joint Regional Planning Panel to Liverpool City Council that the applicant be directed to prepare a Road Safety Audit of the existing Greendale Road.

A Road Safety Audit Report, Stage 5 (Existing Road) July 2012, was prepared by WTS as the result of that direction from Liverpool City Council to Mr. F. Georges via correspondence dated 21 June 2012.

This Road Safety Audit Stage 2 (Preliminary Design) has been prepared at the direction of Mr. Georgopolous through Mr. Ryan Bennett (Pikes Verekers Lawyers), to assist with the assessment of the submitted DA 1133/2010 by the Sydney West Joint Regional Planning Committee.

A Road Safety Audit is a series of formal checks of road and traffic works, both existing and future, in relation to their accident potential and safety performance. It is conducted by a qualified team independent to the Project who can provide an objective safety assessment. The purpose of the audit process is to pro-actively manage road safety by identifying and addressing risks associated with identified road safety deficiencies.

Road Safety Audits at the Preliminary Design Stage may identify unusual features. These may or may not be safety problems: engineering judgment is required. Inconsistent or unexpected features can be a hazard where road users may use them wrongly. This type of audit typically considers issues such as horizontal and vertical alignments, intersection layouts, the use of standards generally or at specific locations, access locations, requirements of likely road users and project staging.

Other objectives of the Audit are:

- To identify potential safety problems for all road users;
- To check that all likely road users have been considered;
- To check the adequacy of the road reservation width and its effect on batters;
- To check intersection layouts and other conflict points;
- To alert designers to areas where attention will be needed at the detailed design stage;
- To check details at the connections to the existing road.

The road features of Greendale Road generally conform to standards of a low volume rural road servicing the areas of Bringelly in the south and Wallacia in the north. The road is bitumen sealed within its full length of the audit boundaries, is a two-lane, two-way undivided road and constructed to a rural road standard at its junction with No. 321 access driveway.

The proposed project is located approximately 8.68 km north of the junction with The Northern Road (refer Appendix 1) and within an 80 km/h speed regulated environment and within the Liverpool City administrative boundaries.

Traffic volumes along the road were undertaken by Varga Traffic Planning Pty. Ltd. and included in the Traffic and Parking Assessment Report in support of the above referenced Development Application.

The traffic volume count (Dec 2009) peaked at 44 vehicles per hour and if extrapolated by generally accepted industry standards as 10% of Average Daily Traffic (ADT) would equate to 440 vehicles per day.

There were no recorded crashes (RTA Detailed Crash Report 2005 to 2009 – Varga Report) within the vicinity of the site.

For the purpose of this audit Greendale Road functions as a collector/distributor road serving the communities of Bringelly, in the south and Wallacia, in the north, a distance of approximately 17 kilometres (refer Appendix 1).

1.2 Supporting Information

The following documents and relevant to the Audit have been provided by the client:

- JRPP report dated 14 June 2012;
- Letter from JRPP to Liverpool Council's general Manager dated 18 June 2012;
- Letter from Liverpool Council to the applicant dated 21 June 2012;
- Class 1 Application:
- Varga Traffic Planning Pty. Ltd. – Internal Site and External Roadway Traffic and Parking Assessment Report (November 2011);
    - Preliminary design layout
    - RTA Crash Data
    - Traffic Volume Counts December 2009
- Civil & Stormwater Engineering Design Documentation;
- Landscape Architecture Documentation

1.3 Checklists and Reference Material

The subject site was audited in accordance with the Austroads publication "Guide to Road Safety Part 6: Road Safety Audit" and RMS "Guidelines for Road Safety Audit Practices". Key elements examined included:

- General topics including drainage, landscaping and general access
- Design issues;
- Alignment details;
- Intersections;
- Special road users;
- Lighting, signs and delineation; and
- Environmental constraints.

Other specific reference documents, papers and manuals utilised during the course of this audit are detailed as follows:

- RMS Road Design Guide;
- RMS Guide to Signs and Markings Reference List;
- Austroads Guide to Traffic Management;
- Australian Standards AS 1742 (Parts 1 & 2): Manual of Uniform traffic Control Devices.

2 Road Safety Audit Program

2.1 Commencement Meeting

This report is based primarily on publications by Austroads and RMS referred above and used as guides for the Road Safety Audit of the subject site.

This audit has been undertaken at the request of Mr. Ryan Bennett (Pikes Verekers Lawyers) as the client representative for the audit.

The audit included a commencement meeting with Mr. Bennett (via telephone), on Thursday 28 June 2012. At this meeting relevant issues, aligning to the scope of work, were discussed as well as other relevant information available for the audit.

2.2 Site Audit

The audit was carried out by:

Terry Winning and Susan Park
Winning Traffic Solutions Pty. Ltd.
Both IPWEA Accredited Level III Auditors

The auditors have had no involvement with design or development of the work audited.

Field inspections of the site, both daytime (PM) and night time, were undertaken on Tuesday 3 July 2012. The weather at the time of inspection was fine and cloudy.

2.3 Completion Meeting

A completion meeting was conducted with Mr. Bennett on Monday 16 July 2012 (via telephone) where the Audit Findings were discussed.

3 Road Safety Audit Findings

This audit of the preliminary design (refer Appendix 2) addresses the physical features for the proposed road widening to accommodate right turn deceleration lane at No. 321 Greendale Road, Greendale that may impact road user safety and is sought to identify potential safety hazards. However, the auditors point out that no guarantee is made that every deficiency has been identified.

Further, if all the unsafe issues identified in this report were to be acted upon, this would not confirm that the constructed facility is "safe" rather; remedial action should improve the level of safety of the facility for the preparation of the Final Design.

The format of this Road Safety Audit report aligns with the Austroads publication Guide To Road Safety Part 6: Road Safety Audit and contains a "Deficiency Log" listing safety deficiencies identified during the Road Safety Audit of the Preliminary Design (refer Appendix 3).

A Road Safety Audit is a series of formal checks of road and traffic works, both existing and future, in relation to their accident potential and safety performance. It is conducted by a team independent to the Project who can provide an objective safety assessment. The purpose of the audit process is to pro-actively manage road safety by addressing risks associated with identified road user safety deficiencies.

An audit at the Preliminary Design Stage may identify unusual features. These may or may not be safety problems: engineering judgment is required. Inconsistent or unexpected features can be a hazard where road users may use them wrongly. This type of audit typically considers issues such as horizontal and vertical alignments, intersection layouts, the use of standards generally or at specific locations, access locations, requirements of likely road users and project staging.

Other objectives of the Audit are:

- To identify potential safety problems for all road users;
- To check that all likely road users have been considered;
- To check the adequacy of the road reservation width and its effect on batters;
- To Check intersection layouts and other conflict points;
- To alert designers to areas where attention will be needed at the detailed design stage;
- to check details at the connections to the existing road.

The log of safety deficiencies (refer Appendix 3) has been ordered as far as practical in a sequential order, provides a site reference, indicates the direction of travel, and provides a "Preliminary Risk Rating" based on how often the problem is likely to lead to a crash (Frequent, Probable, Occasional, Improbable) and the likely severity of the resulting accident type (Catastrophic, Serious, Minor, Limited), Refer Austroads – Road Safety Audit: Section 6 –Tables 6.1, 6.2, 6.3)

This was achieved by driving the designated road and video recording the precinct to log these items and align with the road features of the site. The Audit Team also inspected the area walking the site.

The description accompanying the Preliminary Design (Varga Report) states that:

> *"Vehicular access to the site is provided via a new, upgraded site access driveway. The improvements proposed to the driveway intersection with Greendale Road make provision for type BAL (***BA**sic **L**eft turn treatment*) left-turn treatment and type CHR right-turn treatment* (**CH**annelised **R**ight turn treatment*) incorporating a right-turn storage bay (and associated taper) approximately 120m in length.*

The geometric design layout of the proposed site access arrangements have been designed to accommodate the swept path requirements of large semi-trailers (which may be required to access the site during construction).

Both of the above referenced designs are attached at Appendix 4 for information.

Firstly it should be noted that the above designs have been combined into the one design to serve the proposed driveway access (refer Appendix 2).

Secondly the above stated designs are for rural type treatments and for the right turn treatment relies on sealed pavement to support pavement markings to define the travel path of vehicles and is generally applied at complex sites with heavy, turning movements and accident blackspots which could be assisted by separation of movements.

The following concerns are raised to ensure that identified road user safety issues are considered in developing the Final Design

The Deficiency Log Matrix (refer Appendix 3) lists those issues that are considered need to be addressed. Of greatest concern arising from this audit:

- Located approx. 20m to the west of the proposed development boundary is a vehicle driveway accessing a rural industry and further to the west residential access is also provided.

  In addition to the east of the subject property driveway access is provided to residential properties on the northern side.

  Under NSW Traffic Regulations vehicles are prohibited from turning right across a painted median barrier.

  On this basis the proposed Preliminary Design prohibits westbound vehicles from turning right into properties impacted by the location of the painted central median proposed.
- The existing gateway access measures approx. 3m wide. Given the type of development proposed there is a high probability the opposing vehicles will meet at the driveway access. The existing driveway can not accommodate passing vehicles and should entry vehicles conflict with exit vehicles this may cause queuing onto Greendale Road.
- The proposed design is considered may bring traffic closer to non-frangible roadside furniture (poles, trees etc). All non-frangible furniture is to be located outside of the designated “clear zone” for the speed of the road or protected.

Other issues to be considered and recommendation for remedial action are shown within the Deficiency Log Matrix at Appendix 3.

In addressing the issues of road user safety and access amenity it is considered that the type of access proposed may not be appropriate given the type of development proposed, the low traffic generation of the proposed development, existing traffic volumes and the type of road environment within the precinct.

Based on the above consideration should be given to applying a reduced access for the development and a type AUR (**AU**xilliary lane **R**ight turn treatment) combined with the BAL already included is recommended (refer Appendix 5 for AUR treatment).

Should the development be approved and an amended design be adopted, it should be noted that the length of right turn storage would need to be calculated to accommodate potential queuing within Greendale Road of a “platoon of vehicles” typically associated with funeral processions.

Further it is recommended that construction of the widened access should precede any construction activity on the site to accommodate access by heavy vehicles.

4 Responding to this Audit Report

As set out in the road safety audit guidelines, responsibility for implementing and or accepting/rejecting the audit findings, always rests with the Project Manager (or equivalent), and not with the auditors.

A Project Manager is under no obligation to accept all the audit findings and comments. Also, it is not the role of the audit team to accept or approve of the Project Manager's response to the audit. Rather, the audit provides the opportunity to highlight potential problems and risks and to have them formerly considered by the Project Manager in developing the final design, in conjunction with all other road management considerations.

5 Formal Statement

The auditors have examined all documents provided and have a reasonable knowledge of the site and its environs.

This audit has been carried out in accordance with Austroads – "Guide To Road Safety" and RMS Road Safety Audits Guidelines for the sole purpose of identifying any features of the proposed works interfacing with the subject road network that could be altered or removed to improve safety.

A Road Safety Audit is a series of formal checks of road and traffic works, both existing and future, in relation to their accident potential and safety performance. It is conducted by a qualified person or team independent to the Project who can provide an objective safety assessment.

The purpose of the audit process is to pro-actively manage road safety by identifying and addressing risks associated with identified road safety deficiencies. It should be noted the while every effort has been made to identify potential safety hazards, no guarantee can be made that every deficiency has been identified.

6 Conclusion

Taking into consideration all of the information provided and gathered to conduct this audit it is considered the submitted Preliminary Design attached to this report (refer Appendix 2) is inappropriate taking into consideration the type of facility it serves and adjoining land use access requirements. Attention is required to all road user safety issues identified and listed within the Deficiency Log Matrix (refer Appendix 3).

Should the development be approved it is recommended that a review of the proposed access arrangements be undertaken.

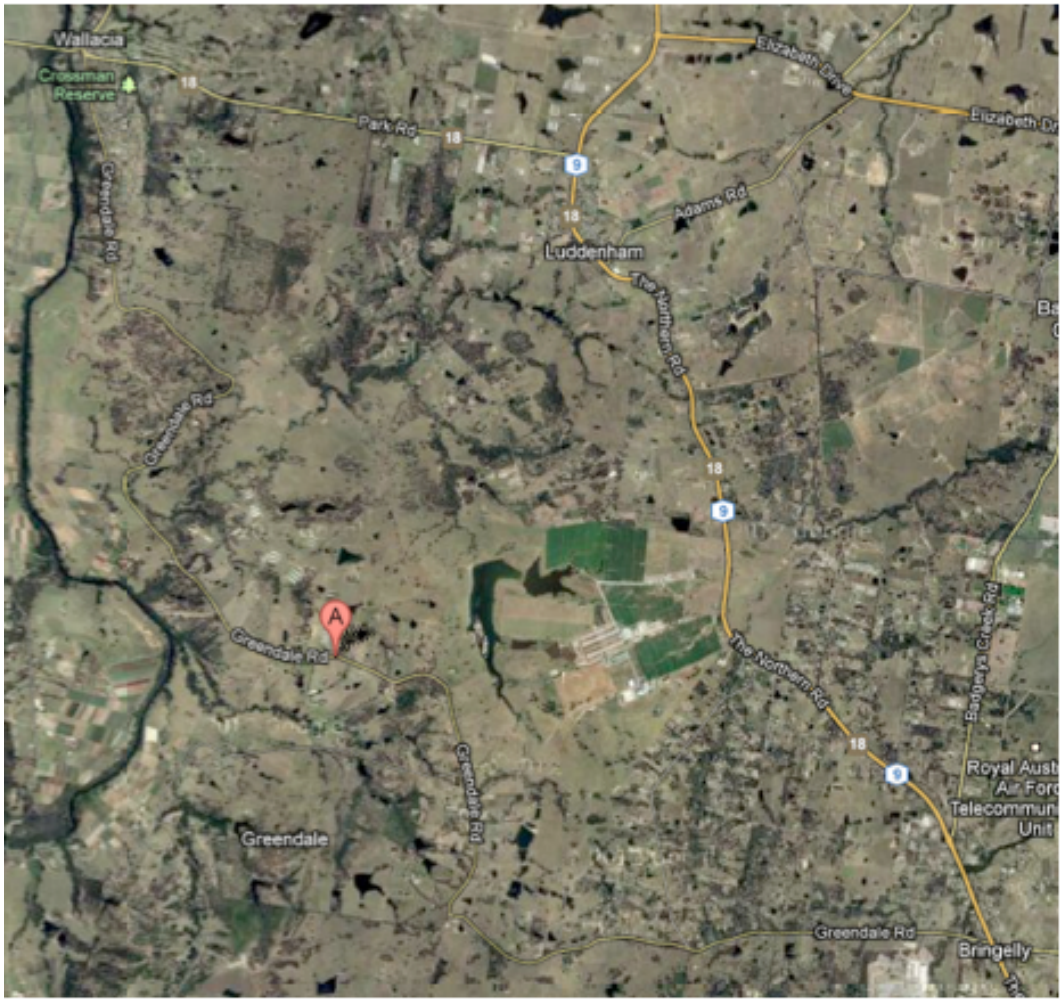
Date… 19 July 2012

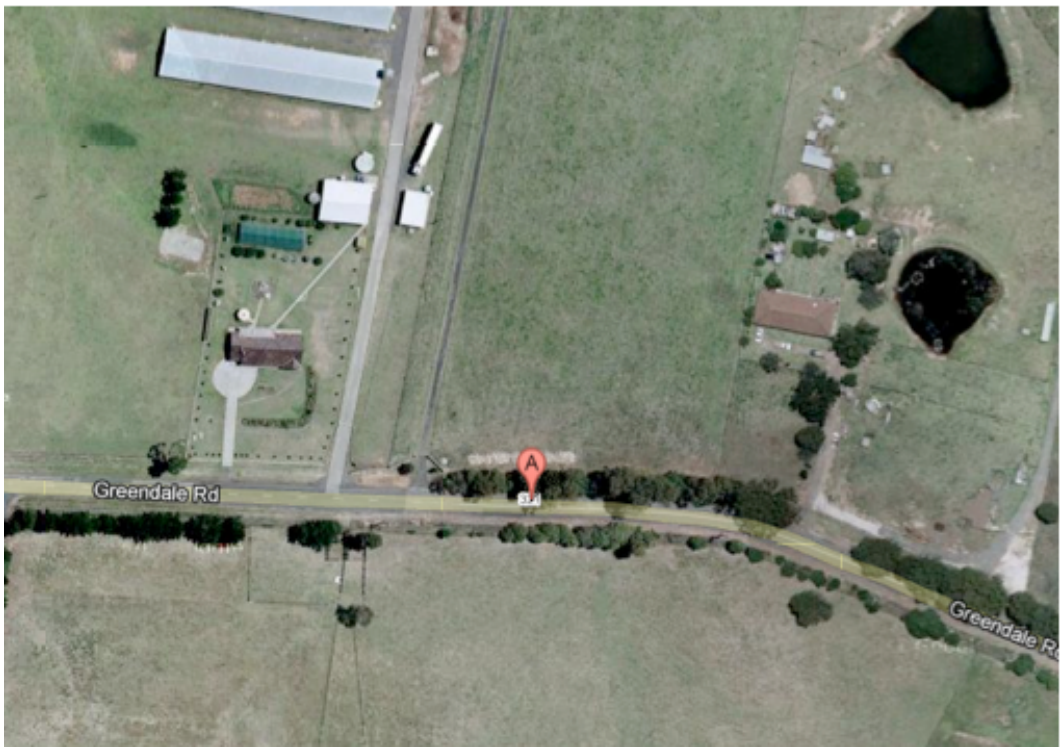
Terry Winning – Lead Road Safety Auditor
Winning Traffic Solutions Pty. Ltd.

Date…19 July 2012

Sue Park – Road Safety Auditor - Team Member
Winning Traffic Solutions Pty. Ltd.

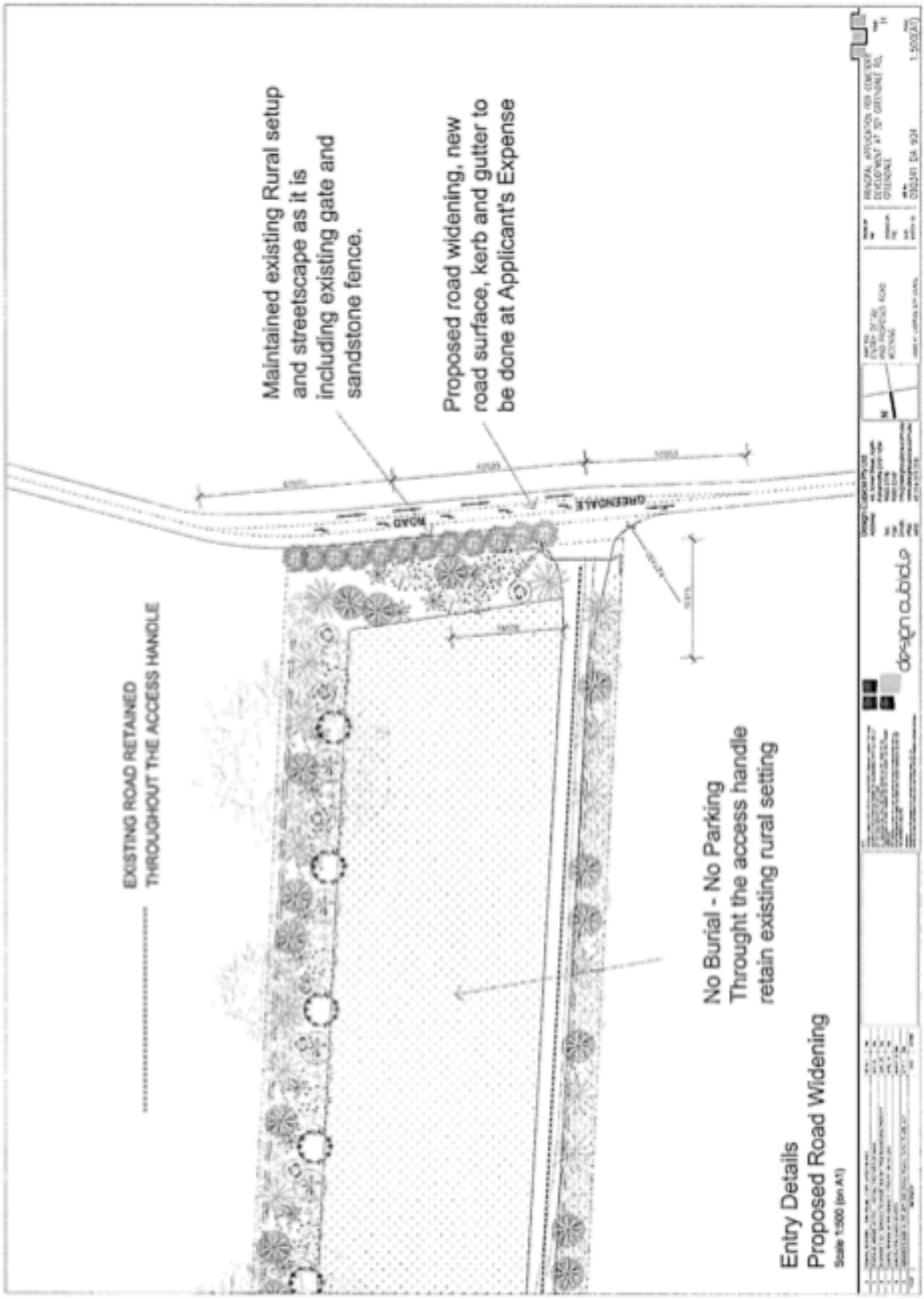
LOCALITY MAP





PRELIMINARY DESIGN LAYOUT

VARGA TRAFFIC PLANNING PTY LTD



Appendix 3

DEFICIENCY LOG MATRIX

ROAD SAFETY AUDIT Stage 2 (Preliminary Design) Road Widening to Accommodate Right Turn Deceleration Lane No. 321 GREENDALE ROAD, GREENDALE				
Item No.	**Location**	**Identified Deficiency**	**Priority**	**Recommended Treatment**
1	At western property boundary	Located approx. 20m to the west of the proposed development boundary is a vehicle driveway accessing a rural industry and further to the west residential access is also provided.  In addition to the east of the subject property driveway access is provided to residential properties on the northern side. Under NSW Traffic Regulations vehicles are prohibited from turning right across a painted median barrier. On this basis the proposed Preliminary Design prohibits westbound vehicles from turning right into properties impacted by the location of the painted central median proposed.	H	Review proposed design to accommodate property access to the east and west of the subject development access driveway.
2	Driveway Access	The existing gateway access measures approx. 3m. Given the type of development proposed there is a high probability the opposing vehicles will meet at the driveway access. The existing driveway can not accommodate passing vehicles and should entry vehicles conflict with exit vehicles this may cause queuing onto Greendale Road. 	H	Widen access driveway to allow vehicles to pass at the gateway entry (i.e. two-way flow).

3	General	The design refers to kerb and gutter "to be done at the Applicants expense". It is considered the applied design incorporating K&G and being a rural environment, does not maintain consistency of a rural road environment and may create a "hazard" especially at night in terms of driver expectation for through vehicles.	M	Kerb and gutter not required.
4	General	From Point 3 above particular attention will need to be given to ensuring drainage of pavement and water flow within the intersection is appropriately treated to avoid ponding.	M	Provide table drains and associated drainage to accommodate design storm-water run-off period. Headwalls if employed to be placed outside of the "clear Zone" for the regulated speed of the road.
5	General	If kerb and gutter is not to be employed in the design roadside shoulders should be provided and transition to existing shoulders.	M	Apply roadside shoulders (min 2m wide) and transition into existing.
6	General	Approach sight distance to be appropriate for the 85th percentile free speed of each approach movement and measured 1.15m to Zero (due to pavement markings).	M	Apply appropriate site distance requirements.
7	General	Roadside furniture (especially signs) and plantings are not to interfere with sight distance requirements at the driveway access. This applies especially to the existing plantings along the frontage of the site.	M	Ensure appropriate intersection sight distances are applied to the design on all legs.
8	General	The proposed design is considered may bring traffic closer to non-frangible roadside furniture (poles, trees etc). All non-frangible furniture is to be located outside of the designated "clear zone" for the speed of the road or protected.	H	Apply 'clear zone' requirements to design to ensure safety.
9	Driveway access roadway	The existing driveway into the subject property is bitumen sealed. This should be indicated in the design and pavement designed in accordance with appropriate standards.	L	Desirably access driveway roadway should be sealed a minimum of 30m into the property and pavement designed to required Council standards.
10	West-bound approach	The design indicates the Westbound through movement will be moved to the south to allow provision of the right turn storage bay. Design standards for both horizontal and vertical alignment appropriate to the design speed should be applied.	M	The change of alignment requires attention to the design of the westbound vertical and horizontal alignment of the road.

ROAD DESIGN LAYOUTS

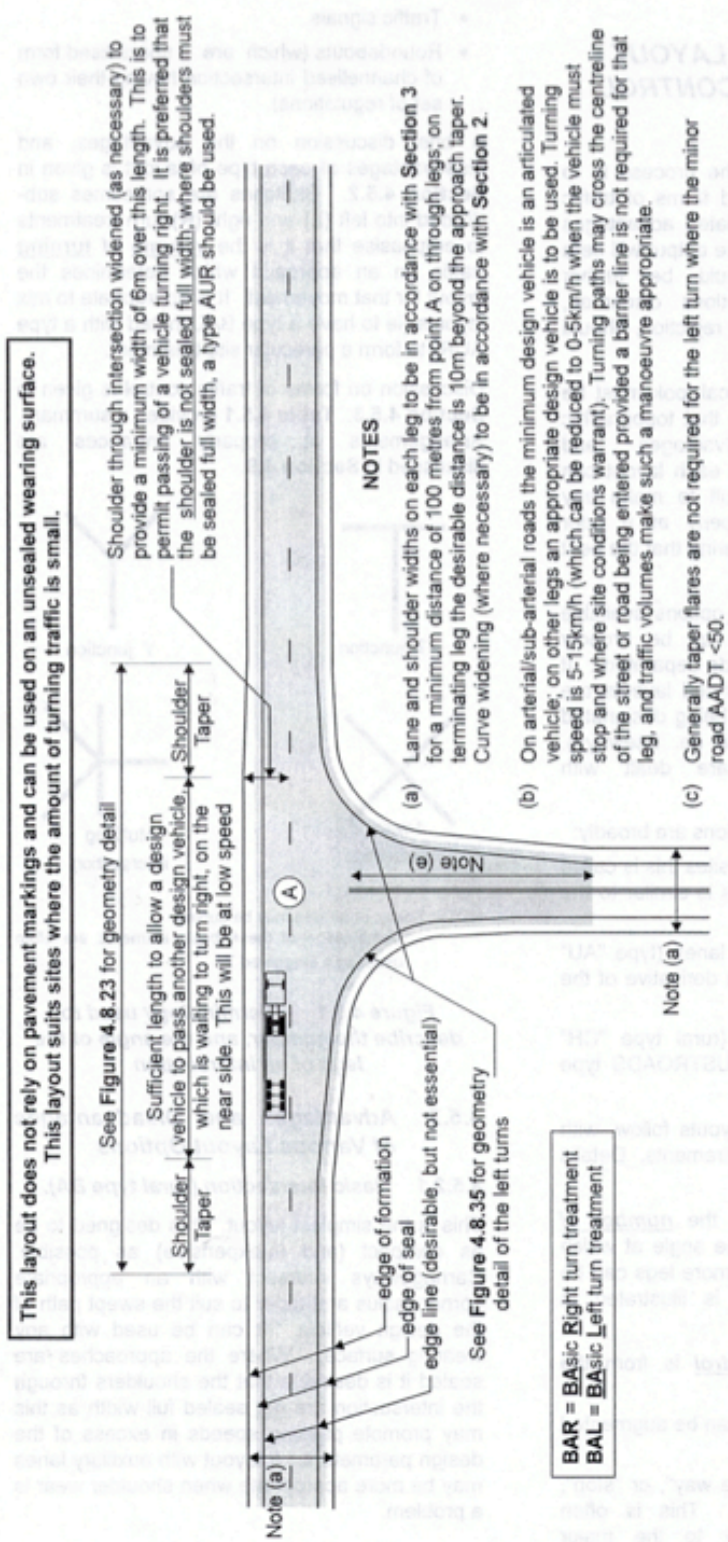
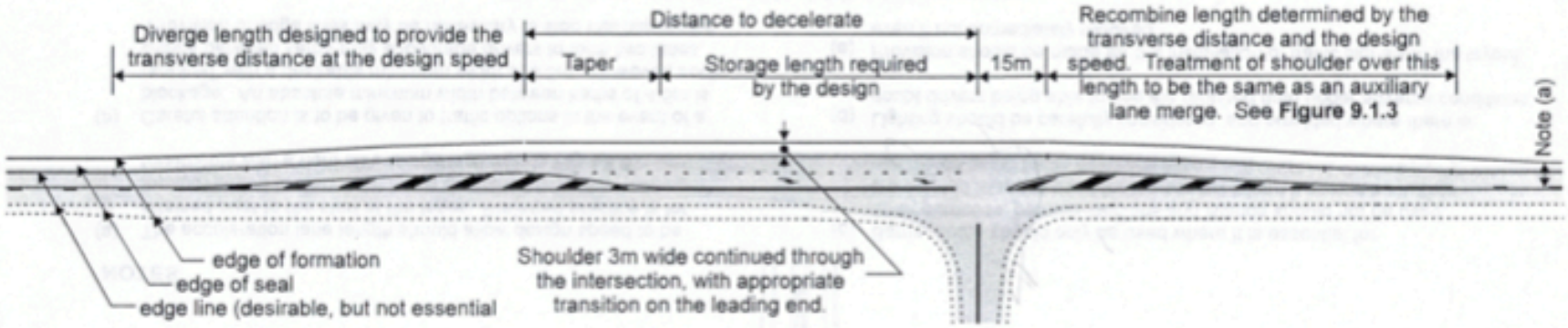


Figure 4.5.2 - Type BAR and BAL Layout Combined to show a Basic Rural Intersection Treatment on both a Through and a Terminating Leg

***Section 4.8** provides details of geometry whilst **"Signs and Markings"** gives the location of signs and details of pavement marking.*

This form of layout has particular application at complex sites with heavy, turning movements, and accident black spots which could be assisted by separation of movements.



NOTES

(a) Lane and shoulder widths on each leg to be in accordance with **Section 3** for a minimum distance of 100 metres from the start of each median; curve widening (where necessary) to be in accordance with **Section 2.**

(b) The longest expected vehicle to be used to define the turning path. Turning speed is 5-15km/h (which can be reduced to 0-5km/h where site conditions warrant). Turning paths are NOT to cross the centreline of the street or road being entered.

(c) Approach sight distance to be appropriate for the 85th percentile free speed of each approach movement and measured 1.15m to zero (because of the pavement markings). Furniture (especially signs) and planting are not to interfere with sight distance requirements.

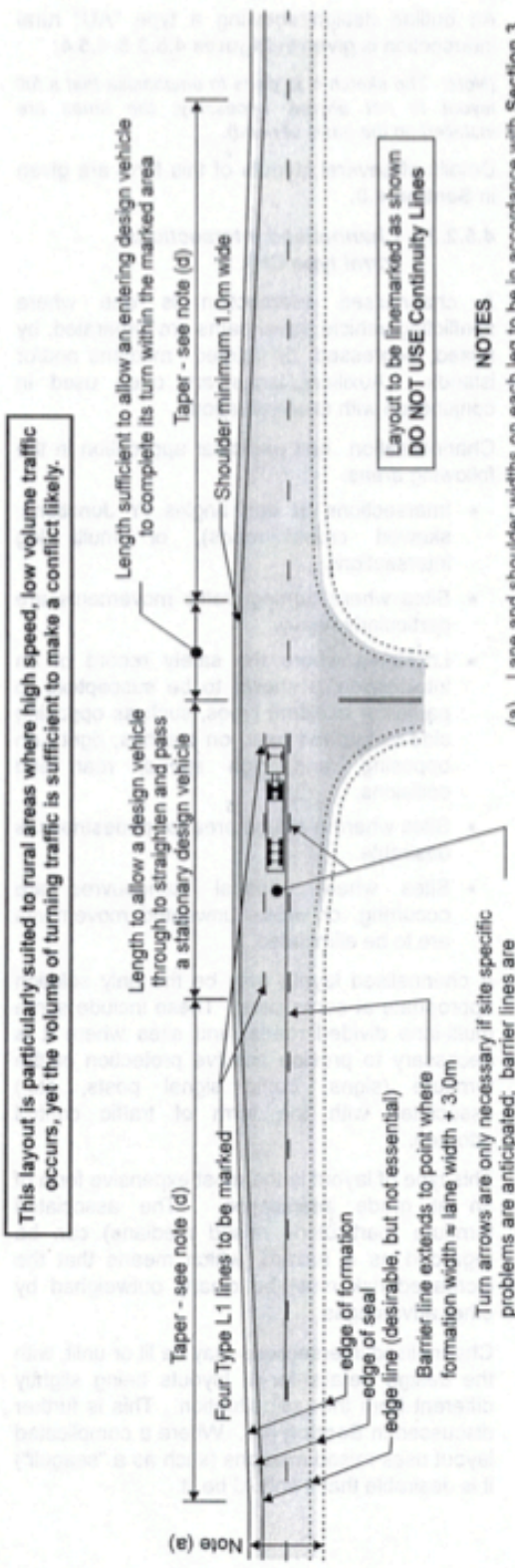
(d) On a curved alignment the diverge and recombine lengths are still to have geometry appropriate to the design speed. A system of offsets (as shown in **Figure 4.8.25**) may be used to determine initial geometry.

(e) All non-frangible furniture to be located outside the clear zone or protected. Locate drainage headwalls and raised letter box type grates outside the clear zone of the through road.

***Section 4.8** provides details of geometry whilst **"Signs and Markings"** gives the details and location of signs and pavement marking. Advanced warning signs, alerting drivers to the presence of the intersection, may be required.*

Figure 4.5.6 - Type "CHR" Rural T Intersection Layout General Details

AUXILIARY LANE RIGHT TURN TREATMENT (AUR)



NOTES

(a) Lane and shoulder widths on each leg to be in accordance with **Section 3** for a minimum distance of 50 metres from each taper; curve widening (where necessary) to be in accordance with **Section 2.**

(b) On arterial/sub-arterial roads an articulated vehicle is the minimum design vehicle used to define the turning path. Turning speed is 5-15km/h. Turning paths may cross the centreline of the street or road being entered provided a barrier line is not required for that leg, and traffic volumes make such a manoeuvre appropriate.

(c) Approach sight distance to be appropriate for the 85th percentile free speed of each approach movement and measured 1.15 to zero (because of the pavement markings). Furniture (especially signs) and planting are not to interfere with sight distance requirements.

(d) Taper length determined on basis that some reduction in speed occurs.

(e) All furniture to be located outside the shoulder. Furniture (guideposts, kerbs, etc. can be used to control the area of conflict.

(f) All non-frangible furniture to be located outside clear zone or be protected. Locate drainage headwalls and raised letter box type grates outside the clear zone of the through road

This layout is designed to store one design vehicle and allow another design vehicle to pass. Where longer storage is necessary a channelised layout is preferred. Where an auxiliary right turn lane is required on the terminating leg, the "AUL" layout can be used.

Figure 4.5.3 - Rural Type "AUR" Layout

***Section 4.8** provides details of geometry whilst **"Signs and Markings"** gives the details and location of signs and pavement marking. Advanced warning signs, alerting drivers to the presence of the intersection, may be required.*