ROWLANDS CREEK ROAD
(MITCHELL ST – CHOWAN CK RD)
TRAFFIC AND SAFETY ASSESSMENT

FOR

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1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been commissioned by Jim Glazebrook & Associates Pty Ltd to undertake a Traffic and Safety Assessment of key curves along a section of Rowlands Creek Road between Rowlands Creek Road / Mitchell Street intersection and the Rowlands Creek Road / Proposed Development access location. The study has been commissioned in response to Item 1, Paragraph 1 of Tweed Shire Councils information request (14/02/2017) and response email (07/04/2017), see Appendix B, relating to the developments proposed use of heavy vehicles along Rowlands Creek Road.

This assessment specifically responds to the section of Tweed Councils Information Request outlined below:

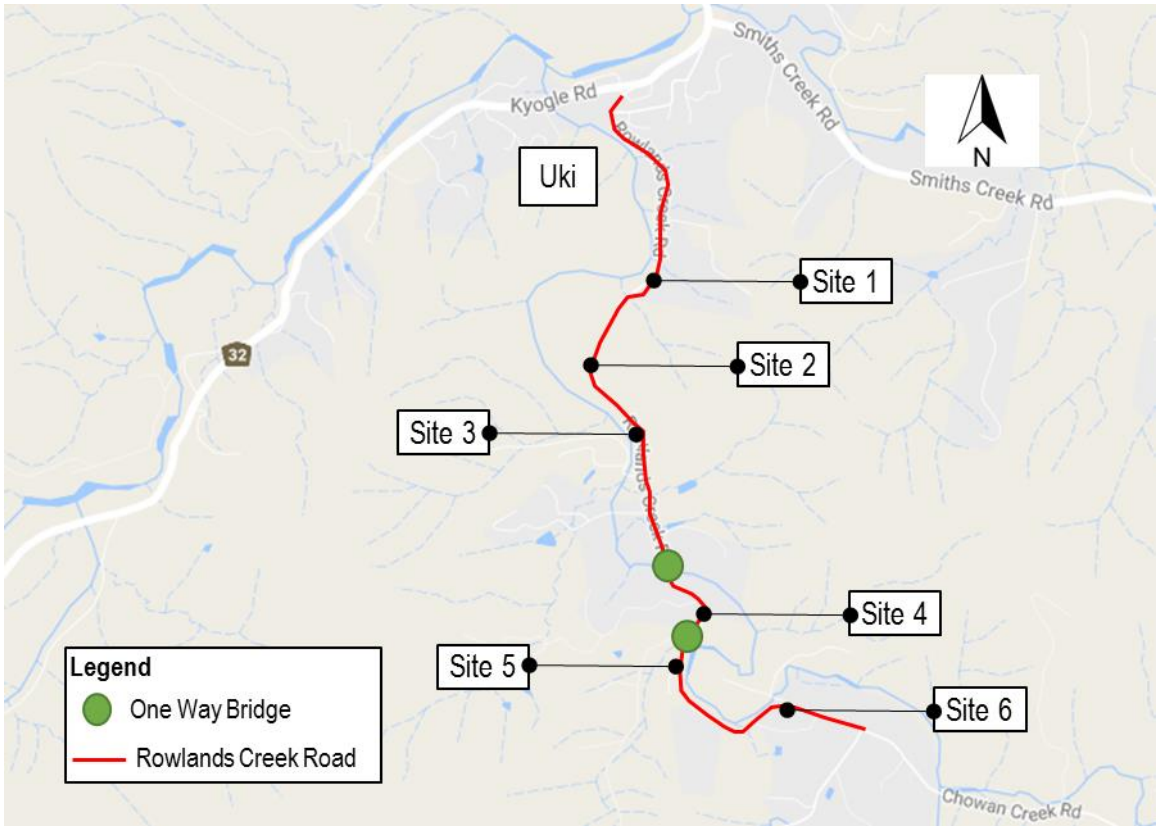
"Please provide an assessment, including swept paths at operating speeds, of Rowlands Creek Road's curves particularly between the creek crossings to indicate that two 15m trucks are able to pass with at least 0.6m separation. Should the above assessment indicate that road upgrades or widening are required then plans are to be submitted with sufficient detail to enable an assessment by Council."

1.2 SCOPE

The scope of work for this assessment involved the following:

- undertake a site inspection;
- an existing conditions road safety review of Rowlands Creek Road between Mitchell Street intersection (Ch 0.00) and the Proposed Development Access Road (Ch 3.34);
- a probability analysis of two vehicles crossing each other along Rowland's Creek Road;
- undertake swept path assessment at constrained curves "*particularly between the creek crossings"*. Swept paths assessments were undertaken over aerial photos with approximated road edgelines; and
- preparation of a report summarising the findings and any recommendations.

The extent of the study area is approximately 3.34km in length and contains six (6) key curves to be assessed, an overview of the study area and each of the key curve locations is shown in Figure 1.1.



Source: Google Maps

Figure 1.1: Study Area

1.3 LIMITATIONS FOR INTERPRETATION OF AUDIT RESULTS

Actions have been suggested for each of the issues identified, primarily as a guide for the personnel responsible for selecting and implementing remedial measures. It is not intended to imply that the suggested actions are the only possible actions.

2. PROBABILITY ANALYSIS

The following section provides a probability analysis to determine the likelihood of two vehicles passing each other along the study section between the Rowlands Creek Road/Mitchell Street intersection and the proposed development access location.

2.1 ROWLANDS CREEK ROAD TRAFFIC VOLUMES

Councils traffic data for Rowlands Creek Road identifies an Average Daily Traffic (ADT) of 499 vehicles (surveyed 13/09/2012). In order to determine the peak hour vehicle volume on Rowlands Creek Road, a conservative 10% of ADT was adopted, which equates to 49 vehicles in the typical AM peak (7.30am-8.30am) and PM peak (3.30pm-4.30pm) periods.

Based on discussions with the client, it is understood that the proposed Water Truck arrival and departure will be managed to occur outside of typical peak times and school times on Rowlands Creek Road (i.e. arrival/departure before 6am or between 10am – 3pm). It is also understood that only one (1) water truck trip will occur at any single time, as the same truck will operate all three (3) development generated trips per day.

The area surrounding Rowlands Creek Road has had no significant development occur in recent times and considering the conservative application of peak hour traffic no growth in base traffic volumes has been applied to the following probability analysis.

2.2 VEHICLES PASSING PROBABILITY

The section of Rowlands Creek Road between the Mitchell Street intersection and the subject site currently has no speed restriction signage installed. As such a average operating speed of 60kph has been applied for the purposes of this assessment, based on observed traffic speeds, the roads rural environment and the number and extent of horizontal curves along the section. The section is approximately 3.34km in length and indicative chainage length has been applied beginning at the Mitchell Street intersection (Ch. 0.0km) as shown in Figure 2.1.

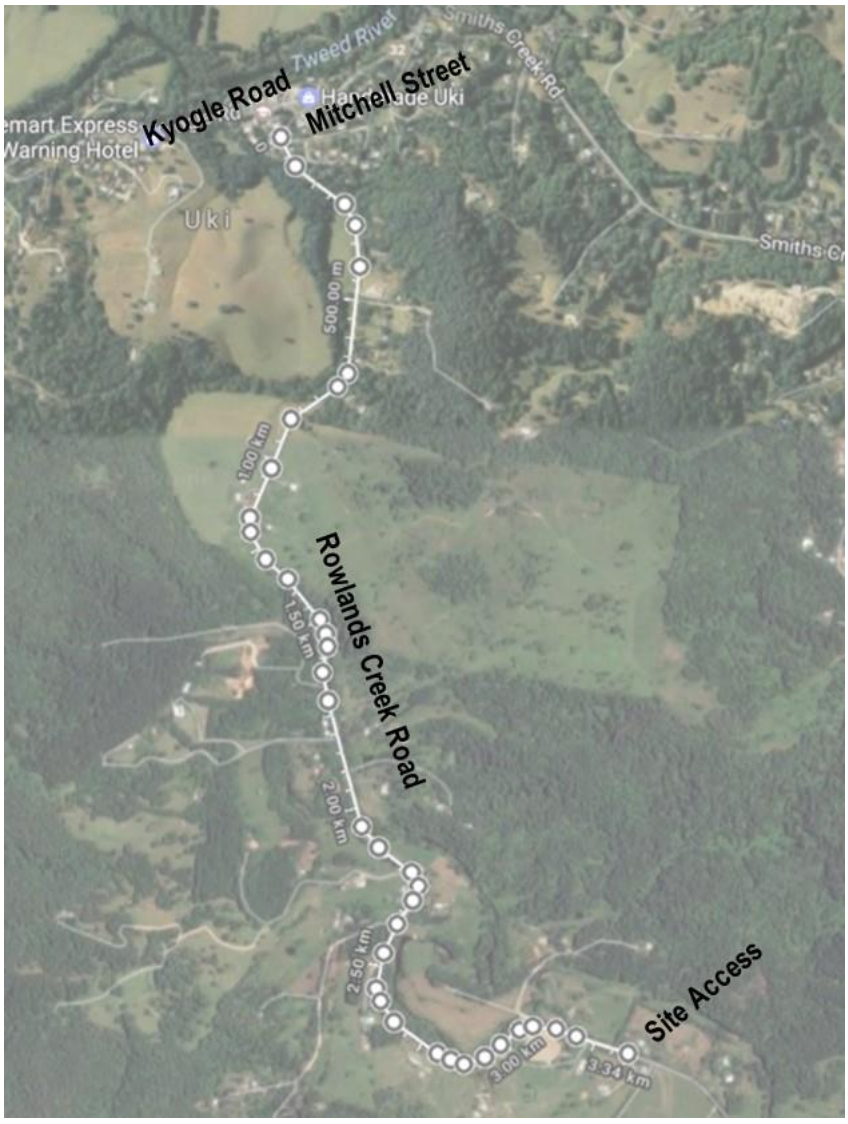


Figure 2.1: Road Section Indicative Chainage

Assuming an average operating speed of 60kph across the 3.34km section results in a total travel time of 3.34 mins (200.4 seconds). A directional traffic split of 30% southbound and 70% northbound has been applied for this assessment, as shown in Figure 2.2, based on typical peak period traffic flows. Total traffic volumes shown include the conservative 49 (peak period) vehicles plus a single water truck generated by the development.

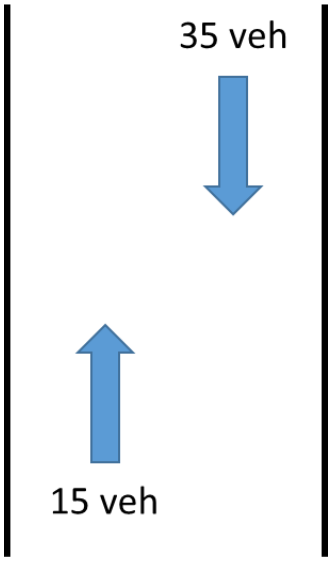


Figure 2.2: Peak Hour Volumes with development

2.2.1 Vehicle Headways

The following section provides a "first principles" assessment of the average vehicle headways to assist in determining the likelihood of two vehicles passing each other along Rowlands Creek Road. For this assessment, the following assumptions were made:

- a total route distance of 3.34km for vehicles to travel the road section between Mitchell Street/Rowlands Creek Road intersection and the development access;
- a travel time of 200.4 sec (3.34 minutes) for vehicles to travel the section travelling at an average speed of 60kph;
- all vehicles will traverse the entire section from beginning to end. It should be noted that this is a conservative assumption as many vehicles may arrive or depart at any location along the section; and
- traffic volumes applied, as per Figure 2.2, are for a conservative peak traffic period. It is noted that development traffic is expected to arrive outside of peak times and as such traffic volumes would be expected to be much lower.

Table 2.1 details the average total and directional headways for the assessed peak hour including development traffic.

Table 2.1: Average Traffic Headways

Total Traffic	Southbound Traffic	Northbound Traffic
72 seconds (1.2 minutes)	103 seconds (1.72 minutes)	240 seconds (4.0 minutes)

As detailed in Table 2.1 there is a possibility of 1 vehicle travelling in the northbound direction and 2 vehicles traveling in the southbound direction over the road section i.e. a total of 3 vehicles at any time on Rowlands Creek Road.

The differences in the time it takes for vehicles to traverse the section (3.34 minutes) and the average headways indicates that vehicles would only occasionally pass one another during the peak period. Considering this, and that development trucks will be arriving outside of peak periods, there is a very low probability of two trucks passing one another on the road section.

2.2.2 Probability Analysis Conclusion

As outlined within Bitzios traffic assessment, the proposed development is expected to generate a total of three (3) trucks to/from the site per day. Further, development operations are expected to result in only 1 truck from the development using Rowlands Creek Road at any time, either to or from the development (2 development trucks will never pass one another) and trucks will be conditioned to operate outside of peak traffic and school periods. In conjunction with the above headway probability analysis it is considered unlikely that a truck and car would pass along the road section, with the probability of 2 trucks passing extremely unlikely.

However, although the likelihood of two vehicles passing is low an assessment of the available road widths has been undertaken in Section 2.3. This assessment includes swept paths of constrained curves, in particular, those outlined by Council in their information request.

2.3 Road Widths and Swept Paths

2.3.1 Minimum Passing Width Requirements

The minimum width requirements for a water truck and car to pass and for two (2) trucks to pass is shown in Figure 2.3 and Figure 2.4 respectively.

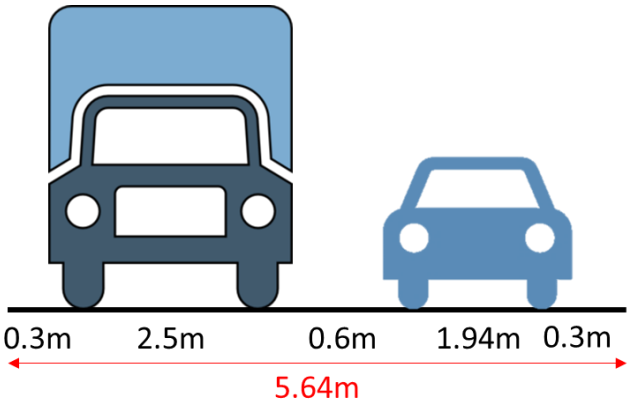


Figure 2.3: Truck Passing Car Minimum Width

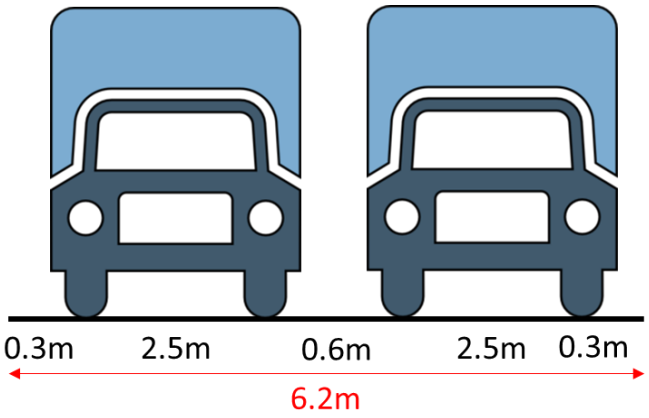


Figure 2.4: Two Trucks Passing Minimum Width

It is understood that these minimum widths will only apply to straight sections of road and greater shoulder widths may be required for significant curves. As such, the below swept path assessment in Section 2.3.3 focuses on the most constrained curve's along the assessed road section.

2.3.2 Existing Road Width

An assessment of road widths on-site and from Councils road condition database (see previous Bitzios Traffic Report) indicates the existing Rowlands Creek Road typically aligns with Council's standard drawing for a Class B rural road (S.D.009 – Aug-14 Rev C). Where a 6-metre-wide pavement is provided with 1.3 metre shoulders resulting in a minimum cross section width of 8.6 metres.

Although several locations along the road section do not appear to adhere to this design, most available road widths can accommodate the cross-sections outlined in Section 2.3.1. However, the road becomes constrained on curves where curve widening has not been accommodated for.

Curve 2, Curve 4 and Curve 5 present the most constrained cross-sections (See Figure 1.1).

2.3.3 Constrained Curve Swept Path Analysis

An indicative swept path analysis has been undertaken on the most constrained curves along the corridor to show a Water Tanker (15m) passing a large car (B99 sized vehicle – 5.2m) as well as a Heavy Rigid Vehicle (HRV – 12.5m). Full swept paths are included in Appendix B. The most constrained curves include Curve 2, Curve 4 and Curve 5.

- **Curve 2**: A car and Water Truck can pass one another successfully on the existing road space, however sight distance is limited due to hill crest adjacent to corner. A Water Truck and HRV require further road width. Civil works reducing the crest height and cutting back batters to widen the road corridor would provide a safer cross-section throughout the curve (see Section 3);
- **Curve 4**: A car and Water Truck can pass one another successfully on the existing road space. A Water Truck and HRV require further road width. Minor road and shoulder widening, including passing bays at strategic points, would assist in providing a safe road cross-section throughout the curve (see Section 3); and
- **Curve 5**: A car and Water Truck can pass one another successfully on the existing road space. A Water Truck and HRV require further road width. Minor road and shoulder widening would assist in providing a safe road cross-section throughout the curve (see Section 3. It should be noted that this curve includes some flood damage where the road has collapsed making it effectively one-way for a short section.

As outlined in Section 2.2, the probability of two (2) trucks passing is extremely low. However, to address Council's concerns, in order to accommodate for this unlikely event several recommendations at each curve along the section have been made to alleviate risks. These recommendations are summarised as part of the safety assessment Section 3 and Table 3.1.

3. ROWLANDS CREEK ROAD ASSESSMENT

The following section summarises safety issues identified during an on-site assessment (undertaken 4th May 2017) of the six (6) curves along the road section and presents the suggested remedial measures to address the identified issues. Key assessment findings for the curves along Rowlands Creek Road are outlined below followed by a table of specific issues in Section 3.2.

The key section wide safety issues identified are as follows:

- flood damage due to early 2017 floods;
- narrow road corridor due to ditches/culverts/embankments;
- vegetation obscuring the sight lines;
- absence of speed restriction, curve warning and other signage; and
- insufficient shoulder/road widening at a number of curves.

It should be noted that although unsigned, road speeds across the section are limited by horizontal curves and the road environment. An approximate average operating speed of 60km/h was observed along the corridor and each curve has been assessed under this parameter.

3.1 ASSESSMENT OF SECTION CURVES

The following section outlines observed and analysed safety issues at each of the six (6) curves along the corridor section in relation to the ability for two (2) vehicles to pass. The locations of these issues are shown in Figure 3.1 to Figure 3.7 and Table 3.1 summarises these issues and suggests various treatment measures to improve the curve.

It should be noted that Council specifically mentioned an assessment of the road at Curve 4 and Curve 5 as part of their RFI, the remaining four curves have been assessed to provide a more thorough assessment of the road section.

3.1.1 Curve 1 Assessment

Located approximately at Ch. 0.72km the following observations were made for this curve:

- road has an approximate width of 6.2m (sealed) and greater than 1.5m shoulders (unsealed), which is considered sufficient;
- tree branch on side of road needs clearing, minor clearing/trimming required within shoulder to assist in road width and clearance;
- sight lines observed as sufficient during site inspection;
- steep drop noted along eastern edge, outside road shoulder; and
- minor works on existing road shoulders can be undertaken to provide an unsealed shoulder with gravel as per Councils Standard Drawing S.D.009 (Class B) to provide additional corridor width.

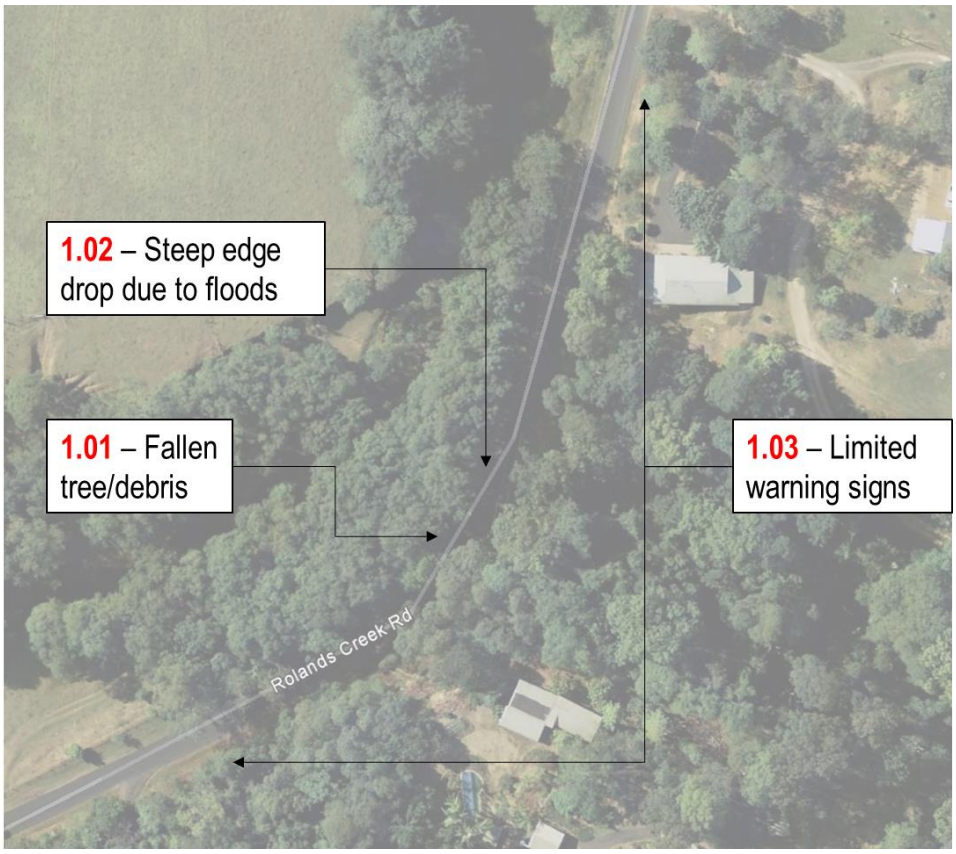


Figure 3.1: Issue Location Curve 1 of 6

3.1.2 Curve 2 Assessment

Located approximately at Ch. 1.16km the following observations were made for this curve:

- sight distance issues currently exist around bend for cars and trucks. It is noted that a truck drivers elevated sight distance is not as effected due to driver eye height. An elevated crest on eastern side of road is obstructing driver sight lines;
- minor civil works would be required to cut the batters back to provide adequate shoulder width and greater sight lines. Interim measures should be considered, such as installing truck and curve warning signage;
- NSW globe boundary data indicates the road corridor boundary allows width for cutting back batters for shoulder widening(as per Councils Standard Drawing S.D.009); and
- as confirmed on Councils website (see Figure 3.2), the boundary of *Lot Section Plan: 38//755730, Address: 117-120 Rowlands Creek Road UKI 2484* has road reserve width available for curve widening.

Source: Tweed Shire Council Online Maps

Figure 3.2: Council Road Corridor Boundary

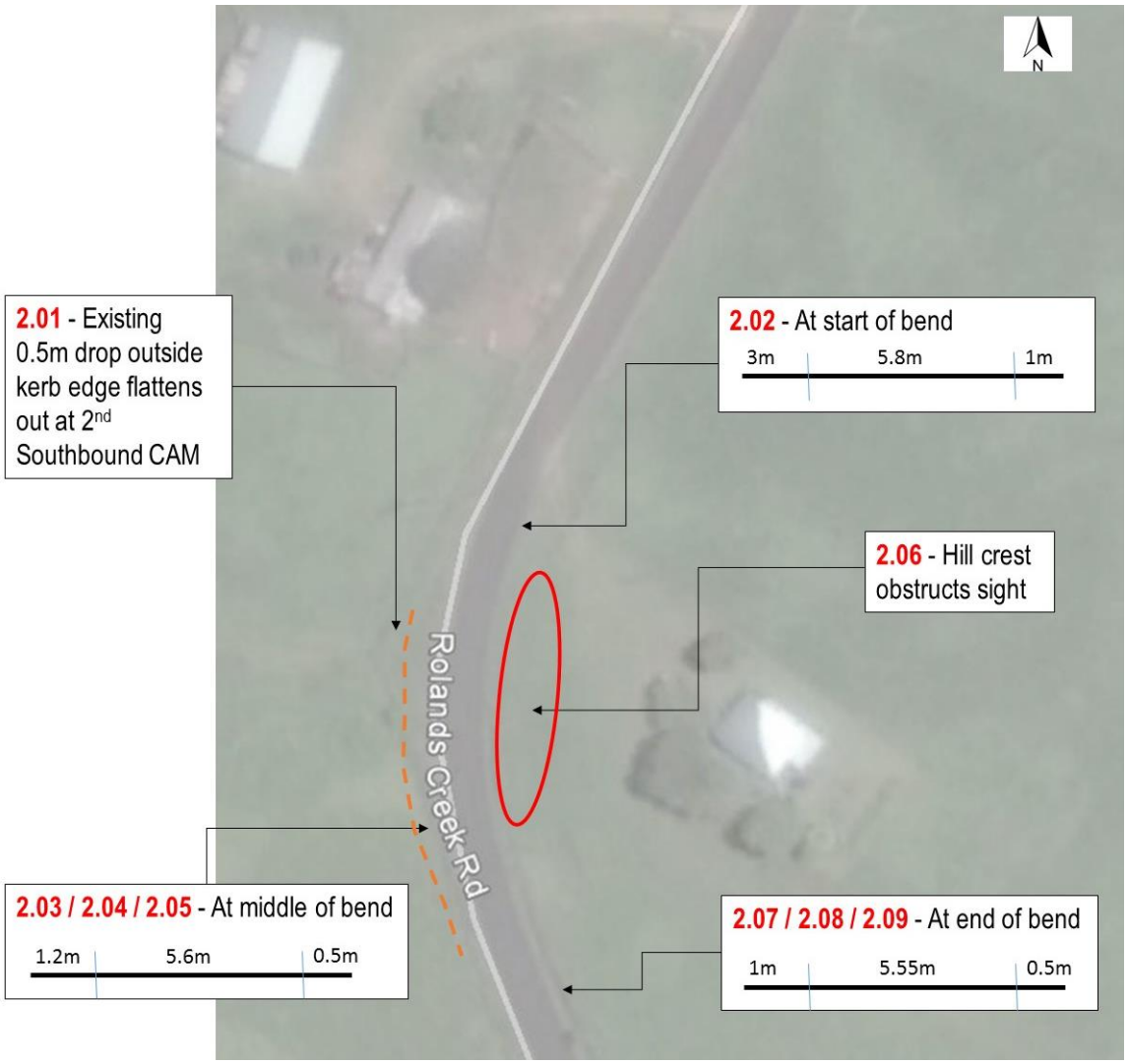


Figure 3.3: Issue Location Curve 2 of 6

3.1.3 Curve 3 Assessment

Located approximately at Ch. 1.55km the following observations were made for this curve:

- tree trimming along western side of road is required to improve northbound sight lines;
- this section of Rowlands Creek Road has minor flood damage outside of road shoulder, however road surface provides sufficient width as per Council's Standard Drawing for a Class B rural road; and
- there is available space along the eastern roadside to provide a 1.3 metre gravel shoulder (as per Councils Standard Drawing) and allow vehicles to use this space when passing large vehicles.

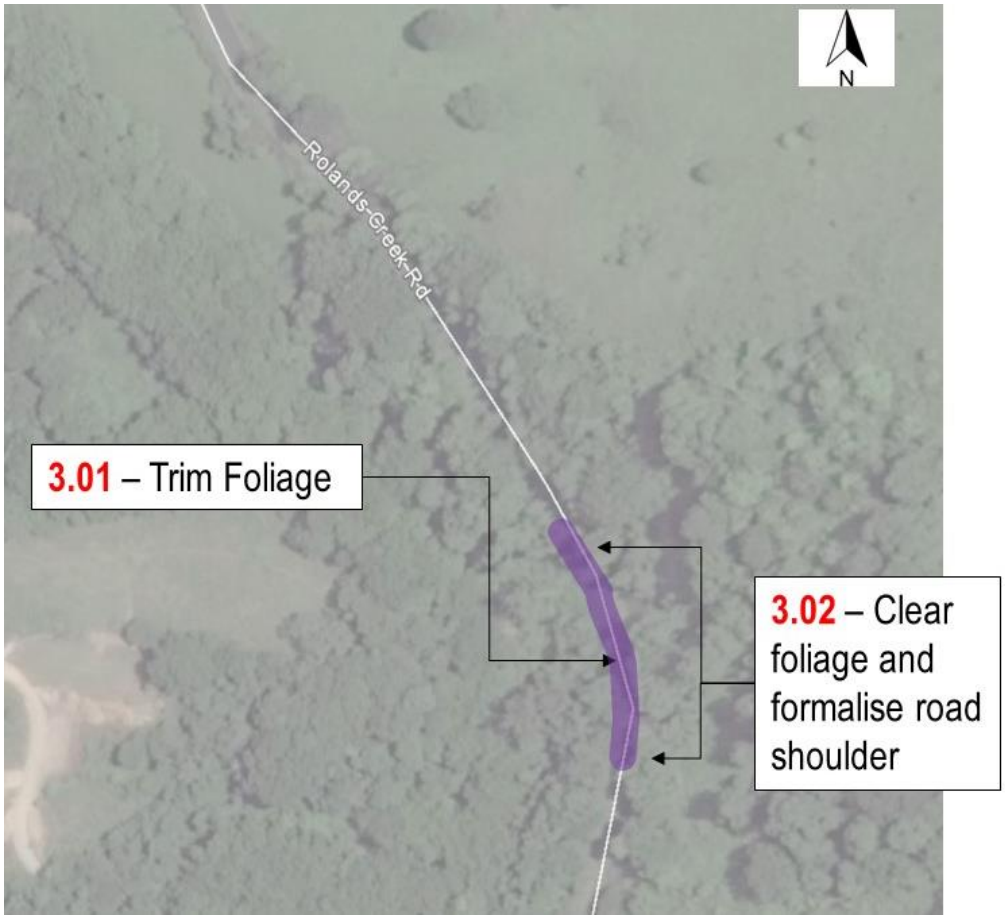


Figure 3.4: Issue Location Curve 3 of 6

3.1.4 Curve 4 Assessment

Located approximately at Ch. 2.25km the following observations were made for this curve:

- sufficient roadside space is available to widen unsealed road shoulder to 1.3 metres with gravel as per Councils Standard Drawing for Class B rural road;
- trimming foliage on eastern road side would improve sight lines;
- minor civil works to flatten part of gently sloped verge along western road edge would allow a wider shoulder for passing vehicles; and
- lack of curve warning signage approaching the curve and one-way bridges to the north and south of the assessed curve.

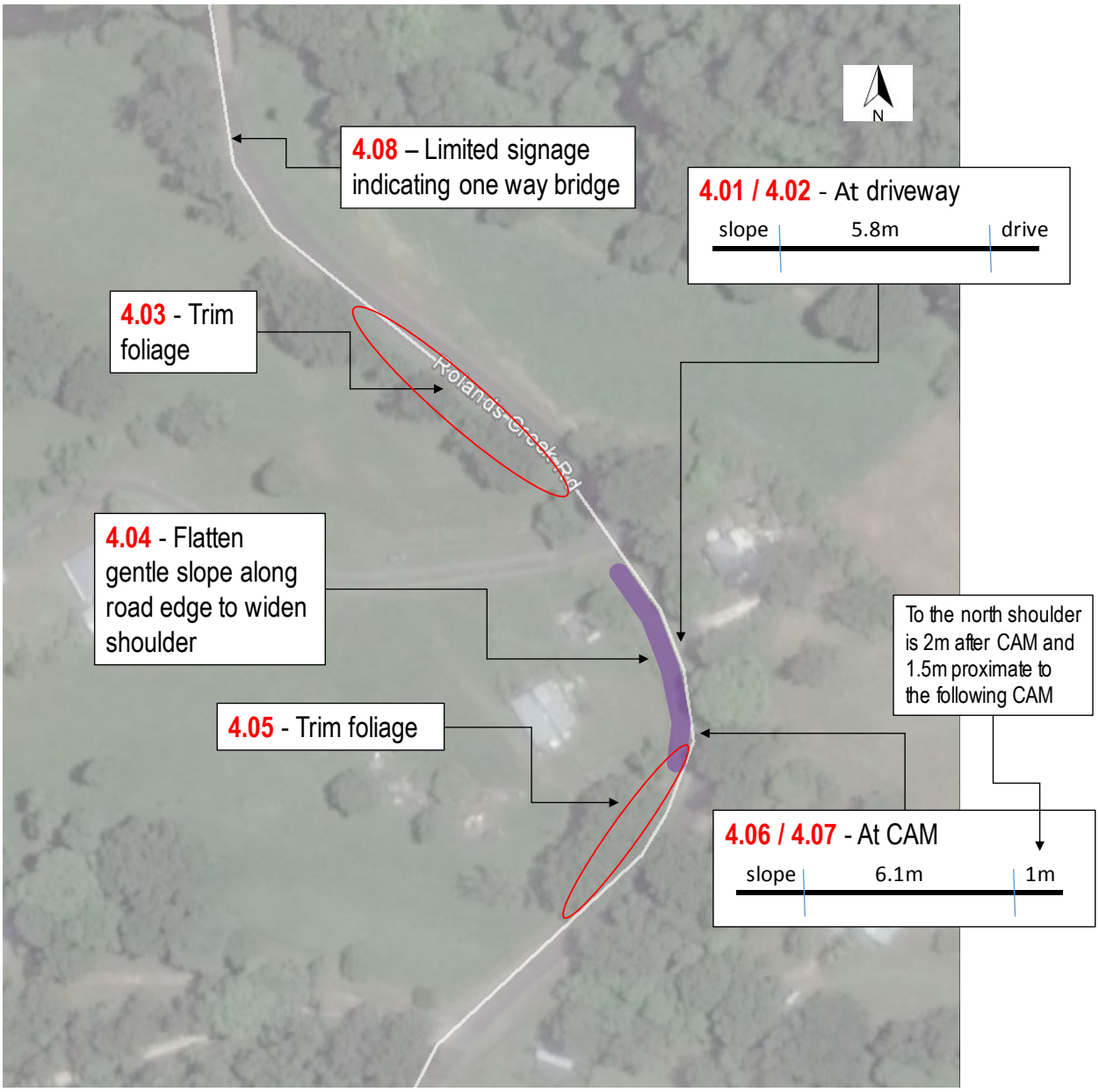


Figure 3.5: Issue Location Curve 4 of 6

It is noted that this curve was a key concern within Council's RFI request and exists between two one-way bridges.

3.1.5 Curve 5 Assessment

Located approximately at Ch. 2.57km the following observations were made for this curve:

- lack of warning signage and give-way line marking on approach to the one-way bridge to the north;
- sufficient space exists along western side of road to allow for vehicles to pass however the area needs clearing of foliage and formalising;
- road cross-section is constrained near driveway at southern end of corner. Consider extending or widening driveway area to the south and west to allow for larger passing area or stopping area;
- suggest installing truck warning signage on approaches to this curve; and
- it is noted that existing major flood damage at northern end of corner effectively makes the road one-way.

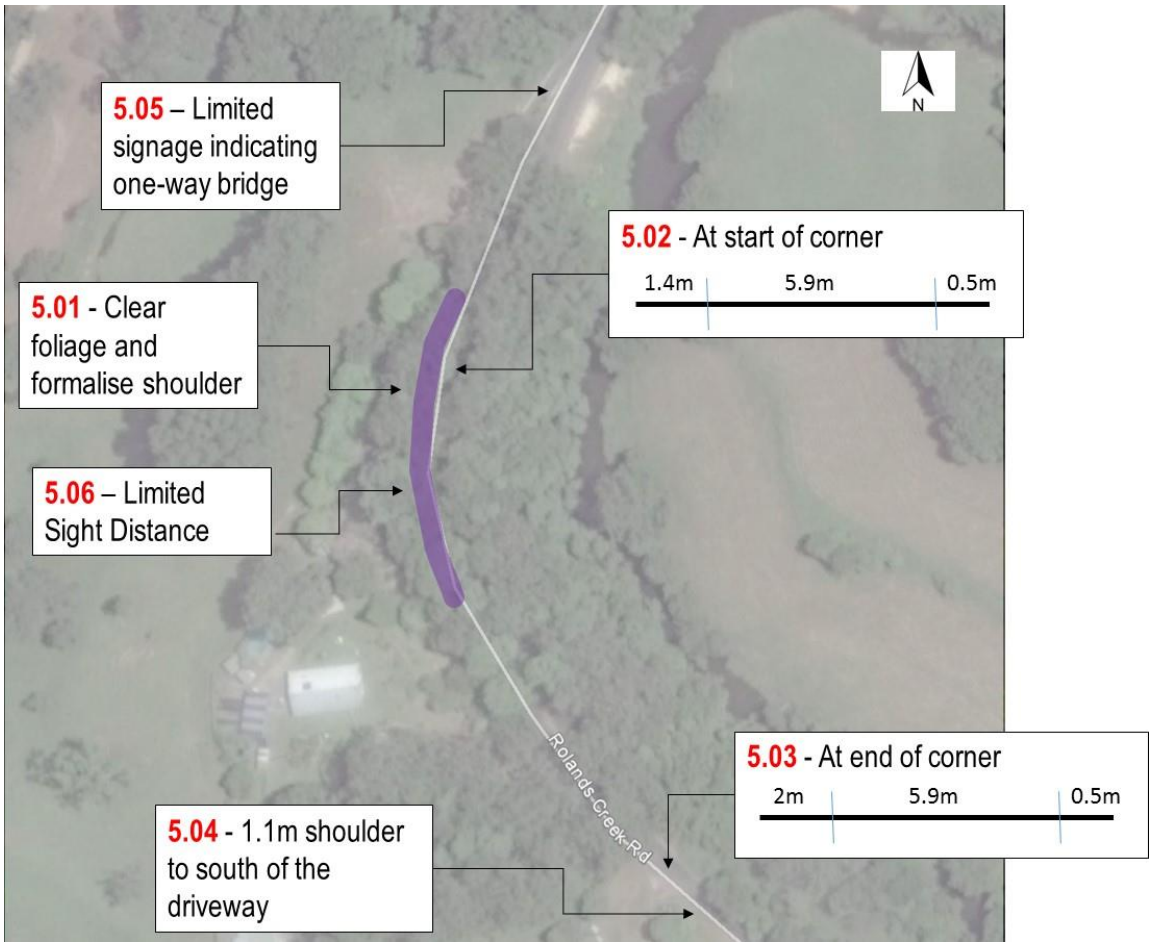


Figure 3.6: Issue Location Curve 5 of 6

3.1.6 Curve 6 Assessment

Located approximately at Ch. 2.92km the following observations were made for this curve:

- informal roadside shoulders provide sufficient width for 1.3 metre unsealed shoulders (as per Councils Standard Drawing) on both bends;
- trimming trees at north bend, on north side, would improve sight lines; and
- no curve warning signage to the east of eastern bend.

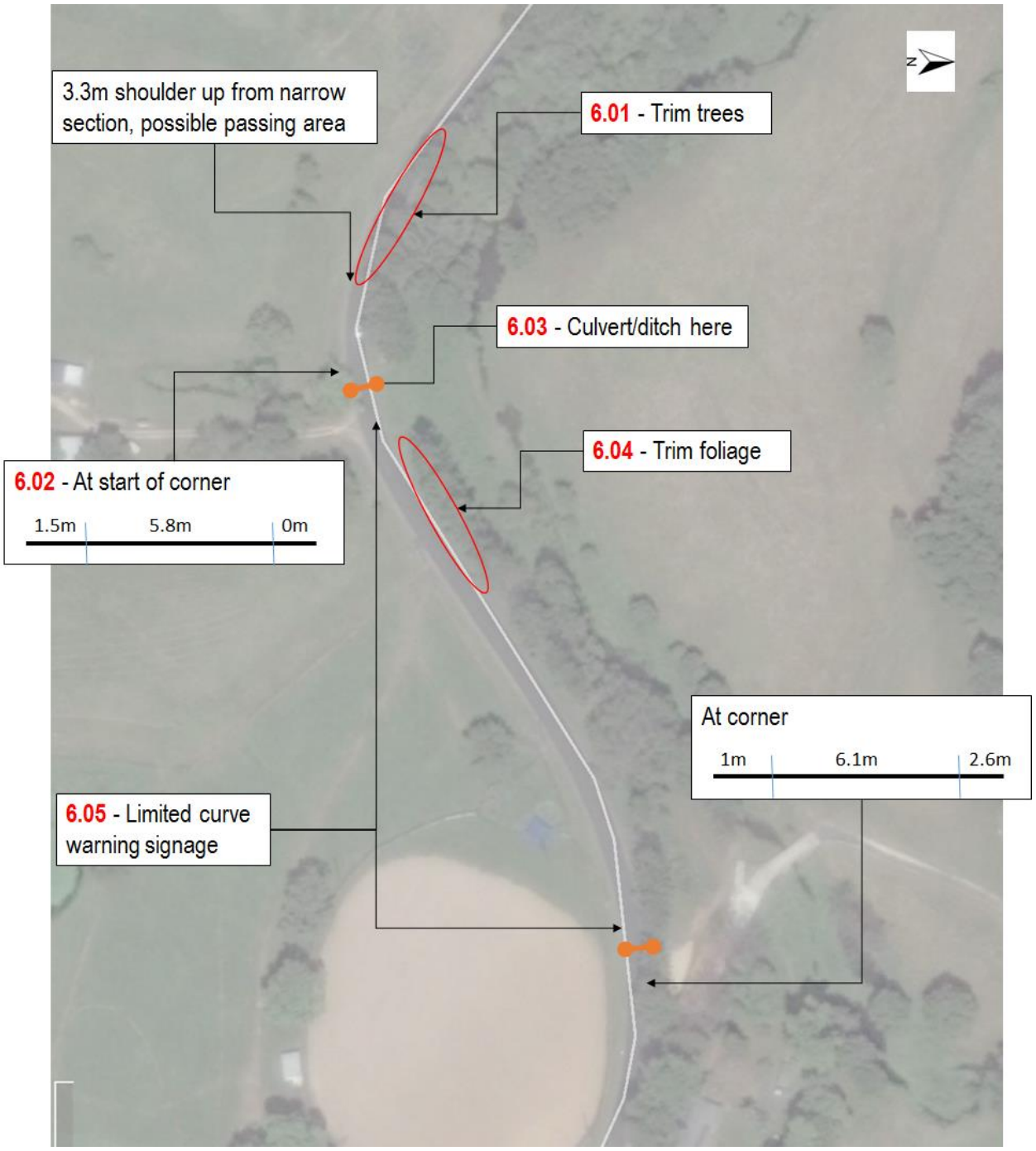


Figure 3.7: Issue Location Curve 6 of 6

3.2 ISSUES AND RECOMMENDATIONS

Table 3.1: Issues and Recommendations Summary

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
1.01	Ch. 0.99 km	Fallen tree east on side of road.		Clear shoulders of debris.
1.02	Ch. 0.98 km	Steep slope outside eastern shoulder of road.		While road width and shoulder widths are considered sufficient consider minor works to provide gravel on both shoulders as per Councils Standard Drawing for a Class B rural road to provide greater usability for vehicles.
1.03	Ch. 0.92 - 1.12 km	Absence of curve warning and recommended speed signage.		Investigate installing appropriate speed signage. Conisder installing curve warning signs on approach to curve. Installation of truck warning signs to the north of this curve would assist in driver awareness.
2.01	Ch. 1.49 km	Existing 0.5m drop outside western kerb edge.		Edge flattens out at the northern end of the curve, widening the shoulder at this location, by undertaking minor works to install gravel, would provide a larger shoulder/pull-over area for northbound vehicles when two vehicles pass.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
2.02	Ch. 1.45 km	Narrow eastern road shoulder at the northern end of the bend.		Road corridor boundary has road reserve width to provide a 1.3m shoulder along the eastern road edge. This would require minor civil works, including a possible retaining wall.
2.03	Ch. 1.50 km	Narrow western road shoulder at the middle of the bend.		Provide unsealed 1.3 metre western shoulder (as per Councils Standard Drawing) with gravel in conjunction with eastern shoulder widening (Items 2.02, 2.05, 2.09).
2.04	Ch. 1.50 km	Narrow road pavement width at the middle of the bend.		Consider widening road pavement to 6 metres in conjunction with elevated roadside verge works along this section. Provision of curve and narrow road warning signage on approach to curve is recommended.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
2.05	Ch. 1.50 km	Narrow eastern shoulder at the middle of the bend.		Road corridor boundary has road reserve width to provide a 1.3m shoulder along the eastern road edge. This would require minor civil works, including a possible retaining wall.
2.06	Ch. 1.49 km	Elevated section of verge adjacent to eastern edge of road obstructs sight lines on both approaches.		Consider civil works to reduce the size and/or set-back the elevated roadside verge from the road edge. It should be noted that truck sight distance is not as effected due to driver eye height (1.5m as opposed to 1.1m). In the interim curve warning and slow speed signage is recommended.
2.07	Ch. 1.52 km	Narrow western shoulder at the southern end of the bend.		Road corridor boundary has road reserve width to provide a 1.3m shoulder along the eastern road edge. This would require minor civil works, including a possible retaining wall.

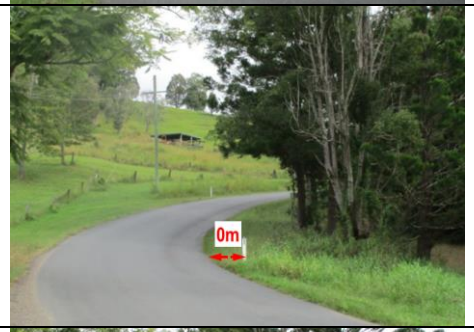
Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
2.08	Ch. 1.52 km	Narrow road pavement width at southern end of the bend.		Consider widening road pavement to 6 metres in conjunction with elevated roadside verge works along this section. Provision of curve and narrow road warning signage on approach to curve is recommended.
2.09	Ch. 1.52 km	Narrow eastern road shoulder at the southern end of the bend.		Road corridor boundary has road reserve width to provide a 1.3m shoulder along the eastern road edge. This would require minor civil works.
3.01	Ch. 1.81 km	Sight lines for northbound traffic are obstructed by foliage.		Undertake tree/foliage trimming on the western side of road to improve northbound sight lines.
3.02	Ch. 1.73 - 190 km	Road shoulder has debris and is not clear for vehicle use.		Space is available on the eastern road shoulder to provide a 1.3 metre gravel shoulder (as per Councils Standard Drawing) to allow vehicles to use this additional width safely.

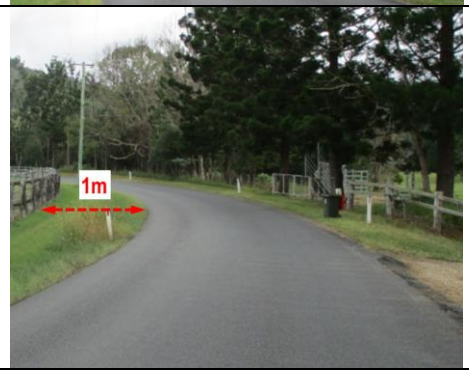
Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
4.01	Ch. 2.53 km	Small slope/rise along western shoulder opposite driveway for 239 Rowlands Creek Road restricts use of shoulder and road width.		Undertake minor works to flatten gentle slope within shoulder and provide a 1.5 metre gravel unsealed shoulder.
4.02	Ch. 2.53 km	Narrow road pavement at driveway for 239 Rowlands Creek Road.		Undertake minor works to flatten gentle slope within shoulder and provide a 1.5 metre gravel unsealed shoulder on eastern edge of road and provide 1.5m unsealed gravel shoulder along western road edge to provide greater corridor width.
4.03	Ch. 2.45 km	Trees and foliage obstruct northbound sight lines.		Trim foliage on eastern road side to the north of driveway for 239 Rowlands Creek Road.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
4.04	Ch. 2.52 - 2.59 km	Road shoulder is not formalised for vehicle use, restricted by small slope.		Install unsealed gravel shoulder around bend providing a wider shoulder that will allow vehicles to pass trucks. Install truck warning signage on approaches to curve.
4.05	Ch. 2.60 - 2.64 km	Trees and foliage obstruct southbound sight lines.		Trim foliage along eastern road edge on bend.
4.06	Ch. 2.59 km	Slope along west shoulder opposite southernmost CAM sign.		Shoulder space is available to widen road by providing unsealed gravel shoulders, refer to Councils Standard drawing for rural road and Item 4.01.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
4.07	Ch. 2.59 km	Narrow eastern road shoulder at southern most CAM sign.		To the north of the CAM the road shoulder widens to 1.5m and 2m proximate to the following CAM. This space can be formalised as unsealed gravel road shoulder to provide some storage space for passing vehicles.
4.08	Ch. 2.33 km	Limited signage to indicate one-way bridge to north of curve 4.		Install signage for approach to curve, including truck warning signs. Formalise one-way bridge operation with give-way line on southern side and signed on approach.
5.01	Ch. 2.83 - 2.93 km	Informal road shoulder along western side of road with obstructions and debris.		Clear foliage and provide unsealed gravel shoulder. This will provide sufficient width for trucks and cars to pass.
5.02	Ch. 2.86 km	Narrow eastern road shoulder at northern end of corner.		Install guideposts along edge and implement Item 5.01 recommendations.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
5.03	Ch. 3.01 km	Narrow eastern road shoulder adjacent to ditch and driveway for 284 Rowlands Creek Road.		Install guideposts along road edge and widen driveway area on western edge to provide a "stopping bay" area to allows vehicles to pass.
5.04	Ch. 3.02 km	Narrow western shoulder to the south of driveway for 284 Rowlands Creek Road.		Install unsealed gravel shoulder in available space along western edge and incorporate with Item 5.03.
5.05	Ch. 2.69 km	Limited signage to indicate one-way bridge to north of curve 5.		Install signage for approach to curve, including truck warning signs. Formalise one-way bridge operation with give-way line on southern side and signed on approach.
5.06	Ch. 2.88 km	Sight distance limited to approximately 80 metres around bend for cars.		Install truck warning signage on approach to curve.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
6.01	Ch. 3.15 - 3.17 km	Trees and foliage obstruct northbound and southbound sight lines along eastern side of road at the northernmost bend.		Trim trees and foliage to provide clearer sight lines.
6.02	Ch. 3.18 km	Narrow shoulder along the northern road edge at driveway.		Formalise the 3.3m wide shoulder as unsealed gravel shoulder to the north of driveway to provide a stopping bay area around bend for vehicles to pass if required.
6.03	Ch. 3.19 km	Culvert/ditch hazard.		Install guideposts at hazard.

Item	Locality/ Chainage*	Issues	Site Illustration	Recommendations
6.04	Ch. 3.22 - 3.28 km	Foliage along northern road edge to the west of corner obstructs sight lines.		Trim trees and foliage to provide clearer sight lines.
6.05	Ch. 3.20 - 3.42km	Limited curve warning signage for both bends.		Install curve warning signage on approach to eastern and western bends.

4. CONCLUSION

This assessment has identified potential safety issues for road users and others and has suggested improvements to eliminate or reduce these issues. Through the introduction of the recommendations outlined in this report, road safety should improve but this is also dependent on the awareness of the road user in their environment.

The assessment has been undertaken on the assumption that largest trucks using the road section will be the development's Water Truck (15 metres in length) and Heavy Rigid Vehicles (12.5 metres in length). The audit has not considered issues such as pavement loading or slope stability.

It is understood that the client is proposing to use 15m ARV (Water Truck) vehicles over this section. However, the ability for the road section to cater for the proposed development vehicles would be greatly improved with the implementation of the recommendations outlined in Table 3.1, including the following key treatments:

- shoulder formalisation with gravel to adhere to Councils standard drawing for a Class B rural road where existing shoulder width is available;
- installing curve and truck warning signage to improve awareness;
- minor civil works on two bends to improve available shoulder and road widths; and
- tree and foliage trimming at a number of locations to improve sight distances around bends.

Development trucks would be conditioned to operate on Rowland's Creek Road outside of school periods and to stay at low speeds (50kph) to further reduce the likelihood of impacts to other road users.

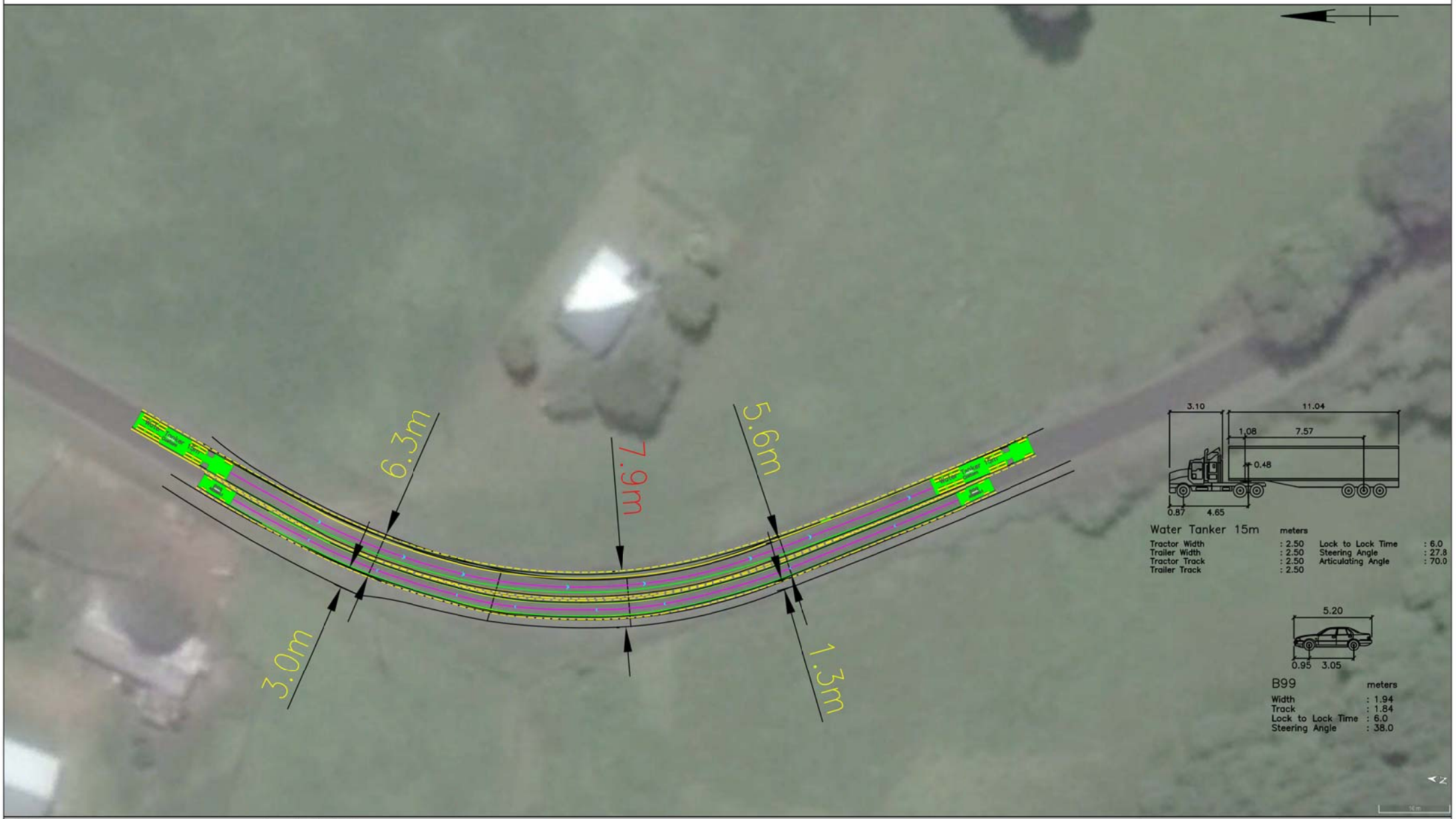
In addition, an assessment of probability, undertaken for a typical development operating hour (i.e. as per condition above), found that two vehicles are unlikely to pass along the section of road between the Mitchell Street/Rowlands Creek Road intersection.

In conclusion, with the additional of the suggested treatments, conditioning of the development operating times and low number of vehicles generated by the development, the operation of the proposed development can be conducted in a safe manner.

APPENDIX A

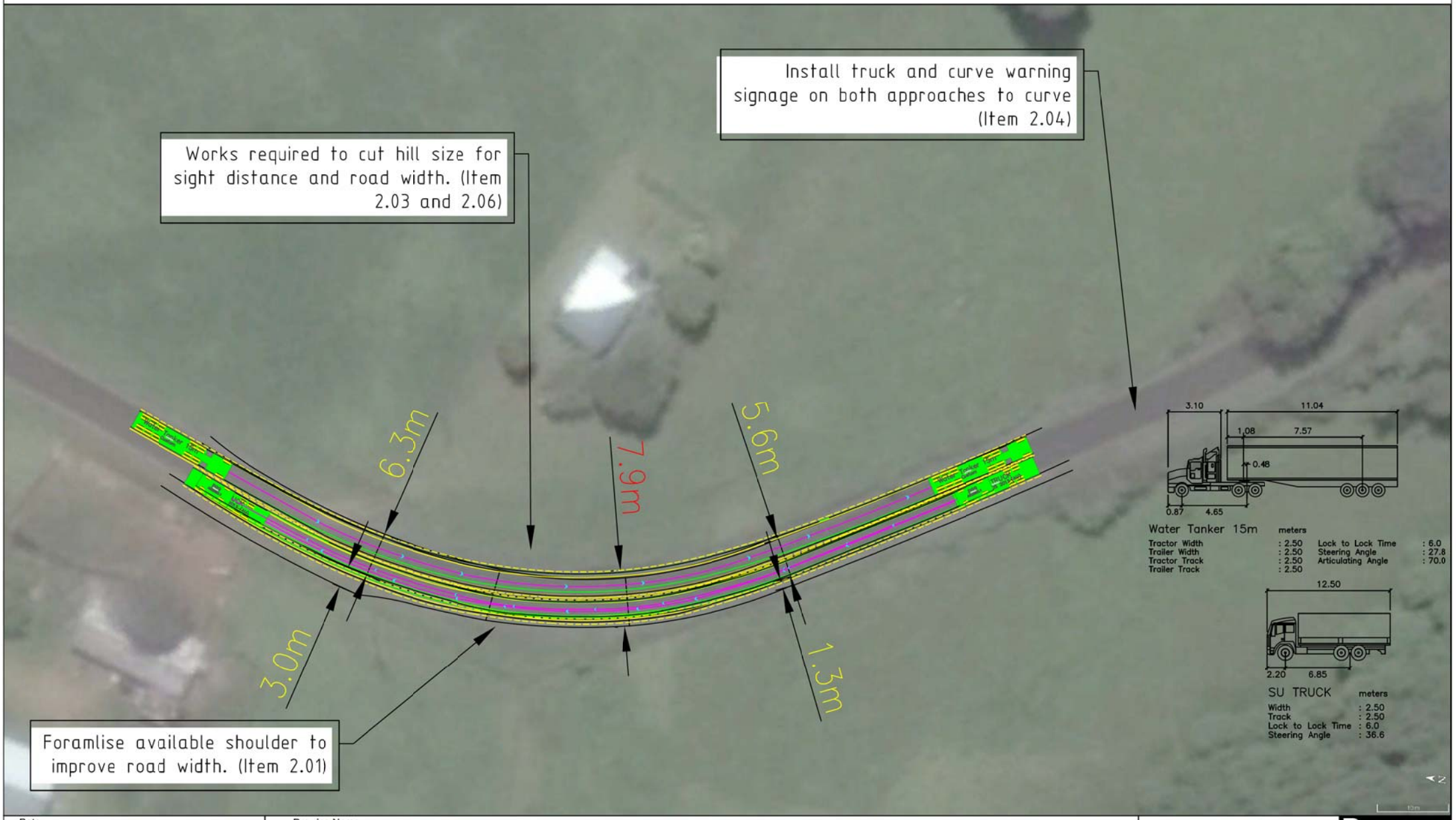
SWEPT PATH ASSESSMENT AND COMMENTS

NOT FOR CONSTRUCTION

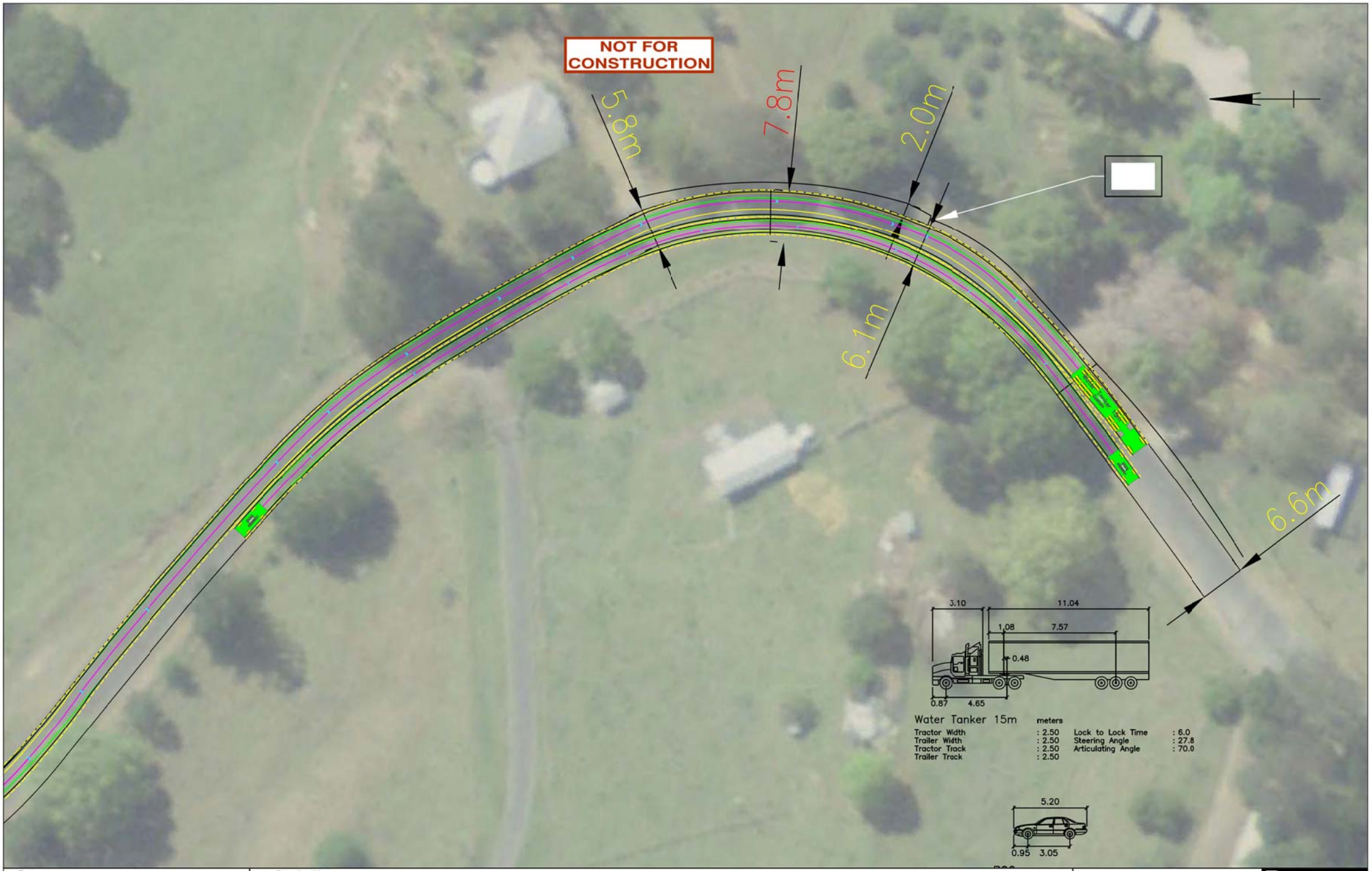


Date: 15/05/17	Drawing Name: Curve 2 (Ch. 1.5km) Swept Path Assessment - Truck and Car		BITZIOS consulting	
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1	Version A

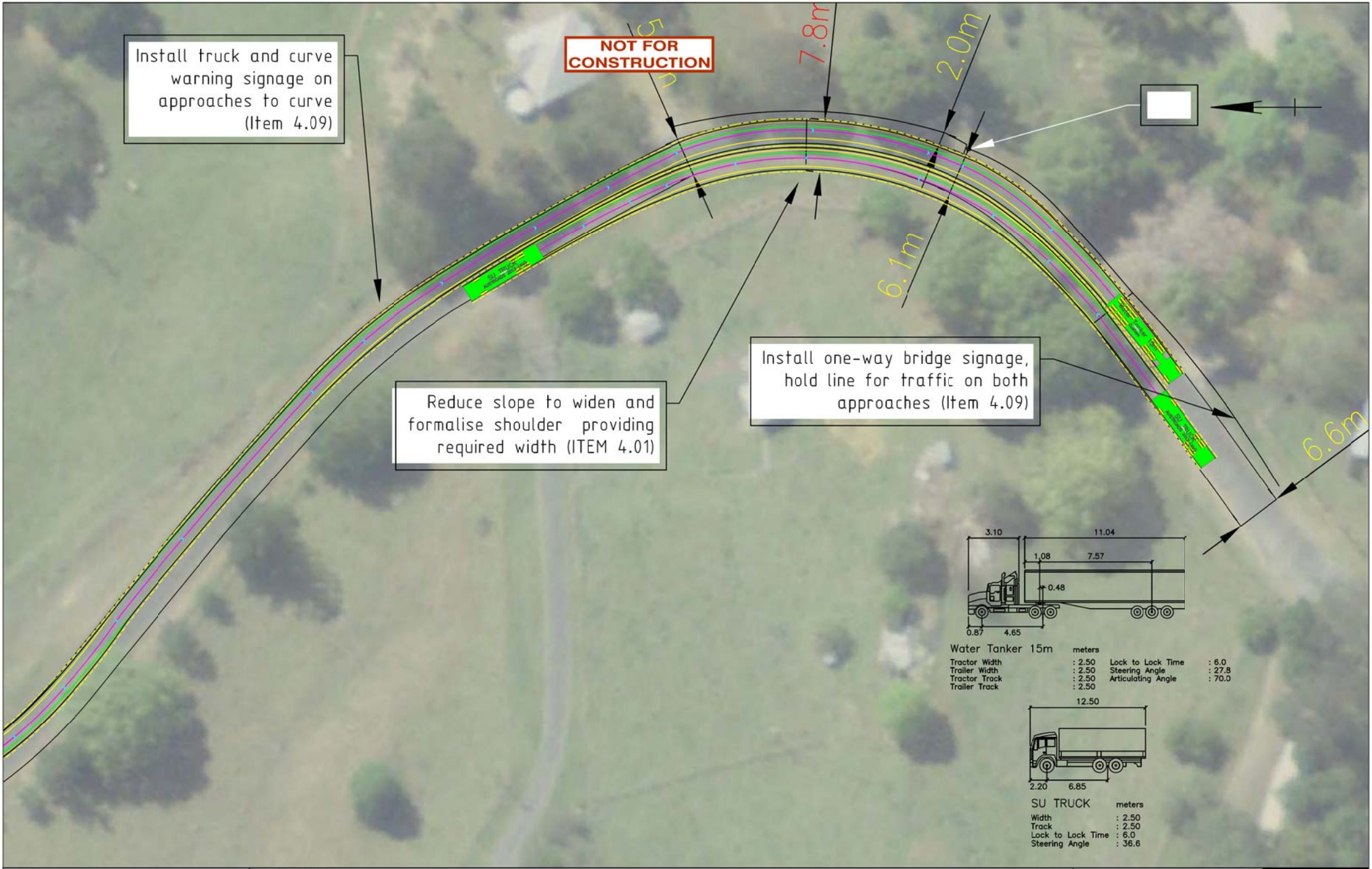
NOT FOR CONSTRUCTION



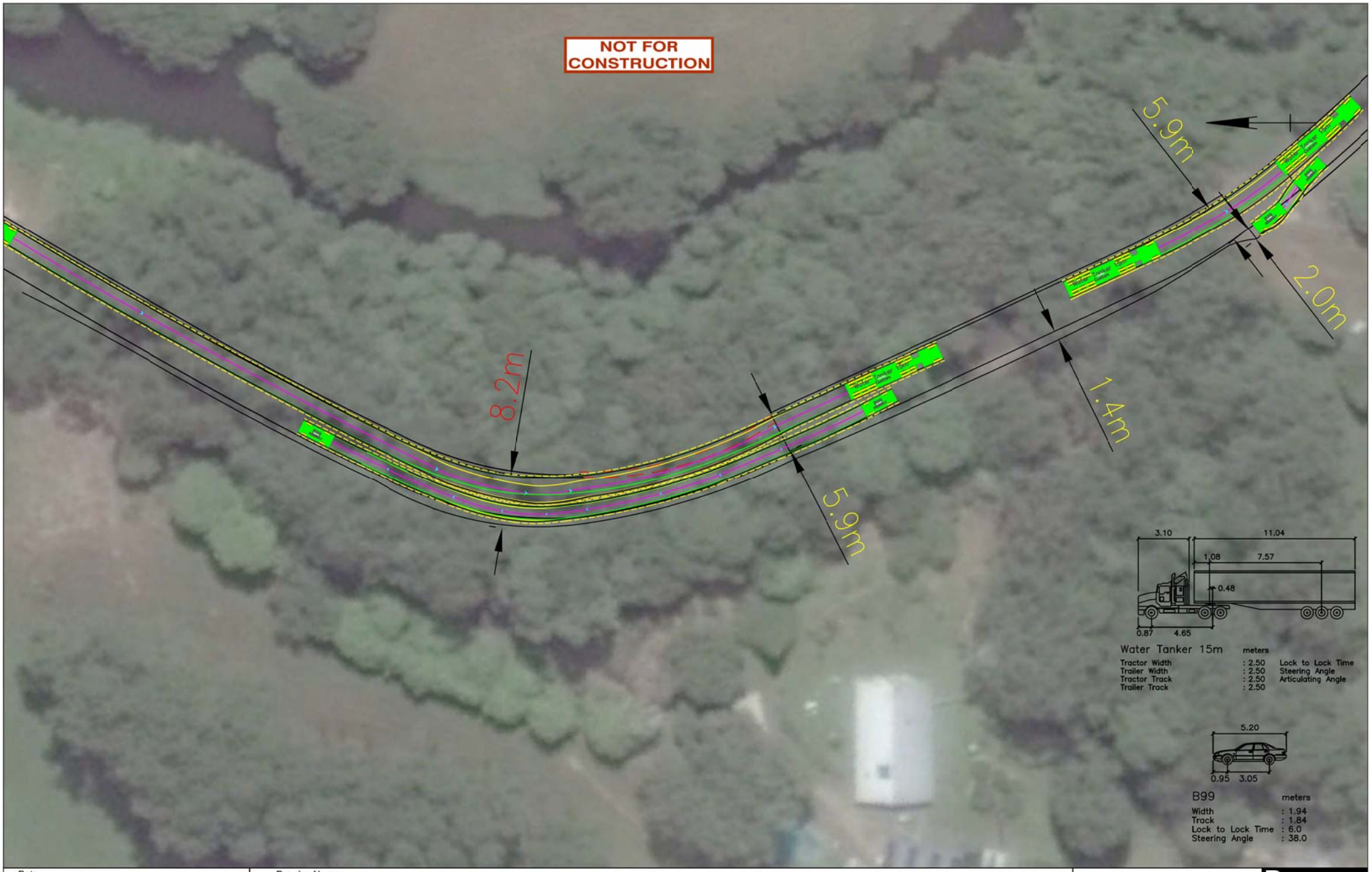
Date: 15/05/17	Drawing Name: Curve 2 (Ch.1.5km) Swept Path Assessment - Truck and HRV		BITZIOS consulting
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1 / Version A



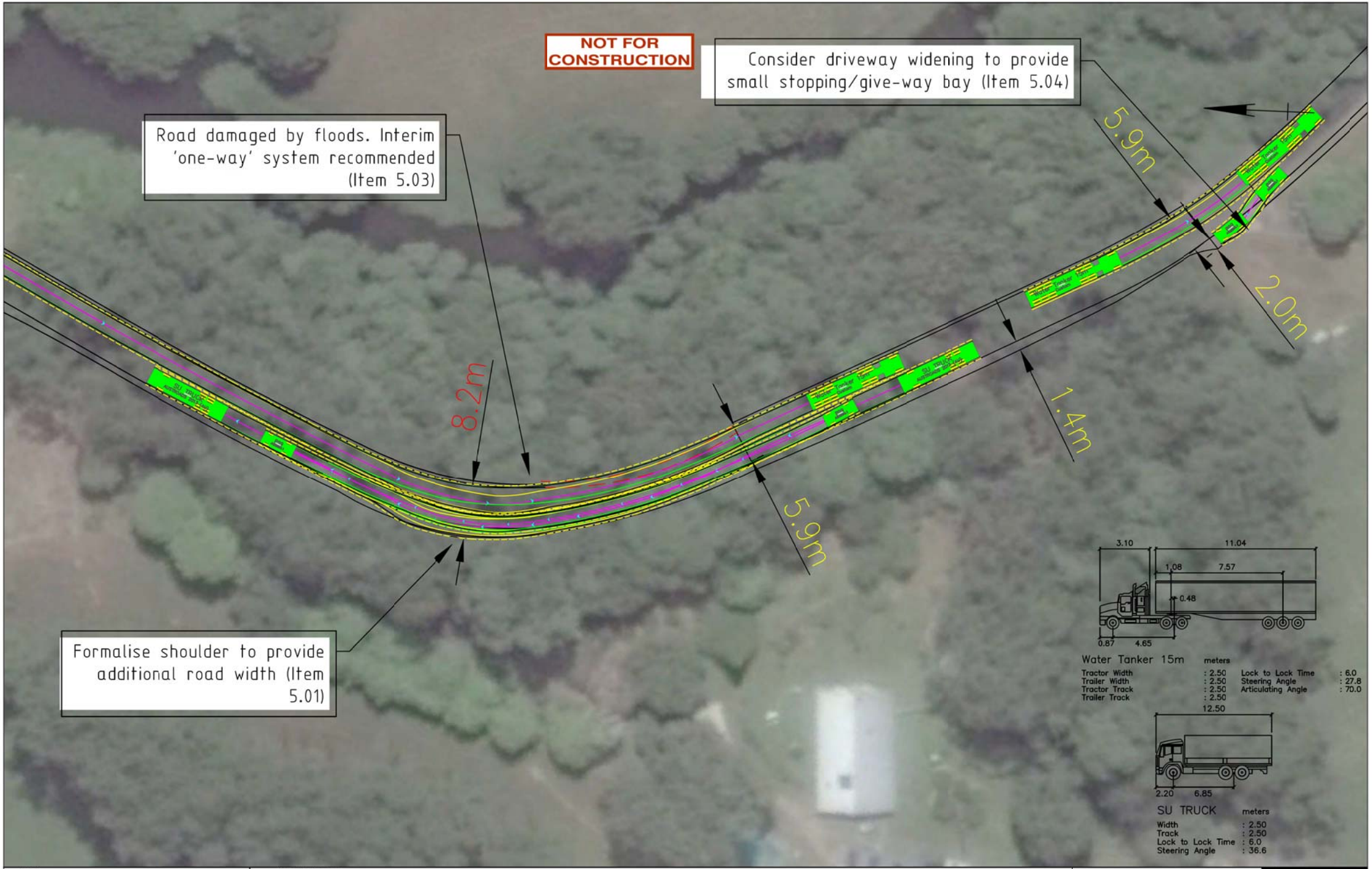
Date: 15/05/17	Drawing Name: Curve 4 (Ch.2.6km) Swept Path Assessment - Truck and Car		BITZIOS consulting
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1 / Version A



Date: 15/05/17	Drawing Name: Curve 4 (Ch.2.6km) Swept Path Assessment - Truck and HRV		BITZIOS consulting
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1 / Version A



Date: 15/05/17	Drawing Name: Curve 5 (Ch.3.0km) Swept Path Assessment - Truck and Car		BITZIOS consulting
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1 / Version A



Date: 15/05/17	Drawing Name: Curve 5 (Ch.3.0km) Swept Path Assessment - Truck and HRV		BITZIOS consulting
Project No: P2759	Project Name: Rowlands Creek Water Extraction Traffic Services	0 5 10 15 20m Scale 1:500 (A3)	Sheet 1 / Version A

APPENDIX B

COUNCIL RFI AND RESPONSES

Council Reference: DA16/0936 LN32986
Your Reference:

TWEED SHIRE COUNCIL

14 February 2017

Customer Service | 1300 292 872 | (02) 6670 2400

tsc@tweed.nsw.gov.au
www.tweed.nsw.gov.au

Fax (02) 6670 2429
PO Box 816
Murwillumbah NSW 2484

Please address all communications to the General Manager

ABN 90 178 732 496

Jim Glazebrook & Associates Pty Ltd
PO Box 827
MURWILLUMBAH NSW 2484

Dear Sir/Madam

Development Application for a water extraction facility at Lot 3 DP 815475; No. 350 Rowlands Creek Road ROWLANDS CREEK

I refer to the above application for approval for a water extraction facility and wish to advise that a satisfactory response is required in relation to the following matters:

1. **Traffic Assessment**
   Please provide an assessment, including swept paths at operating speeds, of Rowlands Creek Road's curves particularly between the creek crossings to indicate that two 15m trucks are able to pass with at least 0.6m separation. Should the above assessment indicate that road upgrades or widening are required then plans are to be submitted with sufficient detail to enable an assessment by Council.

   Please provide a further sight distance assessment to the west in consideration of eastbound traffic on Chowan Creek Road and 85th percentile speeds. The assessment should include any proposed warning signage and vegetation removal to improve awareness and recognition of the driveway.

   The applicant is advised that any approval will require upgrading of the access driveway to the property at 350 Rowlands Creek Road according to Council's requirements according to the driveway Access to property Design Specification Policy, subject to a Section 138 Roads Act application and approval.

√2. **Statement of Environmental Effects**
   The Statement of Environmental Effects (SEE) incorrectly references the zone objectives of the RU1 zone, rather than the correct zoning of the property, namely RU2 Rural Landscape. Please address this error.

3. **Hydrogeology Analysis**
   A hydrogeology analysis is to be prepared by a suitably qualified hydrologist to determine if the removal of the water for commercial wholesale purposes will not adversely impact on the natural water systems or potential agricultural use of land as outlined in Part 7.15 of Tweed Local Environmental Plan 2014 as shown below:

   7.15 Water bottling facilities in Zone RU2 Rural Landscape:

From: Jim Glazebrook & Associates Pty Ltd
To: Ben James
Subject: FW: DA 16/0936 (Hallam Rowlands Creek Road) - Request for Additional Information
Date: Friday, 7 April 2017 3:49:51 PM
Attachments: image001.png
image002.png

Hello Ben,

Can you have a look at this & get back to me. I have asked the Council to provide me with the name & contact number for their engineer so that he can be contacted directly.

Regards,

Jim Glazebrook

From: Joanne Kay [mailto:JoanneKay@tweed.nsw.gov.au]
Sent: Friday, 7 April 2017 2:18 PM
To: Jim Glazebrook & Associates Pty Ltd
Cc: David O'Connell
Subject: RE: DA 16/0936 (Hallam Rowlands Creek Road) - Request for Additional Information

Hi Jim,

Council acknowledges your emails of 21 March and 10th March in response to Councils request for further information for the subject application.

Councils Traffic Engineer has reviewed the information supplied and has provided the following response;

The application involves the proposed use of 15m trucks on Rowlands Creek Road and the provided information from the applicant does not adequately address the resultant safety issues. Whilst these trucks are able to use this road without approval, approval is sought through the DA process and without a thorough assessment of the road, consent is not recommended for the DA.

Given this response, any report to Council prepared in the upcoming period would be recommending refusal of the application on traffic safety grounds.

Please note that Council has recently referred the application to the Department of Primary Industries. This referral was delayed while awaiting the hydrogeology analysis that will not be provided as per recent advice.

Having regard to the above, Council gives you a final opportunity to provide the information requested by the traffic engineer while a response from the DPI is outstanding. If no further information is provided, a report will be prepared recommending refusal of the application.

Please call me if you have any questions.

Regards
Jo Kay

Joanne Kay | Town Planner
Planning and Regulation | Development Assessment and Compliance

TWEED SHIRE COUNCIL

p (02) 6670 2757 | **f** (02) 6670 2429 | **e** joannekay@tweed.nsw.gov.au | **w** www.tweed.nsw.gov.au
Civic and Cultural Centre Tumbulgum Road Murwillumbah NSW 2484 | PO Box 816 Murwillumbah NSW 2484

Customer Service: (02) 6670 2400 or 1300 292 872 ABN: 90 178 732 496
Our values: transparency | customer focus | fairness | reliability | progressiveness | value for money | collaboration

From: Jim Glazebrook & Associates Pty Ltd [mailto:jimglazebrook@better.net.au]
Sent: Tuesday, 21 March 2017 1:01 PM
To: Joanne Kay
Cc: Corporate Email
Subject: DA 16/0936 (Hallam Rowlands Creek Road) - Request for Additional Information

Attention: Joanne Kay

Hello Joanne,

Further to our letter of 10 March 2017 in response to yours of 14 February 2017 we can now address the remaining outstanding matters:

- A traffic assessment has been completed & is attached (refer point 1 of your letter);
- Our client has had soil testing completed for the agrichemicals 2,4-D & 2,4,5-T which were alleged by objectors to have been used/stored on the property. The report (see attached) indicates that there were no detections of any residues of those chemicals. As the request in point 9 of your letter was based solely on the allegations of certain objectors & those allegations related solely to the use of the foregoing chemicals our client believes that he should not be required to take this matter any further. The proposal does not involve any significant ground disturbance nor any additional residential development of the land. Additionally, a regime of ongoing testing of the water is conducted as part of the processing/bottling operations. Our client feels that he is being unfairly targeted because of the noise made by a few disgruntled & unreasonable objectors. I note in that regard that our client built a new dwelling on the property within the last 10 years & was not required by Council to undertake soil testing for any contaminants even though that development involved significant ground disturbance & was for residential purposes;
- Information with respect to the proposed water tanks is attached (refer point 10 of your letter).

I trust that this is of assistance.

Regards,

Jim Glazebrook

JIM GLAZEBROOK & ASSOCIATES PTY LTD
Town Planners & Development Consultants
PO Box 827
3 Nullum Street
MURWILLUMBAH NSW 2484

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Email: jimglazebrook@better.net.au

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S: Suite 26, 58 Riverwalk Avenue
Robina QLD 4226
M: PO Box 5102 Q Super Centre
Mermaid Waters QLD 4218
P: (07) 5562 5377
F: (07) 5562 5733
W: www.bitziosconsulting.com.au

Brisbane Office
S: Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
M: Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
P: (07) 3831 4442
F: (07) 3831 4455
E: admin@bitziosconsulting.com.au

Sydney Office
S: Studio 203, 3 Gladstone Street
Newtown NSW 2042
M: Studio 203, 3 Gladstone Street
Newtown NSW 2042
P: (02) 9557 6202
F: (02) 9557 6219

Our Reference: P2759.001L
Your Reference:

17 March 2017

Jim Glazebrook and Associates Pty Ltd
PO Box 827
3 Nullum Street, Murwillumbah NSW

Attention: Jim Glazebrook
Sent via email: jimglazebrook@better.net.au

Dear Jim

RE: 350 ROWLANDS CREEK ROAD WATER EXTRACTION SITE – RFI RESPONSE LETTER

1.0 BACKGROUND

Bitzios Consulting has been engaged to prepare a response to the traffic and transport aspects of Council's Request for Information (RFI), issued on 14/02/2017, for the proposed water extraction site located at 350 Rowlands Creek Road Uki, NSW. This letter details each RFI item and Bitzios Consulting's response.

2.0 RESPONSE TO RFI ITEMS

2.1. Item 1.1 – Traffic Assessment

> *Please provide an assessment, including swept paths at operating speeds, of Rowlands Creek Road's curves particularly between the creek crossings to indicate that two 15m trucks are able to pass with at least 0.6m separation.*
>
> *Should the above assessment indicate that road upgrades or widening are required then plans are to be submitted with sufficient detail to enable an assessment by Council.*

Existing Road

Bitzios assessment of the road network surrounding the proposed development site found that Rowland's Creek Road, whilst mostly unsigned with a maximum speed limit of 100km/hr, has a road environment where actual road speeds, dictated by road geometry, vary along the route. Site observations indicated variations in travel speed between 50km/hr to 80km/hr along Rowlands Creek Road. The road currently operates as a bus route as well as used by rural heavy vehicles, such as farm equipment and trucks which are of comparable size to the proposed development's design vehicle.

Road Layout Assessment

A road layout assessment was undertaken for Rowlands Creek Road as part of Bitzios Consulting's traffic report. This assessment included a visual on-site analysis (undertaken on the 27th September, 2016) and an assessment against Tweed Shire Councils (TSC) Road Data and Information.

The largest vehicle proposed to access the site is a 'bulk tanker' which has a maximum width of 2.5m, no greater than the buses or larger farm equipment vehicles that currently utilise Rowlands Creek Road. Although the probability of two trucks passing each other simultaneously along any section of Rowlands Creek Road is rare, it is expected that if two vehicles of this size were to pass drivers would proceed with care and give-way where necessary as per the existing road operations/conditions.

For the purposes of addressing Councils request, a 5.6m minimum width requirement has been conservatively estimated (minimum width with 600mm clearance) for the following comparison with the existing Rowlands Creek Road pavement. Table 2.1 summarises the TSC Road Data along Rowlands Creek Road from the Kyogle Road intersection to the Chowan Creek Road intersection adjacent to the proposed development site.

Table 2.1: Rowlands Creek Road TSC Data

Road Name	TSC Defined Road Segment	Pavement Width	Surface Width	Segment Length	Surface Type	Hierarchy	No. of Lanes
Rowlands Creek Road	100-<CULVERT TO CAUSWAY	6.30	6.30	1,110.00	Sprayed Seal	Collector	2
Rowlands Creek Road	110-CAUSWAY TO MANNS RD	6.30	6.30	120.00	Sprayed Seal	Collector	2
Rowlands Creek Road	20-MITCHELL ST TO DAIRY	5.70	5.70	990.00	Sprayed Seal	Collector	2
Rowlands Creek Road	30-DAIRY TO PAST CAUSWAY	5.70	5.70	760.00	Sprayed Seal	Collector	2
Rowlands Creek Road	40-PAST CAUSWAY TO BEFORE	5.70	5.70	320.00	Sprayed Seal	Collector	2
Rowlands Creek Road	50-BEFORE BRIDGE TO CHOWAN CR RD	6.00	6.00	1,340.00	Sprayed Seal	Collector	2
Rowlands Creek Road	60-CHOWAN CK TO BEFORE CAUSWAY	6.00	6.00	400.00	Sprayed Seal	Collector	2
Chowan Creek Road	10-ROWLANDS CK RD TO >BN 86	6.00	6.00	440.00	Sprayed Seal	Local Access	2

As shown above, the narrowest road width along Rowlands Creek Road approaching the development site is 5.7m, this is above the assessed minimum width of 5.6m. Furthermore, Rowlands Creek Road consists of two short one-way culvert/bridge sections. These are approximately 4 metres in width adequately catering for heavy vehicles as well as the current and projected traffic volumes along the road.

Considering that the developments proposed trucks will not exceed the size of the largest vehicles currently utilising Rowlands Creek Road and the unlikelihood of two trucks passing on a curve the existing pavement widths on Rowlands Creek Road would adequately cater for the proposed development vehicles.

Development Trip Generation

The proposed development is a water extraction point within the bounds of the property. Based on proposed site operations the development is expected to generate only three (3) two-way trips per day, an additional 3 inbound trips and 3 outbound trips daily on the surrounding road network. This equates to one (1) truck on the road network every 4 hours over an average 12-hour day as such, the likelihood of two trucks passing one another is extremely low.

Considering the existing road operations, the low volume of trucks expected as part of the development and the road width assessment undertaken within Bitzios previous Traffic Report, the current road condition and geometry is considered adequate and further detailed analysis or request for substantial upgrades along the entire Rowlands Creek Road is not reasonable. However, in order to appease Council's concerns and improve the operation condition along Rowlands Creek Road consideration may be given to an advisory Signage Review along Rowlands Creek Road, between the development and Mitchell Street to the north, to assess location and need for advisory signage (i.e. truck or curve warning) as part of Councils Conditions of Consent.

2.2. Item 1.2 – Traffic Assessment

Please provide a further sight distance assessment to the west in consideration of eastbound traffic on Chowan Creek Road and 85th percentile speeds. The assessment should include any proposed warning signage and vegetation removal to improve awareness and recognition of the driveway.

The applicant is advised that any approval will require upgrading of the access driveway to the property at 350 Rowlands Creek Road according to Council's requirements according to the driveway Access to property Design Specification Policy, subject to a Section 138 Roads Act application and approval.

Sight Distance

The development site is located on the corner of the Rowlands Creek Road/Chowan Creek Road priority controlled intersection and provides an access located to the east of this intersection along the sites northern boundary. It is noted that there appears to be a directional reference error within Councils condition, it has been assumed for the following that Council is referring to facing "east" from the development access and "westbound" traffic on Chowan Creek Road.

As outlined within the previous Bitzios Traffic report the east facing sight distance from the proposed development site access is approximately 100 metres. Further sight distance assessment has found that the east sight distance from the existing Rowlands Creek Road/Chowan Creek Road intersection is 45m, shown in Figure 2.1.

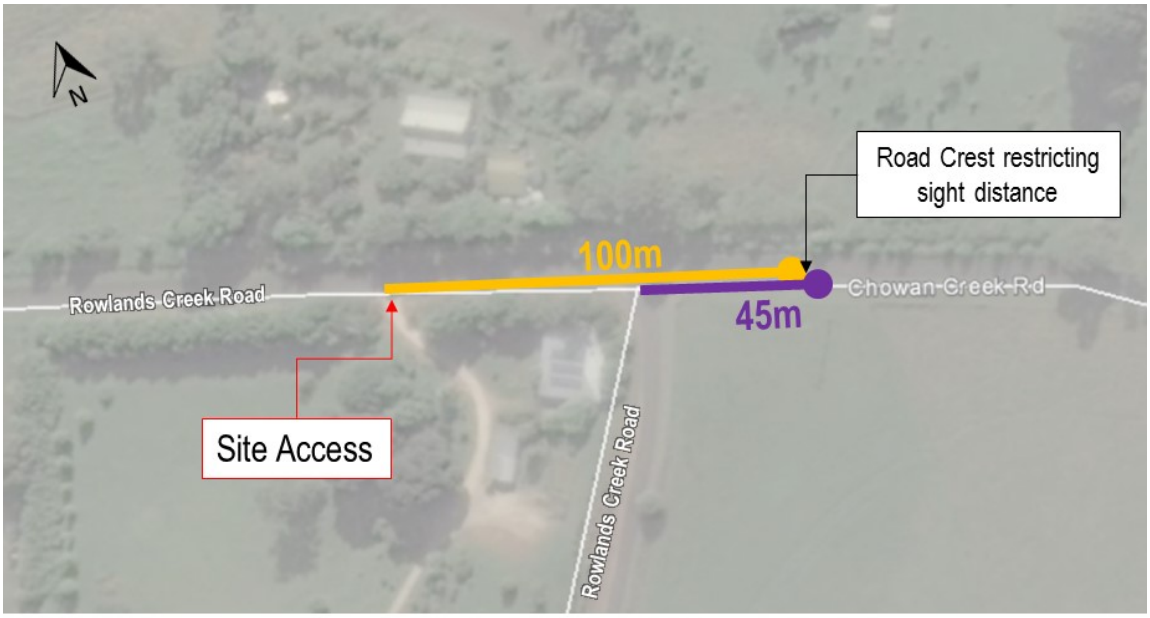

Figure 2.1: East Facing Sight Distance

When assessing sight distance requirements to the east for vehicles approaching from Chowan Creek Road it is important to consider the following points:

- as shown in Figure 2.1 the development access provides a greater sight distance than the existing Rowlands Creek Road/Chowan Creek Road intersection which operates without issue. This is due to a crest along Chowan Creek Road; and

- Chowan Creek Road is a 'No-through' road that services approximately 25 rural properties equating to less than 15 northbound trips during the typical peak hour (based on 0.85 trips per dwelling) or 1 vehicle every 4 minutes. Combined with the proposed development movements, 1 truck every 4 hours, it is not likely that a truck will exit the site when a vehicle is approaching on Chowan Creek Road. Furthermore, the development is expected to be serviced outside of typical peak hour periods decreasing the likelihood of vehicles approaching from the south when a truck is exiting the site.

As such, the existing development access sight distance is considered adequate and it is not necessary to undertake speed surveys or analysis along Chowan Creek Road. In an effort to improve the existing deficiencies in sight distance, from the site access and Rowlands Creek Road/Chowan Creek Road intersection, minor improvements may be appropriate to mitigate Councils concerns as part of the development's conditions of approval. This may include improvements such as, trimming vegetation along the sites boundary and/or warning signage on the Chowan Creek Road westbound approach (i.e. trucks ahead or crest warning signs).

Driveway Access Layout and Form

Tweed Driveway Access to Property – Design Specification V1.4 outlines minimum driveway layout of a 7m width at the property boundary and a 13m width at the kerb. The existing driveway access is 12m in width at the kerb.

It is agreed that the proposed driveway be conditioned to be upgraded to meet these width requirements in line with a rural type of driveway crossover and part of Councils conditions of consent.

3.0 SUMMARY AND CONCLUSIONS

The following key points summarise the above RFI response for the proposed water extraction facility at 350 Rowlands Creek Road, Uki:

- the proposed developments maximum three (3) bulk water tankers per day, the existing number of heavy vehicles (i.e. buses and farm equipment) and the road width assessment undertaken in the previous Bitzios Consulting traffic report indicate that a detailed assessment of Rowlands Creek Road pavement and road alignment is not necessary. Sufficient road width is provided to cater for the bulk tanker water trucks that will service the site, as per the existing road conditions and operations. However, an advisory signage review along Rowlands Creek Road to assess location and implement advisory signage (i.e. truck or curve warning) may be considered as part of Councils conditions of development;
- Chowan Creek Road's low traffic volumes and the observation that the south facing sight distance at the existing intersection is less than that provided by the development indicates no need to undertake traffic speed surveys;
- east facing sight distance from the existing development access location considered adequate. Minor improvements may be conditioned to improve existing sight deficiencies such as trimming vegetation along the site's northern boundary and providing warning signage along the Chowan Creek Road approach; and
- it is agreed that the development be required to widen the existing driveway to 7m at property boundary and 13m at the road edge in line with TSC Driveway Access to Property requirements as part of Councils conditions of consent.

I trust that the above information is sufficient to respond to the Tweed Shire Council's Information Request in relation to the transport planning items and will allow Council to prepare reasonable and relevant Conditions of Consent for the developments approval.

Yours faithfully

Praveen Bollavaram
Senior Traffic Engineer
BITZIOS CONSULTING