



Ardill Payne
& PARTNERS

ENGINEERS PLANNERS SURVEYORS ENVIRONMENTAL PROJECT MANAGEMENT

ROAD SAFETY AUDIT

EXISTING ROAD

Green Pigeon Road / Walters Road Intersection,
Horseshoe Creek

for:

Kyogle Council



Kyogle
NSW AUSTRALIA

December 2017

BALLINA

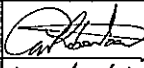


45 River Street
PO Box 20
BALLINA NSW 2478
02 6686 3280

GUNNEDAH

Germane House
285 Conadilly Street
GUNNEDAH NSW 2380
02 6742 9955



Document Control Sheet

| Filename: | 8534 2017-12-12 Walters_Green Pigeon Rd Intersection RSA v0 | | | | |
|-----------------------|---|--------------|--|-----------|--|
| Job No.: | 8534 | | | | |
| Job Captain: | Tony Cromack | | | | |
| Author: | Tony Cromack | | | | |
| Client: | Kyogle Council | | | | |
| File/Pathname: | S:\01 Jobs\8500-8599\8534 Two RSA - Kyogle Council (Walters Rd-Green Pigeon Rd & Imbreys Rd-Summerland Way)\01 Administration\02 Reports\8534 2017-12-12 Walters_Green Pigeon Rd Intersection RSA v0.docx | | | | |
| Revision No: | Date | Checked By | | Issued By | |
| | | Name | Signed | Name | Signed |
| 0 | 14/12/17 | G. Robertson |  | T Cromack |  |
| | 14/12/17 | H. Collins |  | | |
| 1 | | | | | |
| 2 | | | | | |

| Revision No: | Description |
|--------------|----------------|
| 0 | Original Issue |
| 1 | |
| 2 | |

Table of Contents

| | | |
|-----|--|----|
| 1. | PROJECT INFORMATION | 3 |
| 1.1 | Introduction | 3 |
| 1.2 | Description of the Site | 4 |
| 1.3 | Information Provided by the Client | 5 |
| 1.4 | Audit Scope and Objective..... | 5 |
| 1.5 | Audit Team..... | 6 |
| 2. | ROAD SAFETY AUDIT PROGRAM | 7 |
| 2.1 | Commencement Meeting..... | 7 |
| 2.2 | Field Audit..... | 7 |
| 2.3 | Completion Meeting..... | 7 |
| 3. | RISK LEVEL DETERMINATION | 8 |
| 4. | FINDINGS | 10 |
| 5. | CONCLUDING STATEMENT | 12 |

List of Tables

| | |
|-------------------------------|----|
| Table 1 - Frequency..... | 8 |
| Table 2 - Severity..... | 8 |
| Table 3 - Risk | 8 |
| Table 4 - Treatment..... | 9 |
| Table 5 – Audit Findings..... | 10 |

1. Project Information

1.1 Introduction

Kyogle Council (Council) has engaged Ardill Payne & Partners (APP) to undertake a Road Safety Audit (RSA) of an existing intersection – Green Pigeon Road and Walters Road at Horseshoe Creek – approx. 11.4km north of Kyogle (GPS co-ordinates 28.5351 S, 153.0298 E). The site location is shown in **Figure 1**.

A pre-commencement meeting was held via teleconference between Tony Cromack (APP) and Derryn Nix (Council) on 4 December 2017.

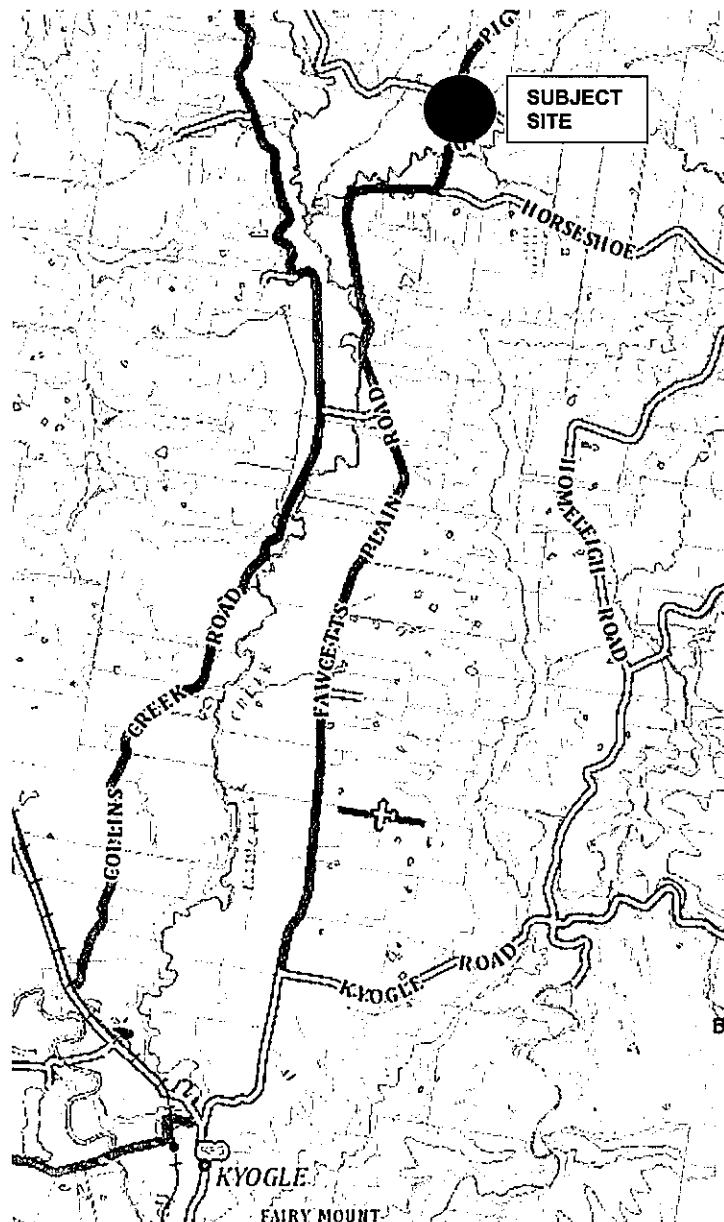


Figure 1: Study Location

1.2 Description of the Site

Green Pigeon Road is a two-way bitumen sealed rural road at the site. The road begins at the junction of Fawcetts Plain Road and Horseshoe Creek Road, and continues north to Mebbin National Park via Green Pigeon. A school bus service operates past the site. The default speed limit is 100km/hr, however local conditions would reduce the operating speed.

The road is generally of a rural standard with no kerb or guttering. There are no waterway crossings near the intersection. Several rural properties gain access from the road via driveways of varying standard. The road has no linemarking and minimal signage. The road has minimal shoulders with table drains running along the edge of the formation.

Approx. 850m north along Green Pigeon Road, on a tight left hand bend, Walters Road intersects from the right. Walters Road is a single lane gravel road that serves up to 3 residences and rural activities.

The intersection layout is shown in **Figure 2**. Photographs of the intersection are provided in **Attachment 1**.

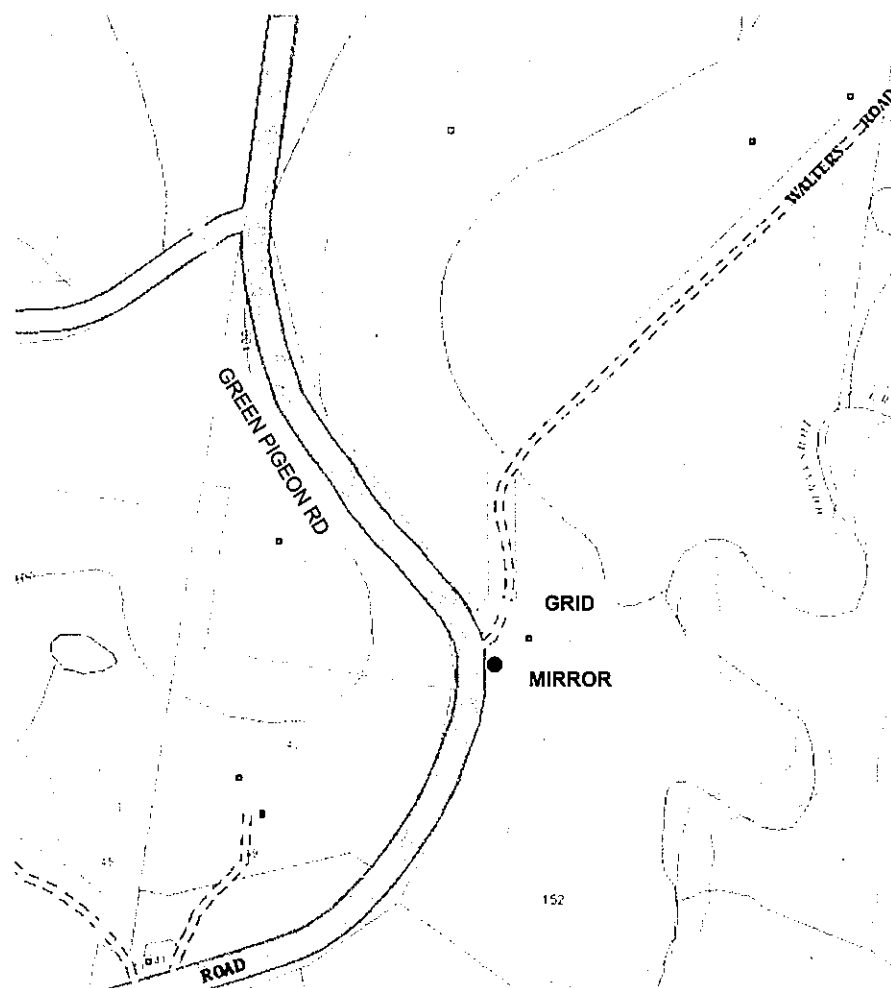


Figure 2: Intersection Layout

Key physical features of the intersection are:

- The intersection is located on a tight bend on Green Pigeon Road
- Walters Road intersects at an acute angle, and approaches at a relatively steep grade
- Walters Road is a gravel road
- A convex safety mirror is installed at the intersection
- There is a narrow cattle grid on Walters Road, approx. 20m from the intersection
- From Walters Road, the sight distance to the south is poor. The sight distance to the north is acceptable, however the angle of the approach makes checking line of sight difficult
- On Green Pigeon Road, sight distance for northbound turning vehicles to observe southbound through traffic is poor.
- There is not enough room for two cars to pass in Walters Road at the intersection
- Most vehicles, but especially larger vehicles, would have difficulty turning right out of or left in to Walters Road.

1.3 Information Provided by the Client

The client has provided the following traffic count information:

- Walters Road – no counts
- Green Pigeon Road – year 2007 – 7 day count 291 – 10.1%HV
- No crashes recorded at the site in the last 5 years

Note that the crash data was provided after the site inspection, and was not reviewed until after the audit findings were documented.

1.4 Audit Scope and Objective

This report is for the RSA of the existing road intersection Green Pigeon Road and Walters Road, Horseshoe Creek, located approx. 11.4km north of Kyogle. The scope of the RSA is limited to an assessment of the existing intersection from the perspective of all road users, from all approaches, during day and night conditions.

The objective of this RSA is to identify any potential road safety issues/deficiencies associated with the existing arrangement from the perspective of all road users that may need to be investigated and rectified. Positive aspects of the design have not been recorded.

This RSA is not a design check, although some design issues may be raised during the audit process. APP does not take responsibility for any suggested design changes made in this report.

1.5 Audit Team

Lead Auditor – Tony Cromack

- Senior Civil Engineer and Principal at Ardill Payne & Partners, with 30 years' experience in urban and rural road design
- Completed Bachelor of Technology (Engineering) through University of Southern Queensland (1999)
- Technologist Member – Engineers Australia
- Member – Institute of Public Works Engineering Australasia (IPWEA)
- NSW RMS accreditation to Prepare Work Zone Traffic Management Plans
- Completed Road Safety Audit Course through IPWEA (2014)
- Completed Lead Road Safety Audit Course through IPWEA (2017)
- Registered Level 3 Road Safety Auditor (NSW)

Auditor – Graeme Robertson

- Coordinator of Asset Management at Richmond Valley Council, with 7 years' experience in Local Government road management
- Completed Bachelor of Technology (Engineering) through University of Southern Queensland
- Member – Institute of Public Works Engineering Australasia (IPWEA)
- Level 1 Bridge Inspection, ARRB (2012)
- Sprayed Sealing Selection & Design, AAPA (2013)
- Completed Road Safety Audit Course through IPWEA (2014)
- Registered Level 2 Road Safety Auditor (NSW)

In addition, the following person joined the audit team as an observer, for training purposes:

Auditor – Hayley Collins

- Design Officer at Lismore City Council, with 11 years' experience in urban and rural road design (Richmond Valley Council and Lismore City Council)
- Certificate IV in Surveying – Brisbane North Institute of TAFE (2011)
- Diploma Civil Construction Design – TAFE NSW Riverina Institute – Leeton Campus (2013)
- Prepare a Work Zone Traffic Management Plan (2017)
- Implement Traffic Control Plans – RMS (2016)
- Designing for Pedestrians and Bicycle Riders – RMS (2016)
- Conduct Road Safety Audits (RSACRS002A) – IPWEA (2017)

2. Road Safety Audit Program

2.1 Commencement Meeting

The commencement meeting was held via teleconference on 4 December 2017. Derryn Nix represented the client and Tony Cromack represented the audit team.

Issues discussed included:

- Mr. Cromack outlined the scope of the audit, reiterating that the audit is not a design check, and that recommendations will not be provided as part of the audit report
- Mr. Nix confirmed the scope of the audit was the intersection of Green Pigeon Road and Walters Road, Horseshoe Creek
- There are no existing or previous road safety audits or reports for the site
- There are no concept or design plans for any intersection upgrade
- There are no known environmental effects (fog, drainage, etc.) that will not be evident during the inspection. It was noted by Mr. Nix that the setting sun may be an issue
- Council will provide road traffic volumes
- Local residents are of the opinion that the site has a crash history, but it is not supported by recorded data
- Further detail and specifics of Council's concerns were not raised or discussed to ensure the audit team could undertake an unbiased RSA.

2.2 Field Audit

The field audit was carried out by the audit team on the afternoon and evening of Monday 11 December 2017. The team drove through the intersection twice in each direction and filmed the drive from the dashboard of the vehicle.

The daylight audit took place between 4:00 and 4:30pm, and the evening audit was undertaken between 8:45 and 9:00pm.

The weather on the day was clear and sunny. There had been no rain in the previous 48 hours prior to the audit, and the road surface was dry.

Photographs of any deficiencies found were taken and notes were made.

2.3 Completion Meeting

A completion meeting generally involves the auditor and the client, and is an opportunity for clarification of aspects of the audit. A completion meeting has not been held at the time of preparing this report.

3. Risk Level Determination

Deficiencies raised in relation to the audit site have been given a risk level based on the associated safety priority, as categorised using **Table 1** to **Table 4**.

Table 1 - Frequency

| Frequency | Description |
|------------|---|
| Frequent | Once or more per week |
| Probable | Once or more per year (but less than once a week) |
| Occasional | Once every five to ten years |
| Improbable | Less often than once every ten years |

Table 2 - Severity

| Severity | Description |
|--------------|---|
| Catastrophic | Likely multiple deaths, for example: <ul style="list-style-type: none"> ▪ High-speed multi-vehicle crash ▪ Car runs into crowded bus stop ▪ Bridge collapse |
| Serious | Likely death or serious injury, for example: <ul style="list-style-type: none"> ▪ High/medium speed two-vehicle collision ▪ High/medium speed single-vehicle collision with fixed roadside object ▪ Pedestrian/cyclist struck at speed |
| Minor | Likely minor injury, for example: <ul style="list-style-type: none"> ▪ Low speed vehicle collision ▪ Cyclist falls from bike at low speed ▪ Rear-end collision |
| Limited | Likely trivial injury or property damage only, for example: <ul style="list-style-type: none"> ▪ Low speed vehicle collisions ▪ Car reverses into a post ▪ Pedestrian walks into object (no head injury) |

Table 3 - Risk

| Severity | Frequency | | | |
|--------------|-------------|-------------|-------------|------------|
| | Frequent | Probable | Occasional | Improbable |
| Catastrophic | Intolerable | Intolerable | Intolerable | |
| Serious | Intolerable | Intolerable | | Medium |
| Minor | Intolerable | | Medium | Low |
| Limited | | Medium | Low | Low |




Table 4 - Treatment



| Risk | Suggested Treatment Approach |
|-------------|---|
| Intolerable | Must be corrected |
| | Should be corrected or the risk significantly reduced, even if the treatment cost is high. |
| Medium | Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high. |
| Low | Should be corrected or the risk reduced, if the treatment cost is low. |

4. Findings

The following audit findings were identified during the inspection. Audit findings are a listing of identified safety deficiencies: what is potentially dangerous about the road or what could lead to crashes occurring or injury resulting.

Table 5 – Audit Findings

| Number | Description | Risk Rating |
|--------|--|--|
| 01 | <p>Sight distance from Walters Road - south</p> <p>Sight distance to the south is poor. Overhanging vegetation on the inside of the bend further reduces sight distance.</p> <p>Sight distance for vehicles approaching from the south is also poor. Vehicles wishing to turn right into Walters Road do not have good sight of approaching through traffic.</p> <p>There is a risk that vehicles exiting or entering Walters Road could collide with through traffic.</p> <p>Refer to Photo Nos. 1 and 2.</p> | <p>Frequency: Occasional</p> <p>Severity: Serious</p> <p>Risk: </p> |
| 02 | <p>Sight distance from Walters Road - north</p> <p>Sight distance to the north is adequate. However, the angle and grade of the Walters Road approach makes it difficult for drivers to look north and check the line of sight.</p> <p>There is a risk that vehicles exiting Walters Road could collide with through traffic.</p> | <p>Frequency: Improbable</p> <p>Severity: Serious</p> <p>Risk: Medium</p> |
| 03 | <p>Walters Road – intersection alignment</p> <p>Walters Road intersect with Green Pigeon Road at an acute angle. This makes it difficult for drivers to look north and check the line of sight. Drivers wishing to turn right from or left into Walters Road would find it very difficult due to the alignment. For heavy vehicles, this movement would be almost impossible. Drivers wishing to turn right would do so much slower due to the alignment, thereby increasing the risk of an accident.</p> <p>There is a risk that turning vehicles could cross to the wrong side of the road and collide with other traffic.</p> <p>Refer to Photo No. 2.</p> | <p>Frequency: Occasional</p> <p>Severity: Serious</p> <p>Risk: </p> |
| 04 | <p>No line marking on Green Pigeon Road</p> <p>The bend at the intersection is not line marked.</p> <p>There is a risk that vehicles could stray to the incorrect side of the road whilst negotiating the bend, or slowing to turn.</p> <p>Refer to Photo Nos. 1 and 2.</p> | <p>Frequency: Occasional</p> <p>Severity: Serious</p> <p>Risk: </p> |

| | | |
|----|--|--|
| 05 | <p>Walters Road – standard and width of approach</p> <p>Walters Road is a gravel formation and the approach to Green Pigeon Road is narrow and steep. Vehicles entering Walters Road could lose control in the gravel. Vehicles exiting Walters Road could have traction problems when accelerating. There is insufficient room for two vehicles to pass in Walters Road.</p> <p>There is a risk that turning vehicles could lose control and collide with another vehicle, or run off the road. Lack of width on Walters Road could cause confusion among drivers resulting in a collision.</p> <p>Refer to Photo No. 3.</p> | <p>Frequency: Improbable</p> <p>Severity: Serious</p> <p>Risk: Medium</p> |
| 06 | <p>Convex mirror</p> <p>There is a convex mirror located in the SE corner of the intersection. It is unclear what benefit this mirror provides as the angle of the mirror seems unsuitable.</p> <p>There is a risk a driver may rely on the mirror for sight and misjudge approaching traffic, resulting in a collision with through traffic.</p> <p>Refer to Photo Nos. 1 and 2.</p> | <p>Frequency: Improbable</p> <p>Severity: Minor</p> <p>Risk: Low</p> |
| 07 | <p>Approach signage from south</p> <p>A 'Side Road Intersection on Curve' sign is missing from the southern approach.</p> <p>There is a risk that a driver may not be aware of the approaching intersection and collide with a car waiting to turn, or enter the intersection too fast and lose control, colliding with oncoming traffic and/or roadside hazards.</p> | <p>Frequency: Occasional</p> <p>Severity: Serious</p> <p>Risk: </p> |
| 08 | <p>Limited advanced warning of curves</p> <p>The bend on Green Pigeon Road at the intersection is not well defined, particularly at night (e.g. advance warning signs, advisory speed signs, CAMs).</p> <p>There is a risk that a driver could misjudge the road alignment and either collide with oncoming traffic and/or roadside hazards (e.g. tree).</p> <p>Refer to Photo Nos. 1 and 2.</p> | <p>Frequency: Occasional</p> <p>Severity: Serious</p> <p>Risk: </p> |
| 09 | <p>Grid sign at night</p> <p>In the approach to the intersection from the south at night, the 'Grid' sign on the side road is illuminated by headlights.</p> <p>There is a risk that the sign could cause confusion for approaching drivers, resulting in the vehicle losing control and colliding with oncoming traffic and/or roadside hazards.</p> | <p>Frequency: Improbable</p> <p>Severity: Minor</p> <p>Risk: Low</p> |

5. Concluding Statement

The audit has been carried out for the sole purpose of identifying any features of the intersection which could be altered or removed to improve the safety of the intersection. The accompanying findings are put forward for consideration by Council for implementation.

The alignment of the intersection is sub-standard – tight bend on Green Pigeon Road coupled with the acute angle of entry of Walters Road. Sight distances, especially to and from the south, are inadequate. Heavy vehicles would find it almost impossible to turn left into or right out of Walters Road.

Walters Road at the intersection is also sub-standard – narrow pavement, steep approach grade, and gravel surface.

Advance intersection warning signage in the southern approach is missing, along with curve speed advisory signs. The provision of CAMs and line marking on the bend is advisable.

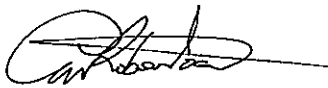
It should be noted that while every effort has been made to identify potential safety hazards, there is no guarantee that every deficiency has been identified.

No 'intolerable' risks were identified during the audit. As per **Table 4**, risks with a 'medium' ranking 'should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.' Risks with a 'high' ranking 'should be corrected or the risk significantly reduced, even if the treatment cost is high'. It is recommended that audit findings be investigated with satisfactory corrective actions identified and implemented.



14/12/2017

Tony Cromack, Senior Civil Engineer (APP)
AUDIT TEAM LEADER



14/12/2017

Graeme Robertson, Asset Management Coordinator (RVC)
AUDIT TEAM MEMBER



14/12/2017

Hayley Collins, Design Officer (LCC)
AUDIT TEAM MEMBER

Attachments

- | | |
|--------------|--------------------------------------|
| Attachment 1 | Site Photographs (taken 11/12/2017) |
| Attachment 2 | General Comments and Recommendations |

ATTACHMENT 1

Attachment 1: Site Photographs
(taken 11/12/2017)



Photo No. 1: Green Pigeon Road, northbound.
Note: mirror location; lack of CAMs; tight bend



Photo No. 2: Green Pigeon Road, southbound.
Note: mirror location; angle of Walters Road



**Photo No. 3: Walters Road, approach to intersection.
Note: steep narrow approach; acute angle; gravel surface**

ATTACHMENT 2

Attachment 2: General Comments and
Recommendations

General Comments and Recommendations

Following is a list of general comments and observations made by the audit team during the audit inspection which may be of some use to Council:

- The intersection could be upgraded to improve the alignment and approach grade of the Walters Road entry
- Walters Road could be widened and sealed for a short distance to provide for two lanes
- Vegetation overhang on the inside of the bend, in the southern approach, could be pruned or removed to improve sight distance
- A 'Side Road Intersection on Curve' sign should be added to the northbound approach to the intersection, similar to the sign provided on the southbound approach
- Speed advisory signs should be installed in both approaches to the bend
- A centre line should be added on Green Pigeon Road around the bend (at the intersection) to define travel lanes
- Provision of a centre line on the bend at the intersection may be warranted
- Provision of CAMs on the bend at the intersection may be warranted, such that there are at least three CAMs per bend, with spacing in accordance with the relevant guidelines.

