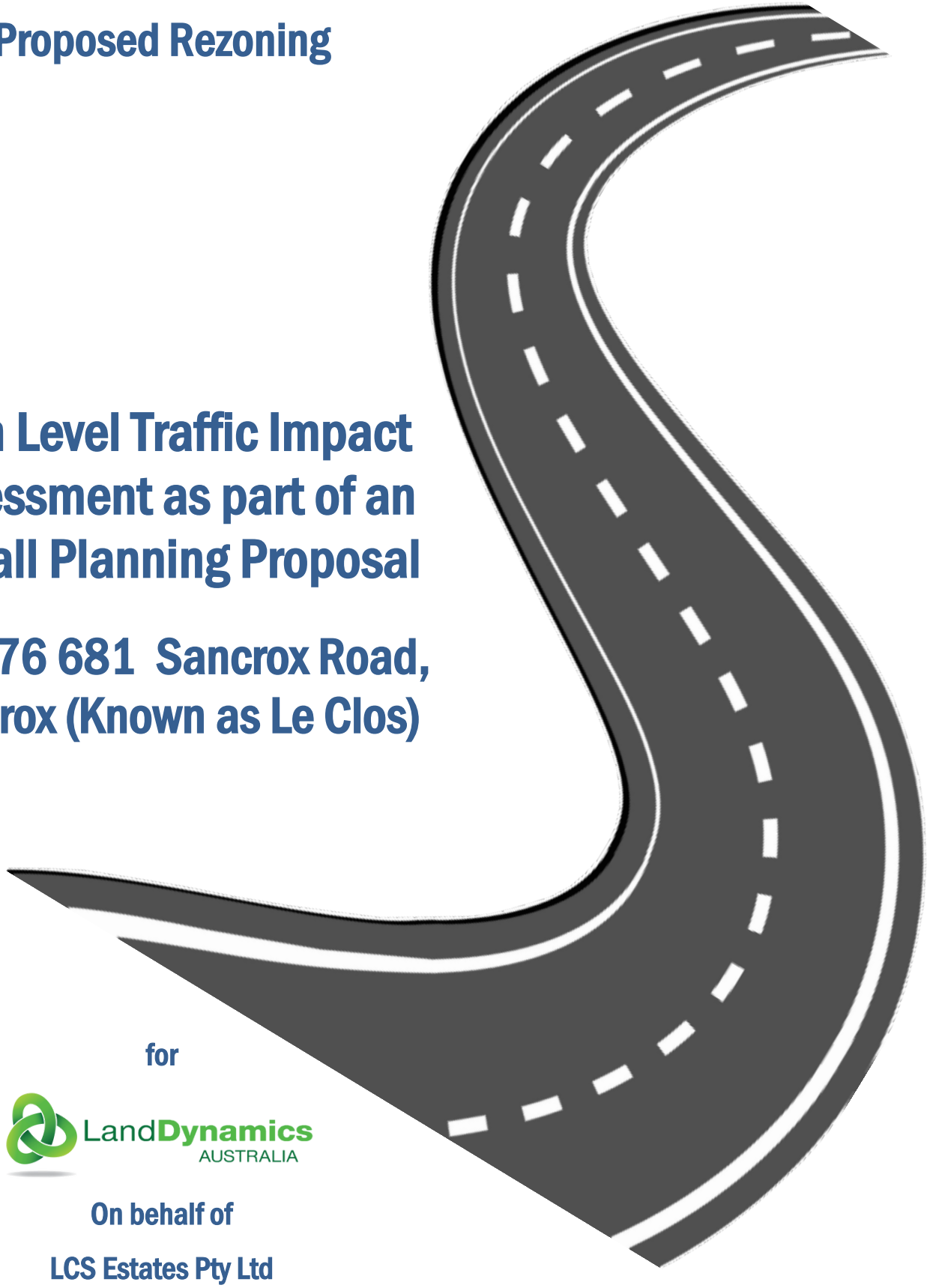
Proposed Rezoning



High Level Traffic Impact Assessment as part of an overall Planning Proposal

DP 776 681 Sancrox Road, Sancrox (Known as Le Clos)

for

LandDynamics AUSTRALIA

On behalf of

LCS Estates Pty Ltd

9 December 2019

Traffic Impact Assessment Details

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APPENDICES

EXECUTIVE SUMMARY

StreetWise Road Safety and Traffic Services have been engaged by Land Dynamics Australia on behalf of LCS Estates Pty Ltd to prepare a High Level Traffic Impact Assessment (TIA) as part of an overall Planning Proposal for a residential development at DP 776681 Sancrox Road, Sancrox known as Le Clos.
This High Level TIA will assess a proposed residential development of the area known as "Le Clos" on Sancrox Road, Sancrox as part of a planning proposal for the site.

Land Dynamics Australia has provided the following indication of how the site will be developed:-

- Village Centre Site (approximately 1.0 hectares in area) Zone B2,
- Existing 3 of Residential (approximately 1.50 hectares in area) Zone E4,
- Approximately 638 Low Density Residential lots (approximately 73.2 hectares in area) Zone R1, and
- Approximately 42 Medium Density Residential lots (approximately 2.3 hectares in area) Zone R3

Port Macquarie Hastings Council has indicated they have not commenced strategic planning for the area known as Sancrox / Rawdon Island. In order for this development to gain development approval (ie rezoning) some background strategic traffic planning will need to be undertaken as part of the assessment for future traffic impacts by this development relating to future local road network (Sancrox Road) upgrades.

In completing this assessment both StreetWise and Land Dynamics staff have attended a number of meetings with Port Macquarie Hastings Council Planning staff to discuss the approach and what the scope of the assessment will be.

It is hoped the assessments completed for this site and the study area will be utilised by Port Macquarie Hastings Council for future strategic planning of the area in question.

Currently there are six public access points / intersections located along Sancrox Road:-

1) Rawdon Island Road,
2) Riverbank Road,
3) Verdun Drive,
4) Le Clos,
5) Bushlands Drive, and
6) The Pacific Highway

Port Macquarie Hastings Council's Urban Growth Management Strategy (UGMS) provides an indication of the land available for rezoning to residential development. This assessment recommends utilising the existing access points with the addition of the proposed access points for the Le Clos development.

This report will give an indication of the possible future upgrades required for Sancrox Road for these locations. The future upgrades will be assessed on the derived future

traffic generation yields. A detailed assessment has been completed for the new intersections proposed as part of the Le Clos development.

It shall be noted previous extensive traffic assessment had been completed for the study area based on large lot residential development Greater Sancrox Concept Road Layout Review & Traffic Modelling (SMEC, 2014). However, with the advent of Port Macquarie Hastings Council's Urban Growth Management Strategy (UGMS) this has now required a rework of the future traffic generation for the development areas to small lot residential.

Port Macquarie Hastings Council has also provide information with regard to an approved industrial subdivision for the area known as Sancrox North in this assessment. (See Appendix B – Approved Subdivision Layout) It is also noted at the time of this assessment being completed the Department of Planning, Industry and Environment has received a development application for the expansion of the existing Hanson's Quarry located within the Sancrox North area.

As part of determining the study area to be assessed for this report input from Port Macquarie Hastings Council staff was sought. Council staff indicated they would like to see the inclusion of the Fernbank Creek area located to the east of the Pacific Highway included as part of this assessment.

Discussions were had on how much this area would impact the study area. However, it is felt the Fernbank Creek area would have minimal impacts on the proposed future traffic flows of Sancrox Road, Bushlands Drive and Rawdon Island Road.

Most of the traffic generated in the Fernbank Creek area would more than likely travel east via Fernbank Creek Road and Hastings River Drive. Any traffic flows to the north and south would likely via the Pacific Highway. Any possible trips to the west (possibly Wauchope) would more than likely be via the Pacific Highway to the Oxley Highway or via the Sancrox Interchange onto Bushlands Drive and the Oxley Highway. All trips would be considered to be internalised accessing the future Village Centre proposed as part of the Le Clos development.

Based on the derived traffic generations for the study area the following local road network (Sancrox Road) upgrades are required.

- Minimum of one travel lane in each direction (3.50m wide),
- 1.50m wide (clear width), 2.0m (if kerb & gutter) cycle lanes along edge of each travel lane,
- 0.5m shoulder outside of cycle lane. Given the future traffic volumes this will allow for emergency stopping where a vehicle can stand within the shoulder / cycle lane outside of the travel lane not obstructing traffic and therefore reducing any roadside hazard,
- 2.50m wide raised central median to allow for pedestrian / cyclist crossing, and
- Auxiliary lanes (turn lanes, acceleration & deceleration lanes) as required. (See intersection upgrades for details).

- Sancrox Rd & Rawdon Island Rd Intersection
  - a central island diameter of 16.0m,
  - a circulating roadway width of 9.0m,

- single lane entry / exit on all legs,
- offroad cyclist access on all legs, and
- pedestrian refuges on the Sancrox Rd (west) and Rawdon Island Road (north) legs.

- Sancrox Rd & Riverbend Rd Intersection
  - a central island diameter of 16.0m,
  - a circulating roadway width of 9.0m,
  - single lane entry / exit on all legs,
  - offroad cyclist access on all legs, and
  - pedestrian refuges on the Sancrox Rd (west) and Riverbend Road (south) legs.

- Sancrox Rd & Verdun Drive Intersection
  - Upgraded to a Type CHR(s) intersection layout.

- Sancrox Rd & Road No.1 (Le Clos) Intersection
  - Proposed single lane roundabout,
  - Plus eastbound right turn bay (Sancrox Rd),
  - Plus westbound left turn bay (Sancrox Rd),
  - Plus eastbound left turn bay (Road No.1 – North), and
  - Off road provision for cyclists through roundabout. (all legs)

- Sancrox Rd & Road No.2 (Le Clos) Intersection
  - Proposed single lane roundabout,
  - Plus separate eastbound left turn slip lane (Road No.2 - North),
  - Plus separate westbound left turn slip lane (Sancrox Rd),
  - Plus eastbound right turn bay (Sancrox Rd),
  - Plus westbound left turn bay (Sancrox Rd), and
  - Off road provision for cyclists through roundabout. (all legs)

- Sancrox Rd & Bushlands Drive Intersection
  - Upgraded to a Type CHR(s) intersection layout (by the year 2030).
  - Upgraded to a Type CHR Channelised intersection layout (by the year 2040).

- Sancrox Rd & Bushlands Drive Intersection (roundabout)
  - Add extra eastbound lane on entry to roundabout (Sancrox Rd, by the year 2040)
  - Upgrade off road provision for cyclists through roundabout. (all legs)

Further detailed assessment of the above upgrades will be required as development in the area comes on line. For the purposes of this assessment a design horizon of 30 years was used.

In order for the Le Clos development to indicate its direct impacts on the local road network (Sancrox Road) a separate assessment was completed taking into account the proposed future Le Clos traffic generation and traffic growth excluding the remainder of the study area development. The following local road network upgrades can be directly attributed to the Le Clos development:-

- In accordance with Figure 4.50 the development is to upgrade Sancrox Road to half width design cross section along full frontage.
- Provision of 2 roundabouts (Road No.1 and Road No.2). The construction of the northern legs of Roads No.1 and 2 roundabouts is to be undertaken by others as future development dictates.
- Provision of a Shared Path along the Sancrox Road frontage of the Le Clos site generally in accordance with Figure 4.50. All other shared path facilities are to be constructed by others as future development dictates.
- Provision of Public Transport Facilities (Bus Bay) at each of the proposed development intersections (roundabouts). All other public transport facilities are to be constructed by others as future development dictates.
- The intersection of Sancrox Road and Bushlands Drive will need to upgraded to a type CHR(s) intersection at the year 2030. Any further upgrades to this intersection are to be completed by others as future development in the area dictates.

1. INTRODUCTION

1.1 General

StreetWise Road Safety and Traffic Services have been engaged by Land Dynamics Australia on behalf of LCS Estates Pty Ltd to prepare a High Level Traffic Impact Assessment (TIA) as part of an overall Planning Proposal for a residential development at DP 776681 Sancrox Road, Sancrox known as Le Clos.

Figure 1.1 – LOCALITY SKETCH

1.2 Description of Project

This High Level TIA will assess a proposed residential development of the area known as "Le Clos" on Sancrox Road, Sancrox as part of a planning proposal for the site. (See Appendix A for Development Site Plan)

Land Dynamics Australia has provided the following indication of how the site will be developed:-

- Village Centre Site (approximately 1.0 hectares in area) Zone B2,
- Existing 3 of Residential (approximately 1.50 hectares in area) Zone E4,
- Approximately 638 Low Density Residential lots (approximately 73.2 hectares in area) Zone R1, and
- Approximately 42 Medium Density Residential lots (approximately 2.3 hectares in area) Zone R3

The above land use components will be assessed to determine the high level traffic impacts on the local road network.

1.3 References

The following references will be utilised to aid in the completion of this TIA:-

- Greater Sancrox Concept Road Layout Review & Traffic Modelling (SMEC, 2014)
- Austroads Guide to Road Design
- Austroads Guide to Traffic Management, and
- Port Macquarie Hastings Council Design Specifications (Mainly, D1 – Geometric Road)
- Port Macquarie Hastings Council's Urban Growth Management Strategy (UGMS)
- Approved Development of Industrial Subdivision known as Sancrox North at the intersection of the Pacific Motorway and Sancrox Road. (DA 305/2012) (See Appendix B – Approved Subdivision Layout)

1.4 Road Network

1.4.1 The Local Road Network

For the purposes of this high level TIA the road network to be assessed will be bounded by the Pacific Highway (A1) in the east, The Oxley Highway (B56) in the south, Sancrox Road to the north and Rawdon Island Road to the west. See Figure 1.1 for context of the Local Road Network.

1.4.2 The Pacific Motorway (A1)

The Pacific Motorway (A1) is part of the national motorway system providing north south connection between cities (Sydney, Newcastle and Brisbane) and towns (Taree, Port Macquarie, Coffs Harbour and Ballina) on the eastern seaboard.

Both the Federal and New South Wales (NSW) State Governments have provided funding for the upgrade of the section of the highway between Taree and the NSW / Queensland Border with the section located near Sancrox recently completed to motorway standard in 2017.

This upgrade to motorway standard provides for dual lane carriageways in each direction to a 110km/h posted speed limit standard with a grade separated interchange located near the industrial operation known as "Expressway Spares".

1.4.3 The Oxley Highway (B56)

The Oxley Highway (B56) is part of the national motorway system providing eastwest connection between Port Macquarie, Tamworth and Gunnedah to the west.

The Oxley Highway has recently been upgraded in the vicinity of the Rawdon Island Road intersection where the intersection has been realigned and overtaking lanes have been provided in each direction.

The posted speed limit in the vicinity of the Rawdon Island Road intersection is 90km/h.

1.4.4 Sancrox Road

Sancrox Road is a collector road servicing the Sancrox and Rawdon Island areas providing connection to Port Macquarie via the Pacific Highway and the Oxley Highway.
The formation width of Sancrox Road is generally 8.50m with 3.25m wide travel lanes. The vertical alignment is considered to be undulating with possibly some substandard vertical crest (further detailed assessment will need to be completed to determine the extent of this) for the posted speed limit at the time. The horizontal alignment is generally acceptable for the posted speed limit with some further detailed assessment required for some curves at the eastern end of Sancrox Road.

The posted speed limit for Sancrox Road is 80km/h.

1.4.5 Rawdon Island Road

Rawdon Island Road is a collector road servicing the Sancrox and Rawdon Island areas providing connection to Port Macquarie via the Oxley Highway.

The formation width of Rawdon Island Road is generally 8.50m with 3.25m wide travel lanes. The vertical alignment is considered to be undulating with possibly some substandard vertical crest (further detailed assessment will need to be completed to determine the extent of this) for the posted speed limit at the time. The horizontal alignment is generally acceptable for the posted speed limit with some further detailed assessment required for some curves along the alignment.

The posted speed limit for Sancrox Road is 80km/h.

1.4.6 Intersection of Sancrox Road & Frogs Road

The existing roundabout at the intersection of Sancrox Road and Frogs Road was constructed as part of the Pacific Highway upgrade where a grade separated interchange was provided for local access.

The roundabout will be the main access location for the future Sancrox Employment lands (Industrial Area) located to the north of the roundabout where currently a hard rock quarry gains uses it for access.

Sight distance is currently acceptable for the standards on all four legs of the roundabout.

Sancrox Road – Looking East

Sancrox Road – Looking West

Frogs Road – Looking South

Frogs Road – Looking North

1.4.7 Intersection of Sancrox Road & Bushlands Drive

The intersection of Sancrox Road and Bushlands Drive generally conforms to a BAR/BAL T junction layout with some shoulder widening for the left turn out and right turn in movements.

Sight distance is currently acceptable for the standards in both directions along Sancrox Road.

Sancrox Road – Looking West

Bushlands Drive – Looking North

1.4.1 Intersection of Sancrox Road & Le Clos Access Road

The existing intersection of Sancrox Road and the Le Clos Access Road generally conforms to a BAR/BAL T junction layout. There is no widening provided at the intersection for the safe turning of heavy vehicles out of Verdun Drive to remain in their lane.

Sight distance is currently not acceptable for the standards in both directions along Sancrox Road for both the horizontal and vertical alignments.

It shall be noted this access location will be closed in the future redevelopment of the Le Clos site.

Sancrox Road – Looking East

Sancrox Road – Looking West

Le Clos Access Road – Looking North

1.4.2 Intersection of Sancrox Road & Verdun Drive

The existing intersection of Sancrox Road and Verdun Drive generally conforms to a BAR/BAL T junction layout. There is no widening provided at the intersection for the safe turning of heavy vehicles out of Verdun Drive to remain in their lane.

Sight distance is currently acceptable for the standards in both directions along Sancrox Road.

Sancrox Road – Looking East

Sancrox Road – Looking West

Le Clos Access Road – Looking South

1.4.3 Intersection of Sancrox Road & Riverbend Road

The intersection of Sancrox Road and Riverbend Road generally conforms to a BAR/BAL T junction layout with widening at its intersection to allow for heavy vehicles to turn safely within their lane.

Sight distance is currently acceptable for the westbound approach however the eastbound approach may not be acceptable for the current posted speed limit.

Sancrox Road – Looking East

Sancrox Road – Looking West

Riverbend Road – Looking South

1.4.4 Intersection of Sancrox Road & Rawdon Island Road

The intersection is an uncontrolled four way intersection. Sancrox Road (west) services the local rural residential subdivision while Sancrox Road (east) provides connection for the Rawdon Island and Sancrox areas to in Port Macquarie and beyond.

Rawdon Island (north) services the local Rawdon Island area and provides connection to Port Macquarie via Sancrox Road (east). Rawdon Island (south) services, the areas of Walters road and Muscio Road and Warrigal Ridge to the south along with providing connection for these areas to Port Macquarie via either the Oxley Highway or Sancrox Road.

Sight distance on the Sancrox Road (east) approach is constrained for both the north and south directions by vegetation on both sides of the intersection. Sight distance to the south is also reduced by the vertical crest alignment on Rawdon Island Road (south) for the current posted speed limit. To make turning at the intersection safer Give Way signs are installed on both sides of Sancrox Road.

Sight distance on the Rawdon Island Road (south) approach is constrained for both the east and west directions by vegetation on both sides of the intersection.

Sancrox Road (east) – Looking West

Sancrox Road (west) – Looking East

Rawdon Island Road (north) – Looking South

Rawdon Island Road (south) – Looking North

2. EXISTING TRAFFIC VOLUMES

2.1 Background Traffic Volumes

To aid in the completion of the assessment, StreetWise Road Safety and Traffic Services have completed a manual intersection count to determine the AM and PM peak traffic periods for the following intersections:-

- Sancrox Road & Frogs Road, and
- Sancrox Road & Rawdon Island Road

Figures 2.10 and 2.11 provide a summary of the AM and PM peak period traffic flows for both of the intersections in question. The counts indicated the AM Peak to be between 7.45 and 8.45am with the PM Peak being between 4.45 and 5.45pm.

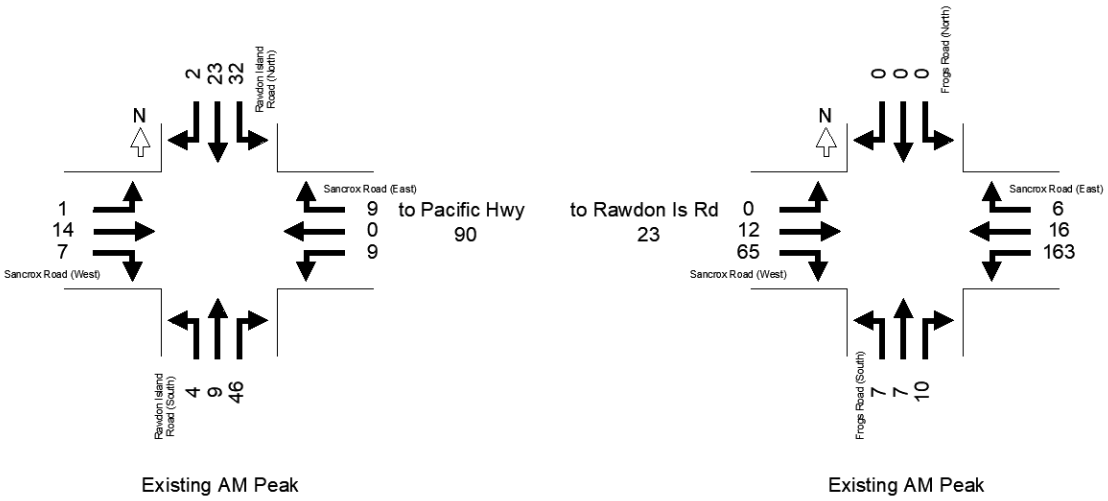


Figure 2.10 – EXISTING AM PEAK PERIOD TRAFFIC FLOWS (BOTH INTERSECTIONS)

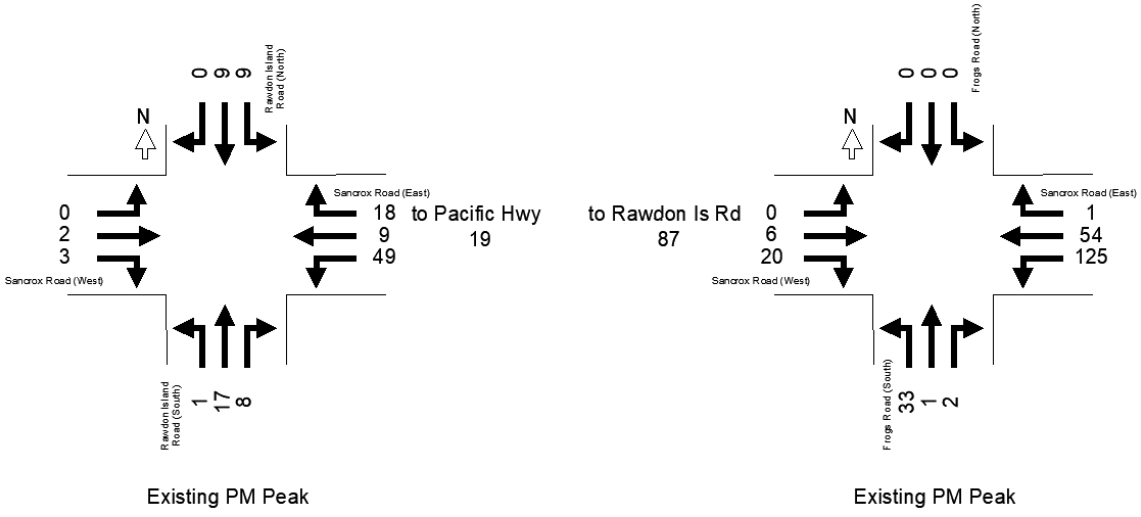


Figure 2.11 – EXISTING PM PEAK PERIOD TRAFFIC FLOWS (BOTH INTERSECTIONS)

A summary of the raw intersection counts is provided in Appendix C of this report.

Figures 2.12 and 2.13 summarise the Sancrox Road and Rawdon Island Road intersection configuration major turn requirements for the AM and PM peak periods:-

- Rawdon Island Road Southbound – Left into Sancrox Road,
- Rawdon Island Road Northbound – Right into Sancrox Road, and

- Sancrox Road Westbound – Left into Rawdon Island Road.
- Sancrox Road Westbound – Right into Rawdon Island Road.

based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings.

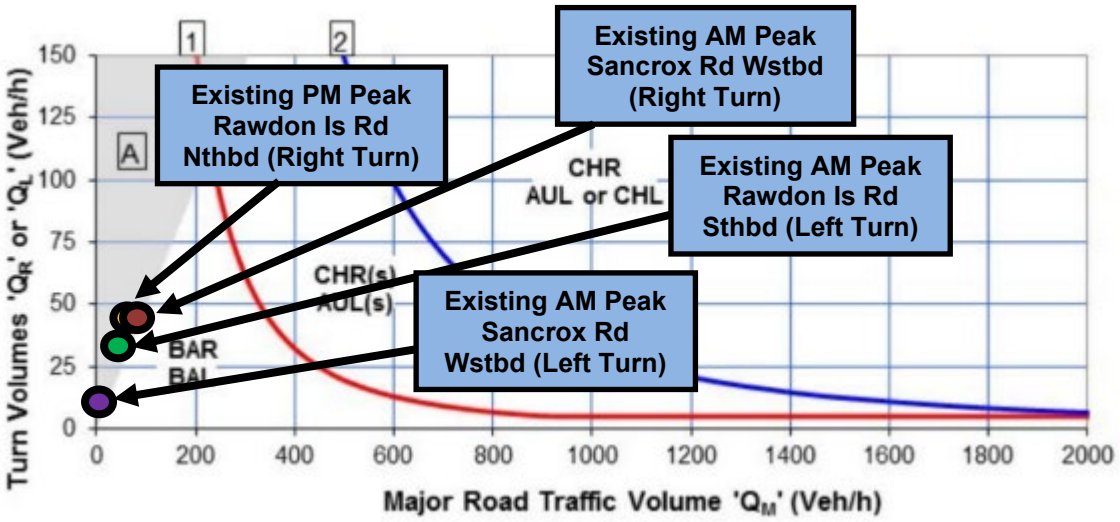


Figure 2.12 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS (MAJOR TURN MOVEMENTS FOR AM PEAK AT SANCROX ROAD & RAWDON ISLAND ROAD INTERSECTION)

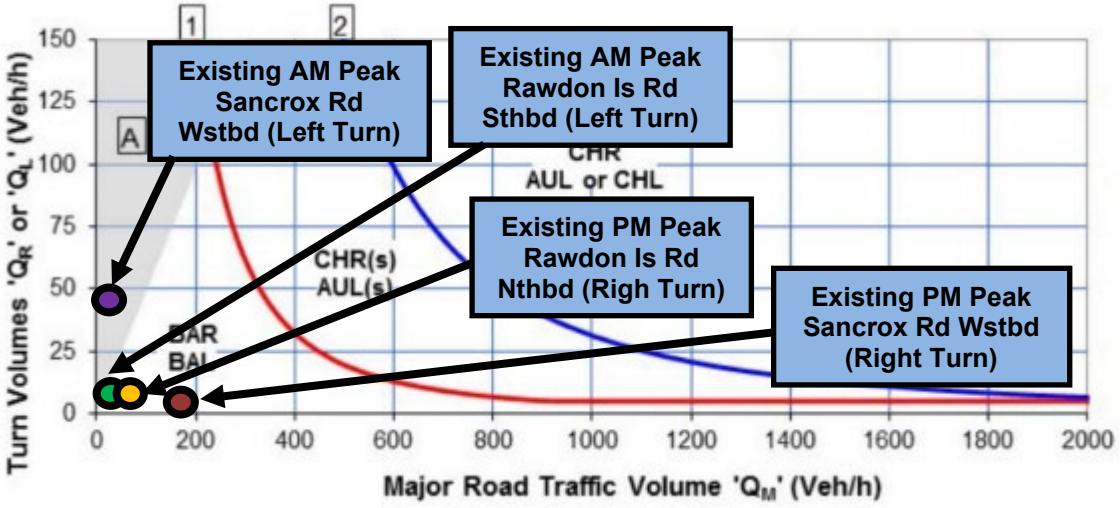


Figure 2.13 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS (MAJOR TURN MOVEMENTS FOR PM PEAK AT SANCROX ROAD & RAWDON ISLAND ROAD INTERSECTION)

The assessment, based in the existing traffic volumes at the time, indicates the intersection configuration is justified as a BAR / BAL layout for both the AM and PM peak periods.

3. FUTURE TRAFFIC ASSESSMENT

3.1 Land Use Traffic Generation Rates

As outlined in section 1.2 of this assessment the following proposed land uses will be part of the overall redevelopment of the Le Clos site:-

- Village Centre Site (approximately 1.0 hectares in area) Zone B2,
- Existing 3 of Residential (approximately 1.50 hectares in area) Zone E4,
- Approximately 638 Low Density Residential lots (approximately 73.2 hectares in area) Zone R1, and
- Approximately 42 Medium Density Residential lots (approximately 2.3 hectares in area) Zone R3

It shall be noted previous extensive traffic assessment had been completed for the study area based on large lot residential development Greater Sancrox Concept Road Layout Review & Traffic Modelling (SMEC, 2014). However, with the advent of Port Macquarie Hastings Council's Urban Growth Management Strategy (UGMS) this has now required a rework of the future traffic generation for the development areas to small lot residential.

3.1.1 Traffic Flow Generation

The primary reference documents used to determine the traffic flow generated by the developments are the "RMS Guide to Traffic Generating Developments" and PMHC Development Control Plan 2013.

3.1.2 RMS Guidelines

The RMS Guide to Traffic Generating Developments provides the following trip generation rates to be used for the land use components to be considered for this development.

- Village Centre Site
  - 12.3 to 16.3 peak hour trips for up to 10 000sqm GLFA *(RMS Technical Direction – TD13-04a)*
- Existing Residential
  - 4 to 6.5 trips per dwelling
  - 0.4 to 0.65 weekday peak hour trips per dwelling *(RMS Guide to Traffic Generating Developments)*
- Low Density Residential
  - 7.4 daily trips per dwelling in regional areas.
  - 0.75 peak hour trips per dwelling in regional areas. *(RMS Technical Direction – TD13-04a)*

3.1.3 Port Macquarie Hastings Council Guidelines

Port Macquarie Hastings Council (PMHC) does not prescribe traffic generation rates.

3.1.4 Traffic Generation Rates to be Adopted for this Assessment

Based on the above information the following assumptions have been made for the determination of future traffic generation per land use as proposed by this development.

- Village Centre Site
  - 12.3 peak hour trips for up to 10 000sqm GLFA
- Medium Density Residential
  - 4 to 6.5 trips per dwelling
  - 0.4 to 0.65 weekday peak hour trips per dwelling

(RMS Guide to Traffic Generating Developments)

- Low Density Residential
  - 7.4 daily trips per dwelling in regional areas.
  - 0.75 peak hour trips per dwelling in regional areas.
    (RMS Technical Direction – TD13-04a)

3.2 Proposed Traffic Generation – Le Clos Development

Table 3.20 provides a summary of the future traffic generation is provide for the land use components of the development.

Land Use	Area (ha)	Daily Trip Rate	Peak Hour Trip Rate	Daily Trip Generation	Peak Hour Trip Generation
Village Centre Site	1.0	Nil	12.3	5000	500
Low Density	57.3	7.4	0.75	4722	479
Medium Density	2.3	4.0 - 6.5	0.4-0.65	160-260	16-26
Total Development Trip Generation				9982	1005

Table 3.20 – SUMMARY OF FUTURE TRAFFIC GENERATION

3.3 Possible Future Traffic Generation – Study Area

In order to give a true indication of the impacts future traffic volumes will have on the local road network an assessment of the possible future development yields in the area needs to be assessed.

For the purposes of this assessment Figure 3.30 indicates the study area to be assessed to determine possible future traffic generation. The study area generally takes in the following localities:-

- Bengal Street,
- Sancrox Central (Riverbend Road),
- Sancrox Central (South of Sancrox Road),
- Walters Road (North of Walters Road only)
- Le Clos Verdun,
- Le Clos,
- Sancrox North
- Freeman / Stubbs Land,
- Bushlands Drive, and
- Sancrox Employment Lands (North of Sancrox Road)

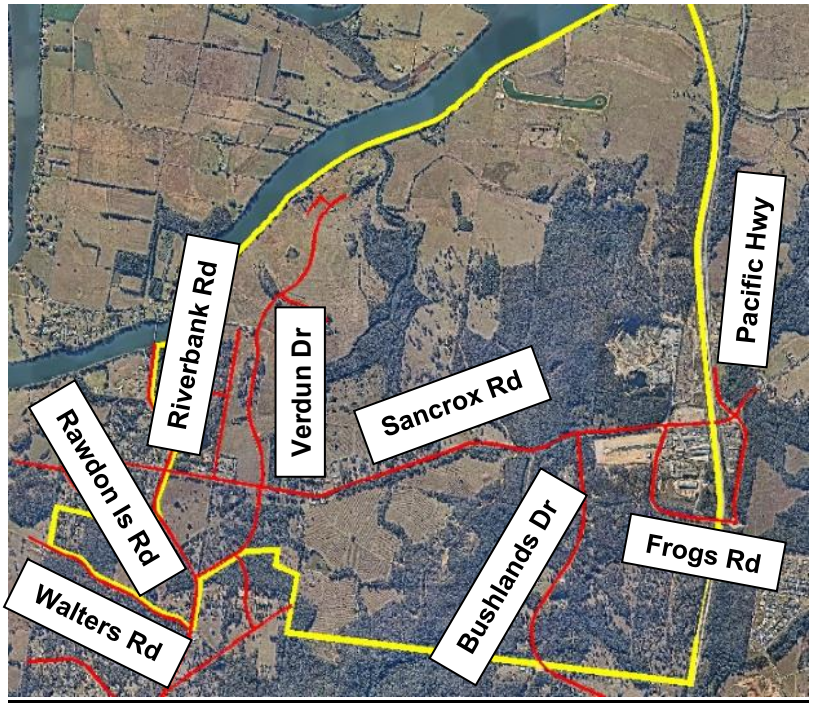


Figure 3.30 – STUDY AREA

Table 3.30 provides an indication of the assumed traffic generation each locality will generate over a design horizon period of 30 years to the year 2050.

Locality	Peak Hour Trip Generation			Daily Trip Generation		
	2030	2040	2050	2030	2040	2050
Bengal Street	19	38	38	190	380	380
Sancrox Central (Riverbend Road, North)	58	126	254	592	1260	2530
Sancrox Central (Riverbend Road, South)	80	164	330	800	1640	3298
Walters Road (North of Walters Road)	11	22	22	110	220	220
Le Clos Verdun	31	92	140	310	922	1397
Le Clos	See Section 3.2			See Section 3.2		
Sancrox North	35	80	160	29	78	126
Freeman / Stubbs Land	146	388	805	1455	3880	8046
Bushlands Drive	27	40	70	270	395	700
Sancrox Employment Lands (North of Sancrox Road)	1388	1454	1454	13875	16971	16971

Table 3.30 – SUMMARY OF STUDY AREA FUTURE TRAFFIC GENERATION

3.3.1 Traffic Generation Calculation Assumptions

The following assumptions have been used in order to calculate the above traffic generations for the study area:-

- All areas have been assumed to be zoned Residential Zone R1 and R3 (E4 existing) with exception being the Employment (Industrial) Land accessing Frogs Road to the north of the study area.
- See Section 3.2 of this report for a detailed assessment of the proposed land uses assessed for the Le Clos development traffic generation,
- A lot yield of 11 lots per hectare was used to calculate the number of lots,

- Traffic generation rates of 7.4 trips per day and 0.75 trips per peak hour were used for low density residential and 4.0 to 6.5 daily trips and 0.4 to 0.65 peak hour trips for these land uses. (In accordance with the RMS Technical Direction – TD13-04a), and
- Traffic generation rates of 5 trips per 100m^2 Gross Floor Area (GFA) per day and 0.5 trips per 100m^2 GFA per peak hour were used for the employment land use. (In accordance with the *Greater Sancrox Concept Road Layout Review & Traffic Modelling Report, SMEC 2014*).

3.4 Traffic Generation – Employment Land (Sancrox North)

As part of assessing the future road network impacts this study will assess the industrial land area known as Sancrox North located on the northwestern corner of the intersection of the Pacific Motorway and Sancrox Road.

In April 2013 Port Macquarie Hastings Council provided development approval for a 72 lot industrial subdivision. (See Figure 3.40). It shall also be noted the existing Hanson's Quarry has lodged a development application with the Department of Planning, Industry and Environment to expand its current footprint and output.

This traffic study will detail the traffic to be generated by these development in order to assess the future road network impacts.

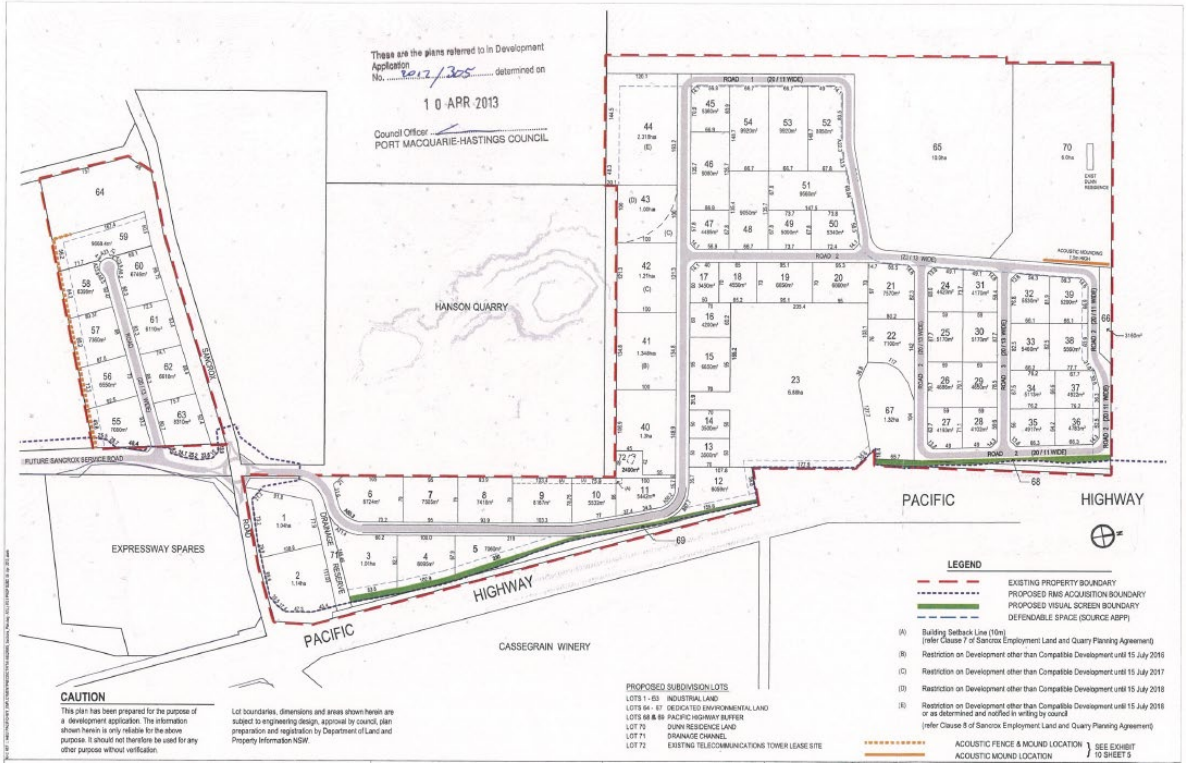


Figure 3.40 – APPROVED INDUSTRIAL LAND SUBDIVISION LAYOUT

3.4.1 Sancrox North Industrial Subdivision

As indicated Port Macquarie Hastings Council has recently approved a industrial subdivision for the area known as Sancrox North.

As part of the approval process a Traffic Study for the development was completed TTM Consulting (August 2009) to assess the future road network impacts created by this development. The following information is provided as a snapshot of the parameters used in the TTM report.

- 4 different industrial land uses were assessed,
- RMS peak hour traffic generation rates assumed 2571 peak hour trips *(Table 2, TTM report),*
- 2202 peak trips using the RMS Employee Density calculation. *(These figures were adopted in the report),*
- Traffic Assignment, AM Peak: 80% IN / 20% OUT, PM Peak: 20% IN / 80% OUT
- 2% Traffic Growth Rate *(adopted from SMEC Area 13 Sancrox Traffic Study – 2007),*
- A Design Horizon of 20 years was used *(to the year 2029),*
- The Pacific Highway Upgrade had not been commenced at the time of the TTM report being prepared, and
- The report only assessed the assessed the future impacts on the intersection of the Pacific Highway and Sancrox Road. There is detailed assessment of any traffic impacts west of Expressway Spares *(now Frogs Road).*

For the purposes of this Le Clos rezoning Traffic Study the above peak hour traffic generation figures will be used as Port Macquarie Hastings Council has provided development approval based on these figures and assumptions.

3.4.2 Hanson Quarry Development Application Proposal

At the time of this report being prepared StreetWise Road Safety & Traffic Services were made aware the existing Hanson's Hardrock Quarry located on the northern side of Sancrox Road off Frogs Road had lodged a development application with the Department of Planning, Industry and Environment to expand its operation. The quarry currently has approval to extract 455 000 tonnes per annum over 20 years and wants to increase this output to 750 000 tonnes per annum for a period of 30 years. The area of the quarry will increase from 17.2 hectares to 48.60 hectares.

The proposed expansion will increase trip movements to approximately 576 trips per day (24 peak hour trips).

3.4.3 Employment Land Take up / Development in the Municipality

Port Macquarie Hastings Council completed a review of its Industrial Land Strategy in 2015. As part of this review the report suggested the Port Macquarie Hastings area would require the rezoning of 78 to 135 hectares of land to meet the demand up to 2036. This equates to a take up (development of) 4.9 and 8.4 hectares a year over this period. The report also states the Sancrox Employment Land area including Sancrox North takeup would be higher given its locational advantage.

Since development approval for the Sancrox North subdivision was granted in April 2013 there has been approximately 2.41 hectares developed up to September 2019. This represents a take up of 3.7 hectares a year for this period. This is approximately 1.2 hectares a year less than the minimum take up prescribed in the Industrial Land Strategy review. For the purposes of this assessment the existing development take up rate for Sancrox North and the minimum Industrial Land Strategy review rates will be used. Table 3.40 provides a summary of the future traffic generation for the

Sancrox North area based on the design horizon used in this report. For the worst case full development of the Sancrox North Industrial area will be reached in 12.2 years.

Design Horizon (Years)	3.7 hect / yr take up rate (Hectares)	Traffic Generation		4.9 hect / yr take up rate (Hectares)	Traffic Generation		Comments
		Daily (5 trips / 100m² GFA)	Peak Hr (0.5 trips / 100m² GFA)		Daily (5 trips / 100m² GFA)	Peak Hr (0.5 trips / 100m² GFA)	
5	18.5	6938	694	24.5	9188	919	
9.2				45.3	16971	1697	Full Development for 4.9 hect rate
10	37.0	13875	1388	49.0	18375	1838	
12.2	45.3	16971	1697				Full Development for 3.7 hect rate
15	55.5	20813	2081	73.5	27563	2756	Not Required
20	74.0	27750	2775	98.0	36750	3675	Not Required
25	92.5	34688	3469	122.5	45938	4594	Not Required
30	111.0	41625	4163	147.0	55125	5513	Not Required

Table 3.40 – SUMMARY OF INDUSTRIAL LAND TRAFFIC GENERATION PER DEVELOPMENT (HECTARE) TAKE UP RATE

It shall also be noted, Council staff have indicated there is currently more than 200 hectares of zoned industrial land that remains vacant in the municipality and it is unlikely any further land will be rezoned industrial in the near future.

3.5 Inclusion of the Fernbank Creek Investigation Area in this assessment

As part of determining the study area to be assessed for this report input from Port Macquarie Hastings Council staff was sought. Council staff indicated they would like to see the inclusion of the Fernbank Creek area located to the east of the Pacific Highway included as part of this assessment.

Discussions were had on how much this area would impact the study area. However, it is felt the Fernbank Creek area would have minimal impacts on the proposed future traffic flows of Sancrox Road, Bushlands Drive and Rawdon Island Road.

The reason this is most of the traffic generated in the Fernbank Creek area would more than likely travel east via Fernbank Creek Road and Hastings River Drive. Any traffic flows to the north and south would likely via the Pacific Highway. Any possible trips to the west (possibly Wauchope) would more than likely be via the Pacific Highway to the Oxley Highway or via the Sancrox Interchange onto Bushlands Drive and the Oxley Highway. All trips would be considered to be internalised accessing the future Village Centre proposed as part of the Le Clos development.

3.6 Traffic Distribution

The following traffic distribution assumptions have been made for this assessment.

3.6.1 Traffic Distribution – Le Clos

The Le Clos development will utilise two access points for future egress to and from the development to be known as:-

- Road No.1 – Eastern Access location, and
- Road No.2 – Western Access location.

The following traffic distribution assumptions were made for this development:-

- Road No.1 – 12% of total development traffic generation, and
- Road No.2 – 88% of total development traffic generation.

3.6.2 Traffic Distribution – Bengal Street

It is assumed 100% of the total future traffic generation for the Bengal Street area will access Sancrox Road via Rawdon Island Road.

3.6.3 Traffic Distribution – Sancrox Central (Riverbank Road, North)

The following traffic distributions have been assumed for the Sancrox Central (Riverbank Rd, North) area:-

- 50% of future traffic generation directly to Rawdon Island Road (north), and
- 50% of future traffic generation directly to Sancrox Road.

3.6.4 Traffic Distribution – Sancrox Central (Riverbank Road, South)

The following traffic distributions have been assumed for the Sancrox Central (Riverbank Rd, South) area:-

- 50% of future traffic generation directly to Rawdon Island Road (south), and
- 50% of future traffic generation directly to Sancrox Road.

3.6.5 Traffic Distribution – Walters Road (Northern Side)

The following traffic distributions have been assumed for the Sancrox Central area:-

- 50% of future traffic generation Walters Road, Northern Side directly to Rawdon Island Road (north), and
- 50% of future traffic generation Walters Road, Northern Side directly to Rawdon Island Road (south). Not part of this assessment.

3.6.6 Traffic Distribution – Le Clos Verdun (Verdun Drive)

It is assumed 100% of the total future traffic generation for the Le Clos Verdun area will access Sancrox Road.

3.6.7 Traffic Distribution – Sancrox North

It is assumed 100% of the total future traffic generation for the Sancrox North area will access Sancrox Road via the Road No.2 (Le Clos) access location.

3.6.8 Traffic Distribution – Freeman / Stubbs Land

The following traffic distributions have been assumed for the Freeman / Stubbs land area:-

- 30% of future traffic generation to access Sancrox Road via Road No.2 (Le Clos) access location, and
- 70% of future traffic generation to access Sancrox Road via Road No.1 (Le Clos) access location.

3.6.9 Traffic Distribution – Bushlands Drive

The following traffic distributions have been assumed for the Bushlands Drive area:-

- 50% of future traffic generation to access Sancrox Road, and
- 50% of future traffic generation to access Sancrox Road. Not part of this assessment.

3.6.10 Traffic Distribution – Sancrox Employment Land (North of Sancrox Road)

It is assumed 100% of the total future traffic generation for the Sancrox Employment Land (north of Sancrox Road) will access Sancrox Road via the Frogs Road roundabout.

3.7 Traffic Assignment

The following traffic assignment assumptions have been made for this assessment.

3.7.1 Possible Future Traffic Assignment – Rawdon Island Road Intersection

- From Rawdon Island Road (North) including Bengal Street and Sancrox Central (Riverbank Road, North) direct access to Rawdon Island Road (North)
  - 1% to the west (Sancrox Road, west)
  - 31% to the south (Rawdon Island Road, south), and
  - 68% to the east (Sancrox Road, east)

- From Rawdon Island Road (South) including Walters Road (north of Walters Road) and Sancrox Central (South) direct access to Rawdon Island Road (South)
  - 2% to the west (Sancrox Road, west)
  - 28% to the north (Rawdon Island Road, north), and
  - 70% to the east (Sancrox Road, east)

- From Sancrox Road (West)
  - 4% to the north (Rawdon Island Road, north)
  - 64% to the east (Sancrox Road, east), and
  - 32% to the south (Rawdon Island Road, south)

- From Sancrox Road (East) including all westbound traffic east of the Rawdon Island Road intersection.
  - 5% to the west (Sancrox Road, west)
  - 15% to the north (Rawdon Island Road, north), and
  - 80% to the south (Rawdon Island Road, south)

3.7.2 Possible Future Traffic Assignment – Riverbank Road Intersection

- From Rawdon Island Road Intersection including all eastbound traffic.
  - 10% to the north (Riverbank Road, north)
  - 80% to the east (Sancrox Road, east), and
  - 10% to the south (Riverbank Road, south)
- From Sancrox Road (East) including all eastbound traffic.
  - 15% to the north (Riverbank Road, north)
  - 70% to the west (Sancrox Road, east), and
  - 15% to the south (Riverbank Road, south)
- From Riverbank Road (North)
  - 30% to the west (Sancrox Road, west)
  - 10% to the south (Riverbend Road, south), and
  - 60% to the east (Sancrox Road, east)
- From Riverbank Road (South)
  - 30% to the west (Sancrox Road, west)
  - 10% to the north (Riverbend Road, north), and

- 60% to the east (Sancrox Road, east)

3.7.3 Traffic Assignment – Verdun Drive Intersection

- From Riverbend Road Intersection including all eastbound traffic.
  - 5% to the north (Verdun Drive), and
  - 95% to the east (Sancrox Road, east),
- From Sancrox Road (East) including all eastbound traffic.
  - 1% to the north (Verdun Drive), and
  - 95% to the east (Sancrox Road, east)
- From Verdun Drive
  - 30% to the west (Sancrox Road, west), and
  - 70% to the east (Sancrox Road, east)

3.7.4 Traffic Assignment – Road No.2 (Le Clos) Intersection

- From Verdun Drive Intersection including all eastbound traffic.
  - 1% to the north (Road No.2, north)
  - 69% to the east (Sancrox Road, east), and
  - 30% to the south (Road No.2, south)
- From Road No.1 Intersection including all westbound traffic.
  - 20% to the north (Road No.2, north)
  - 50% to the west (Sancrox Road, west), and
  - 30% to the south (Road No.2, south)
- From Road No.2 (North)
  - 25% to the west (Sancrox Road, west)
  - 20% to the south (Road No.2, south), and
  - 55% to the east (Sancrox Road, east)
- From Road No.2 (South)
  - 29% to the west (Sancrox Road, west)
  - 1% to the north (Road No.2, north), and
  - 70% to the east (Sancrox Road, east)

3.7.5 Traffic Assignment – Road No.1 (Le Clos) Intersection

- From Road No.2 Intersection including all eastbound traffic.
  - 10% to the north (Road No.1, north)
  - 70% to the east (Sancrox Road, east), and
  - 20% to the south (Road No.1, south)
- From Bushlands Drive Intersection including all westbound traffic.
  - 20% to the north (Road No.2, north)
  - 60% to the west (Sancrox Road, west), and
  - 20% to the south (Road No.2, south)
- From Road No.1 (North)
  - 25% to the west (Sancrox Road, west)
  - 20% to the south (Road No.2, south), and
  - 55% to the east (Sancrox Road, east)

- From Road No.1 (South)
  - 29% to the west (Sancrox Road, west)
  - 1% to the north (Road No.2, north), and
  - 70% to the east (Sancrox Road, east)

3.7.6 Possible Future Traffic Assignment – Bushlands Drive Intersection

- From Road No.1 Intersection including all eastbound traffic.
  - 70% to the east (Sancrox Road, east), and
  - 30% to the south (Bushlands Drive)
- From Frogs Road Intersection including all westbound traffic.
  - 80% to the west (Sancrox Road, west), and
  - 20% to the south (Bushlands Drive)
- From Bushlands Drive
  - 25% to the west (Sancrox Road, west)
  - 20% to the south (Road No.2, south), and
  - 55% to the east (Sancrox Road, east)

3.7.7 Possible Future Traffic Assignment – Frogs Road Intersection

- From Bushlands Drive Intersection including all eastbound traffic.
  - 20% to the north (Frogs Road, north)
  - 40% to the east (Pacific Highway, north), and
  - 40% to the south (Pacific Highway, south)
- From Sancrox Road (East) including all westbound traffic.
  - 20% to the north (Frogs Road, north)
  - 50% to the west (Sancrox Road, west), and
  - 30% to the south (Frogs Road, south)
- From Frogs Road (North)
  - 10% to the west (Sancrox Road, west)
  - 40% to the south (Frogs Road, south), and
  - 50% to the east (Sancrox Road, east)
- From Frogs Road (South)
  - 20% to the west (Sancrox Road, west)
  - 60% to the north (Frogs Road, north), and
  - 20% to the east (Sancrox Road, east)

4. SANCROX ROAD FUTURE STRUCTURE / CORRIDOR PLAN

4.1 Sancrox Road Structure Plan

Port Macquarie Hastings Council has indicated they have not yet commenced strategic planning for the area known as Sancrox / Rawdon Island. In order for this development to gain development approval some background strategic traffic planning will be undertaken as part of the assessment for future traffic impacts by this development.

It is hoped the assessments completed for this site and the study area will be utilised by Port Macquarie Hastings Council for future strategic planning of the area in question.

Currently there are six public access points / intersections located along Sancrox Road:-

1) Rawdon Island Road,
2) Riverbank Road,
3) Verdun Drive,
4) Le Clos,
5) Bushlands Drive, and
6) The Pacific Highway

Figure 4.10 indicates the available land area that can be rezoned and developed as residential (orange hatch) and / or industrial land (blue hatch).

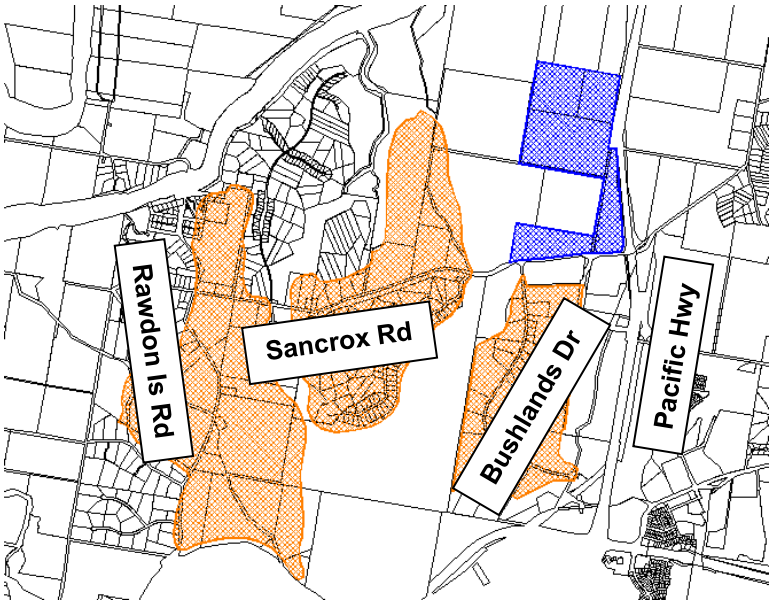


Figure 4.10– LAND SUBJECT TO REZONING FOR FUTURE RESIDENTIAL & IDUSTRIAL DEVELOPMENT

Taking into account the locations of the land available for rezoning in the study area it is recommended the existing access points:-

- Rawdon Island Road,
- Riverbank Road (north),
- Verdun Drive,
- Bushlands Drive, and
- Frogs Road.

along with the addition of the two locations proposed by the Le Clos development and a Riverbank Road (south) be utilised for future controlled access to these areas.

This report will give an indication of the possible future upgrades required for Sancrox Road at these locations. The future upgrades will be assessed based on the derived future traffic generation yields for the study area. It shall be noted a detailed assessment will also be completed for the new intersections proposed as part of the Le Clos residential development.

4.2 Estimated Future Traffic Volumes – Study Area Wide

Based on the calculations for the possible traffic generation and assumptions for the distribution and assignment of the future traffic generation for the study area the following traffic flows have been derived for the nominated intersection for a design horizon of 30 years at 10 year intervals basing the flows on the worst case scenario of the 2019 AM peak period intersection counts and a traffic growth rate of 1.5% applied to the 2019 figures for a 30 year period for the Rawdon Island Road and Frogs Road intersections. Figures 4.20 to 4.26 provide a summary of possible predicted traffic flows for the access locations within the study area.

Based on these projected traffic volumes Section 3 of this assessment provides indications for the upgrade treatments at each of the intersections in question.

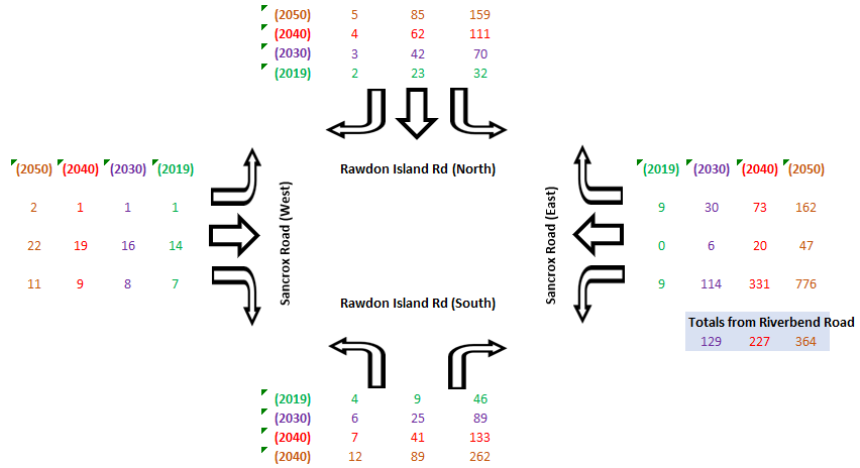


Figure 4.20 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & RAWDON ISLAND ROAD INTERSECTION (30 YEAR DESIGN HORIZON)

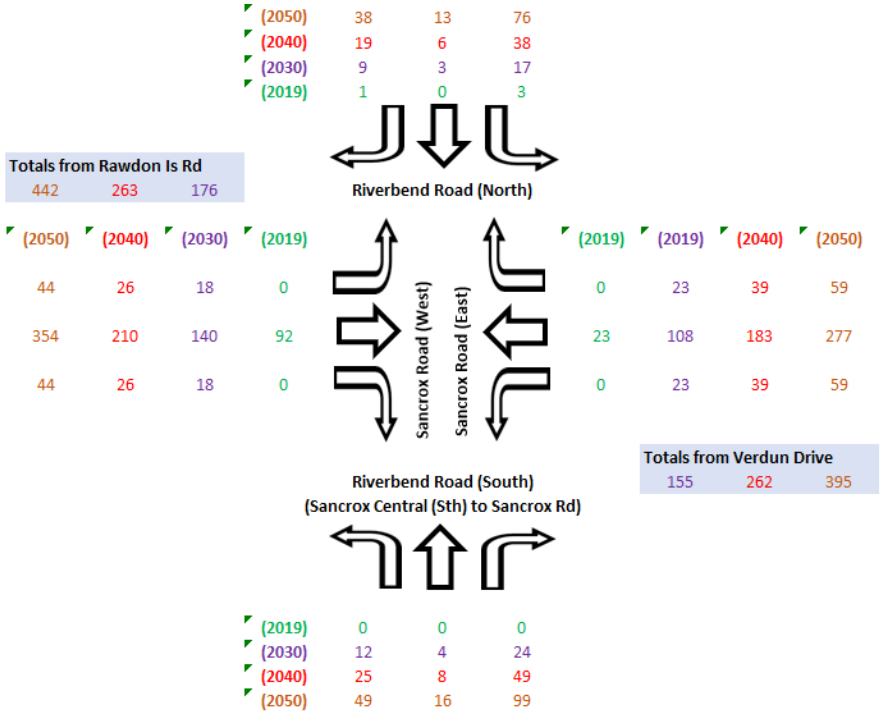


Figure 4.21 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & RIVERBEND ROAD INTERSECTION (30 YEAR DESIGN HORIZON)

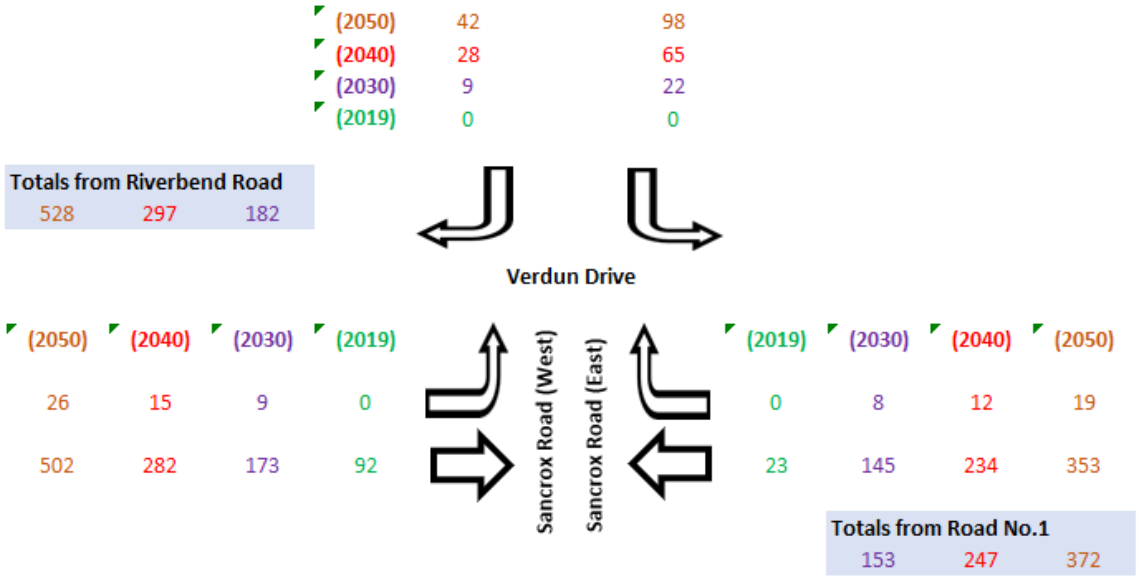


Figure 4.22 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & VERDUN DRIVE INTERSECTION (30 YEAR DESIGN HORIZON)

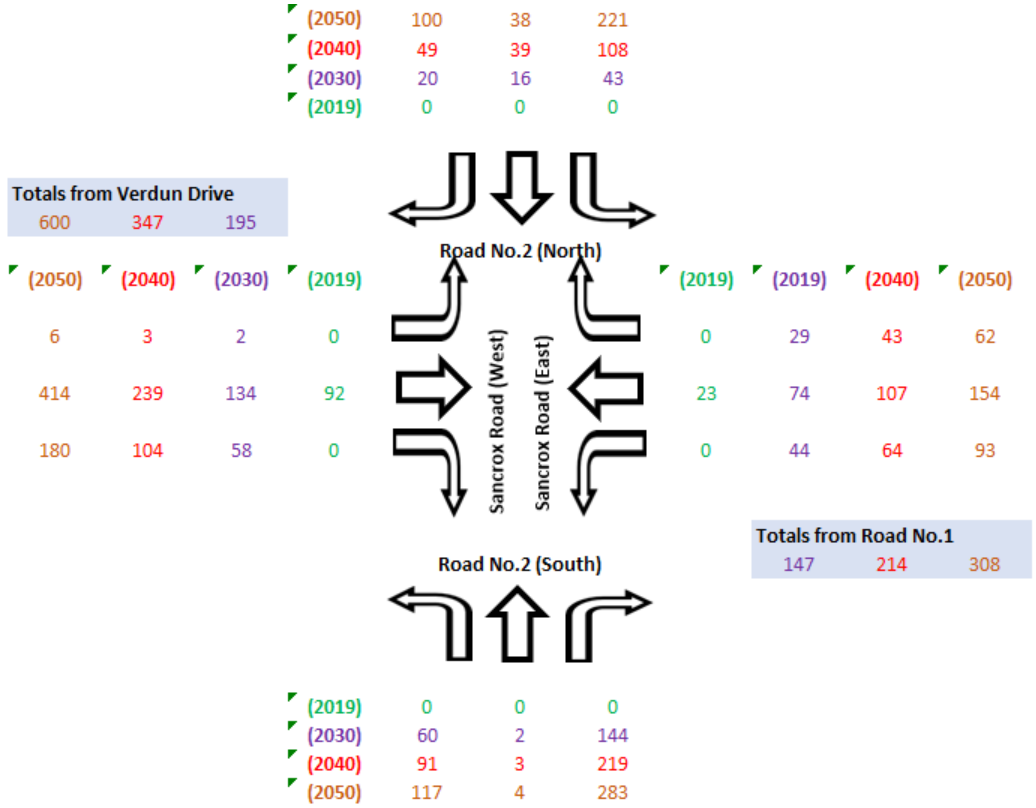


Figure 4.23 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & ROAD NO.2 (Le Clos) INTERSECTION (30 YEAR DESIGN HORIZON)

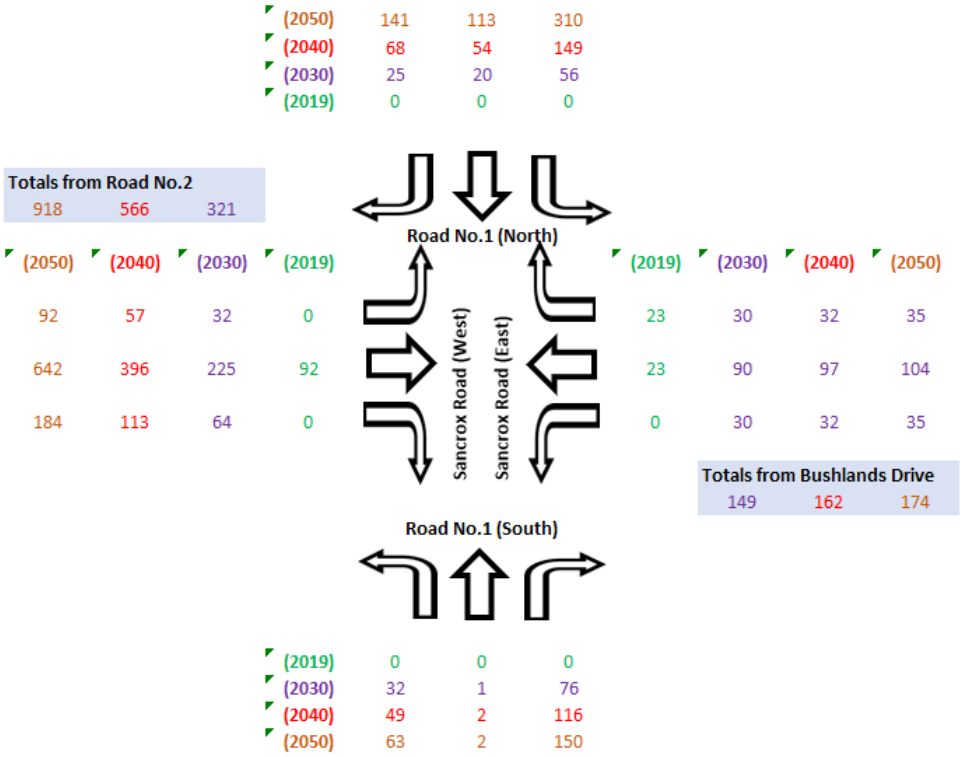


Figure 4.24 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & ROAD NO.1 (Le Clos) INTERSECTION (30 YEAR DESIGN HORIZON)

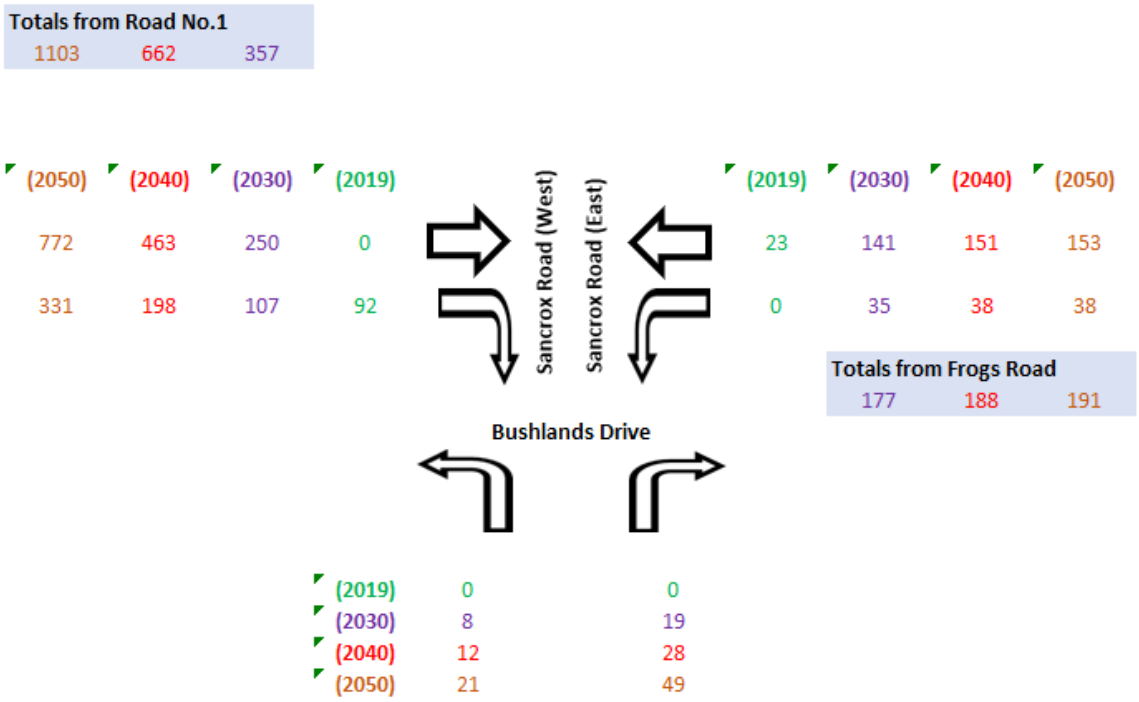


Figure 4.25 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & BUSHLANDS DRIVE INTERSECTION (30 YEAR DESIGN HORIZON)

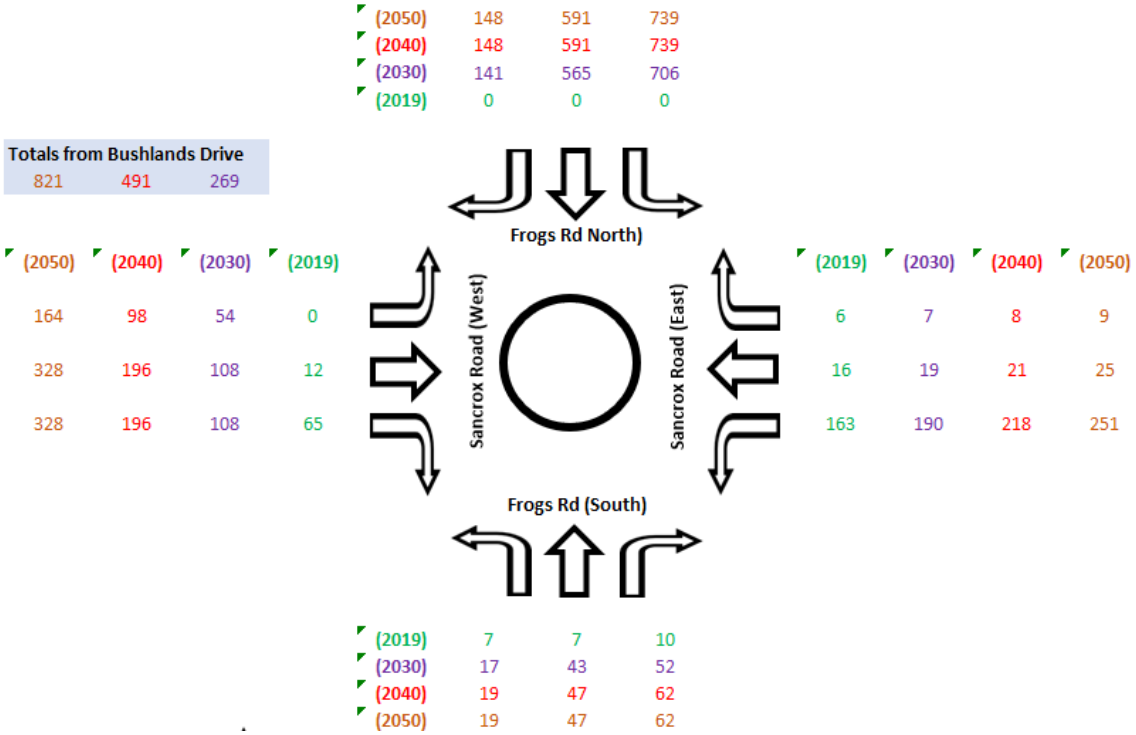


Figure 4.26 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & FROGS ROAD INTERSECTION (30 YEAR DESIGN HORIZON)

4.3 Possible Future Traffic Volumes – Le Clos Only

As part of this assessment there is a requirement to determine what road network upgrades will be triggered by this development so a Voluntary Planning Agreement (VPA) or Contributions Plan can be setup.

For the purposes of this assessment only the predicted future traffic generation for the Le Clos development will be added to the existing traffic volumes (section 2.1) to determine if the development triggers any upgrades to the road network, be it road widening or intersection upgrades.

Based on the calculations for the possible traffic generation and assumptions for the distribution and assignment of the traffic generation for the Le Clos development, the following traffic flows have been derived for the nominated intersections for a design horizon of 30 years at 10 year intervals basing the flows on the worst case scenario of the 2019 AM peak period intersection counts and a traffic growth rate of 1.5% applied to the 2019 figures for a 30 year period for the Rawdon Island Road and Frogs Road intersections. Figures 4.30 to 4.36 provide a summary of possible predicted traffic flows for the access locations within the study area.

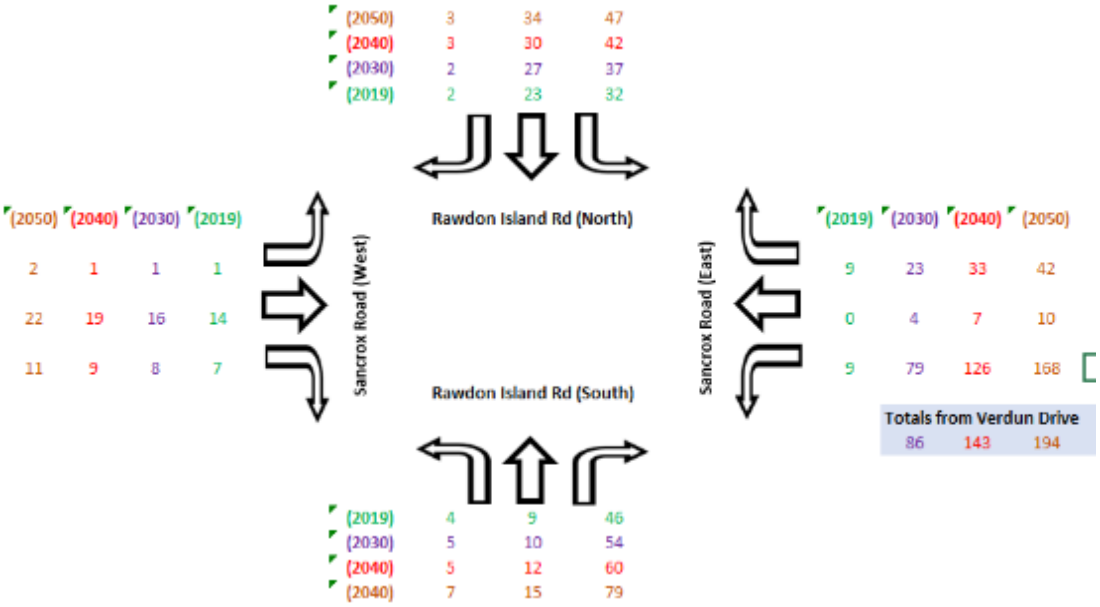


Figure 4.30 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & RAWDON ISLAND ROAD INTERSECTION (30 YEAR DESIGN HORIZON, LE CLOS FUTURE TRAFFIC GENERATION ONY)

Figure 4.31 summarises the Sancrox Road and Rawdon Island Road intersection configuration major turn requirements for the 30 year design horizon:-

- Rawdon Island Road Southbound – Left into Sancrox Road,
- Rawdon Island Road Northbound – Right into Sancrox Road, and
- Sancrox Road Westbound – Left into Rawdon Island Road.
- Sancrox Road Westbound – Right into Rawdon Island Road.

based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings.

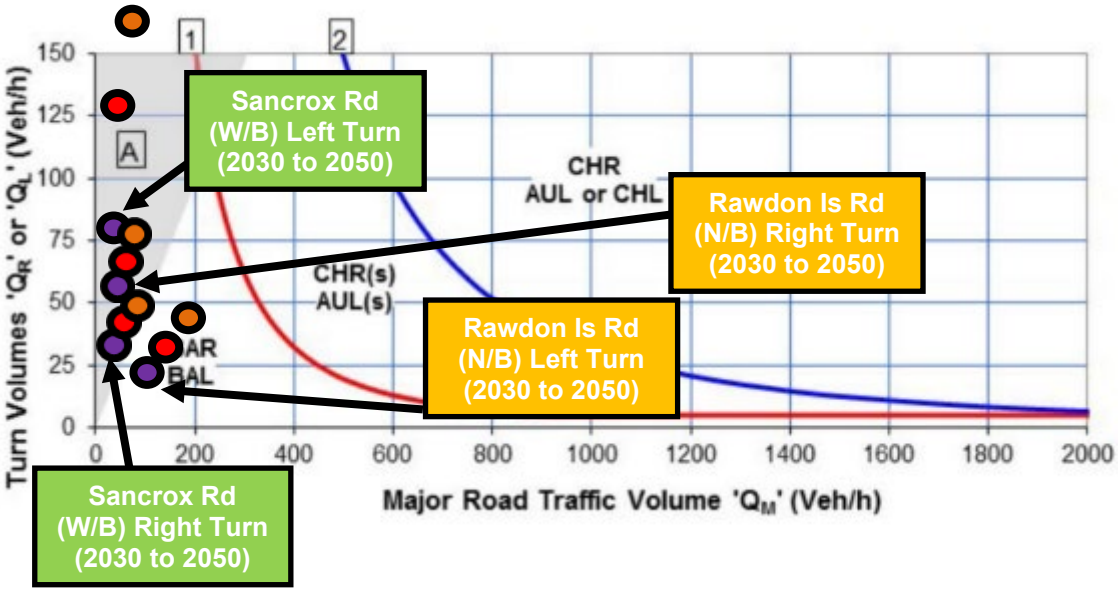


Figure 4.31 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS - SANCROX RD & RAWDON ISLAND ROAD INTERSECTION DESIGN HORIZON, (LE CLOS DEVELOPMENT ONLY)

The assessment, based on the projected traffic generation for the Le Clos development only, indicates the intersection configuration will operate adequately as a BAR / BAL layout for the 30 year design horizon. This is in keeping with the existing intersection configuration.

However, it shall be noted, four way cross junctions are not ideal from a road safety point of view where there could be a number of turn movements crossing each other creating sight distance issues for through traffic.

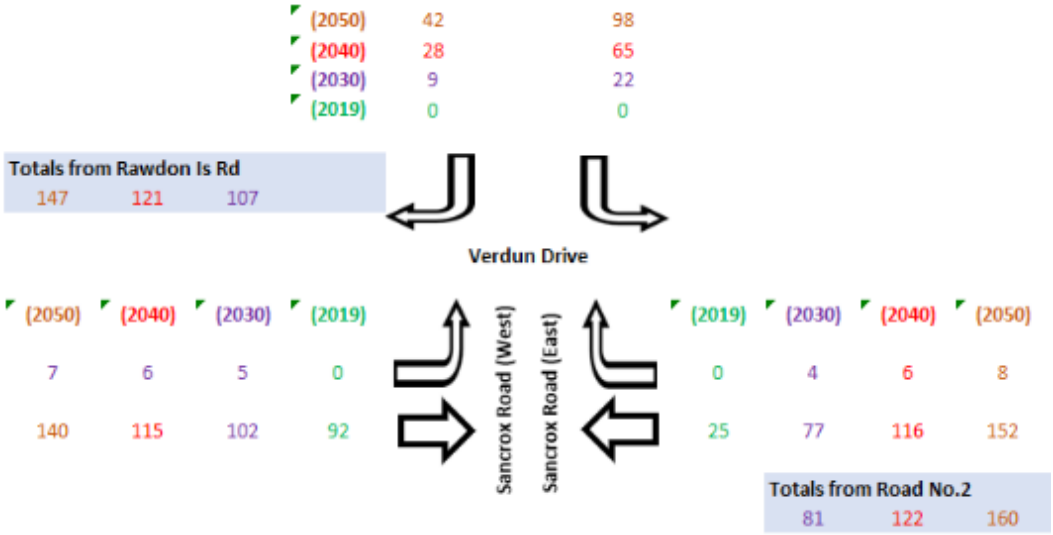


Figure 4.32 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & VERDUN INTERSECTION (30 YEAR DESIGN HORIZON, LE CLOS FUTURE TRAFFIC GENERATION ONY)

Figure 4.33 summarises the Sancrox Road and Verdun Drive intersection configuration major turn requirements for the 30 year design horizon:-

- Sancrox Road Eastbound – Left into Verdun Drive, and
- Sancrox Road Westbound – Right into Verdun Drive.

based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings.

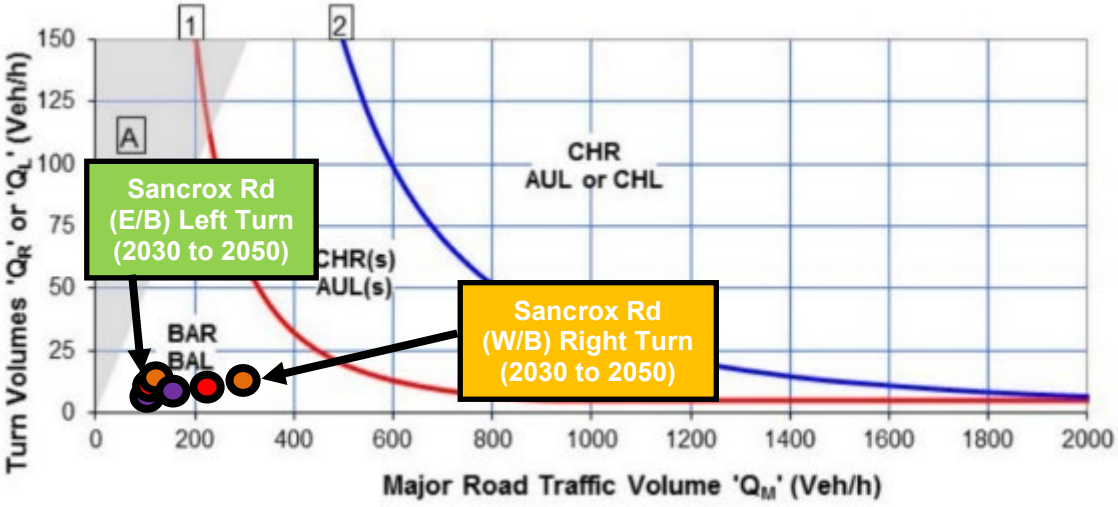


Figure 4.33 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS - SANCROX RD & VERDUN DRIVE INTERSECTION DESIGN HORIZON, (LE CLOS DEVELOPMENT ONLY)

The assessment, based on the projected traffic generation for the Le Clos development only, indicates the intersection configuration will operate adequately as a BAR / BAL layout for the 30 year design horizon.

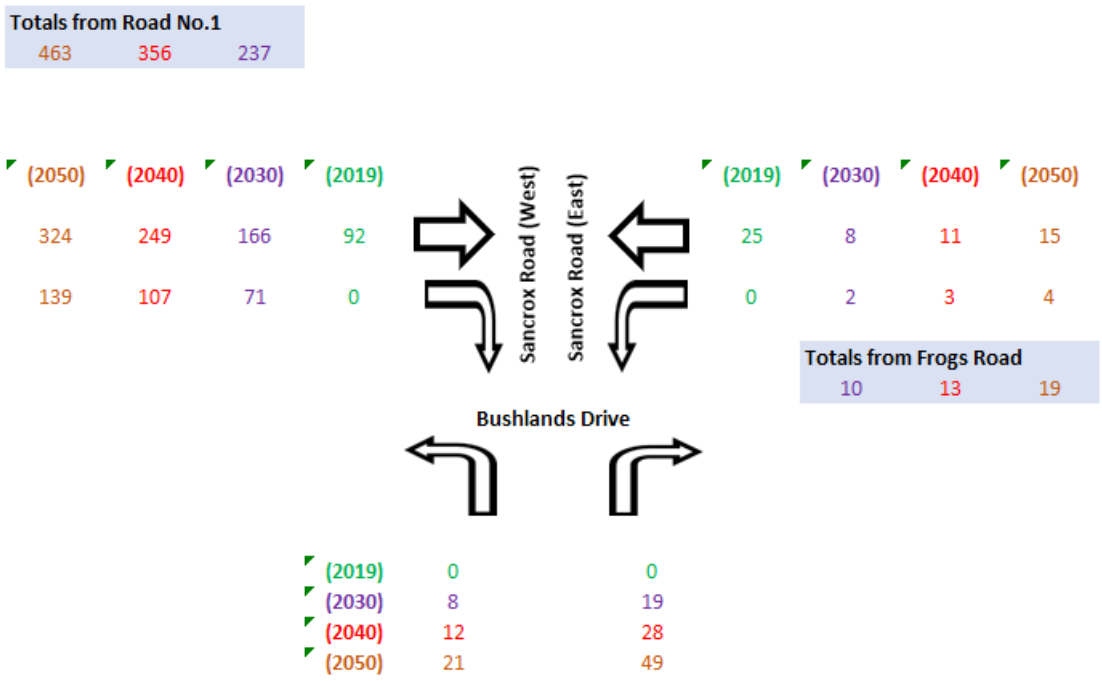


Figure 4.34 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & BUSHLANDS DRIVE INTERSECTION (30 YEAR DESIGN HORIZON, LE CLOS FUTURE TRAFFIC GENERATION ONY)

Figure 4.35 summarises the Sancrox Road and Verdun Drive intersection configuration major turn requirements for the 30 year design horizon:-

- Sancrox Road Eastbound – Right into Bushlands Drive, and
- Sancrox Road Westbound – Left into Bushlands Drive.

based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings.

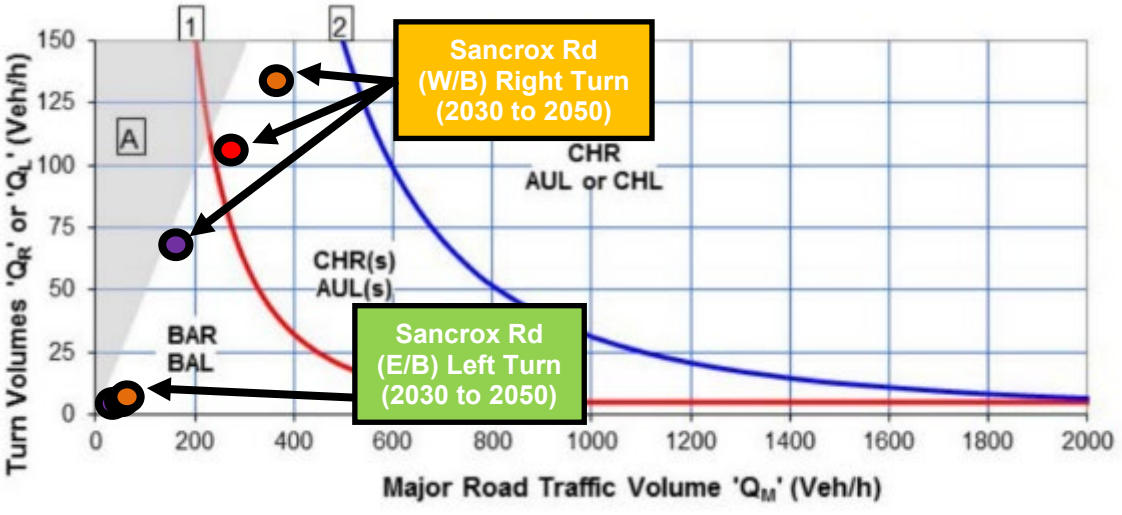


Figure 4.35 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS - SANCROX RD & VERDUN DRIVE INTERSECTION DESIGN HORIZON, (LE CLOS DEVELOPMENT ONLY)

The assessment, based on the projected traffic generation for the Le Clos development only, indicates the intersection configuration will need to be upgraded to a CHR(s) layout beyond the design horizon year of 2040.

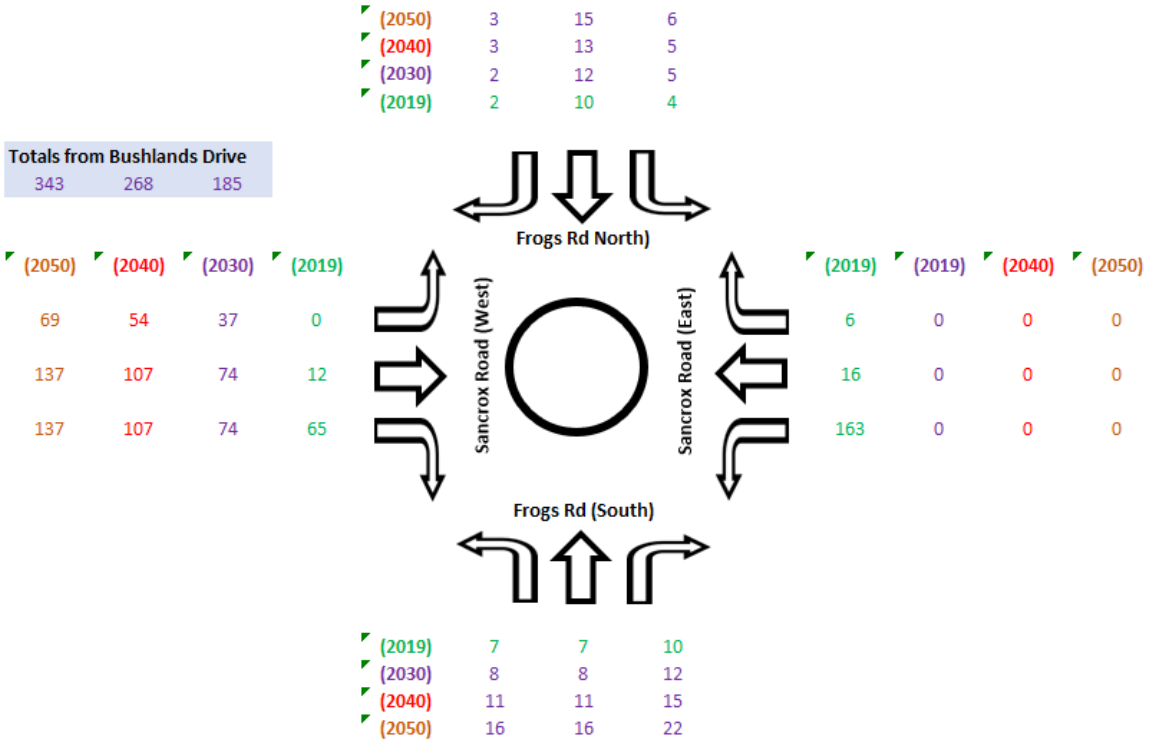


Figure 4.36 – FUTURE TRAFFIC FLOWS – SANCROX ROAD & FROGS ROAD INTERSECTION (30 YEAR DESIGN HORIZON, LE CLOS FUTURE TRAFFIC GENERATION ONY)

4.4 Future Road Capacity

Currently Sancrox Road is catering for approximately 2790 and Rawdon Island Road is 1420 vehicles per day, Annual Average Daily Traffic (AADT).
This assessment will determine Sancrox Road (19091 vpd, 1909 vphr two way) and Rawdon Island Road (15150 vpd, 1515 vphr two way) at the end of the 30 year design horizon.

In accordance with Port Macquarie Hastings Council's version of the AUSPEC-1 D01-Geometric Road Design (2003) – Table D1.5 these roads are classified as being Arterial Roads (up to 20000 vpd) with reference to the traffic volumes.

It shall be noted in accordance with the Austroads Guide to Traffic Management, Part 3 – Traffic Studies and Analysis (2013) the lane capacity for an urban road can be upto 900 vehicles per hour or 9000 vehicles per day (Table 4.30 below).

Type of lane	One-way mid-block capacity (pc/hr)
Median or inner lane	
• Divided road	1000
• Undivided road	900
Middle lane (of a 3-lane carriageway)	
• Divided road	900
• Undivided road	1000
Kerb lane	
• Adjacent to parking lane	900
• Occasional parked vehicles	600
• Clearway conditions	900

Source: Table 5.1 of Austroads Guide to Traffic Management Part 3

Table 4.30 – AUSTROADS LANE CAPACITY

Given this assessment has calculated Sancrox Road will be slightly over the 900 vphr threshold and Rawdon Island Road will fall under this threshold the remainder of this assessment will be based on the Austroads Guide and not the PMHC AUSSPEC version given it is the most upto date guide for the consideration of lane capacity.

With regard to Sancrox Road being over the Austroads threshold it shall be noted the 30 year design horizon predicted traffic volumes are very conservative in this assessment.

4.4.1 PMHC Review of AUSSPEC Version

As part of this assessment PMHC's Acting Group Manager of Infrastructure Planning, Cameron Hawkins was contacted re clarification of the matter of lane capacities. He clarified, PMHC at the time of this assessment being prepared, was completing a review of council's AUSSPEC version and was bringing it more into line with the more recent Austroads guidelines.

4.5 Future Road Corridor Plan – Vehicular Traffic

Given the above assessment criteria being completed the following road infrastructure upgrades are proposed as the future corridor plan for Sancrox Road. The design cross sections provided in this assessment are based on the Austroads Guide to Road Design, Part 3 – Geometric Design.

4.5.1 Sancrox Road

Generally as a minimum Sancrox Road should be upgraded for a design speed standard of 70km/h to:-

- Minimum of one travel lane in each direction (3.50m wide),
- 1.50m wide (clear width), 2.0m (if kerb & gutter) cycle lanes along edge of each travel lane,
- 0.5m shoulder outside of cycle lane. Given the future traffic volumes this will allow for emergency stopping where a vehicle can stand within the shoulder / cycle lane outside of the travel lane not obstructing traffic and therefore reducing any roadside hazard,
- 2.50m wide raised central median to allow for pedestrian / cyclist crossing, and
- Auxiliary lanes (turn lanes, acceleration & deceleration lanes) as required. (See intersection upgrades for details).

Figure 4.50 Provides an indication of the design cross section Sancrox Road should be upgraded to.

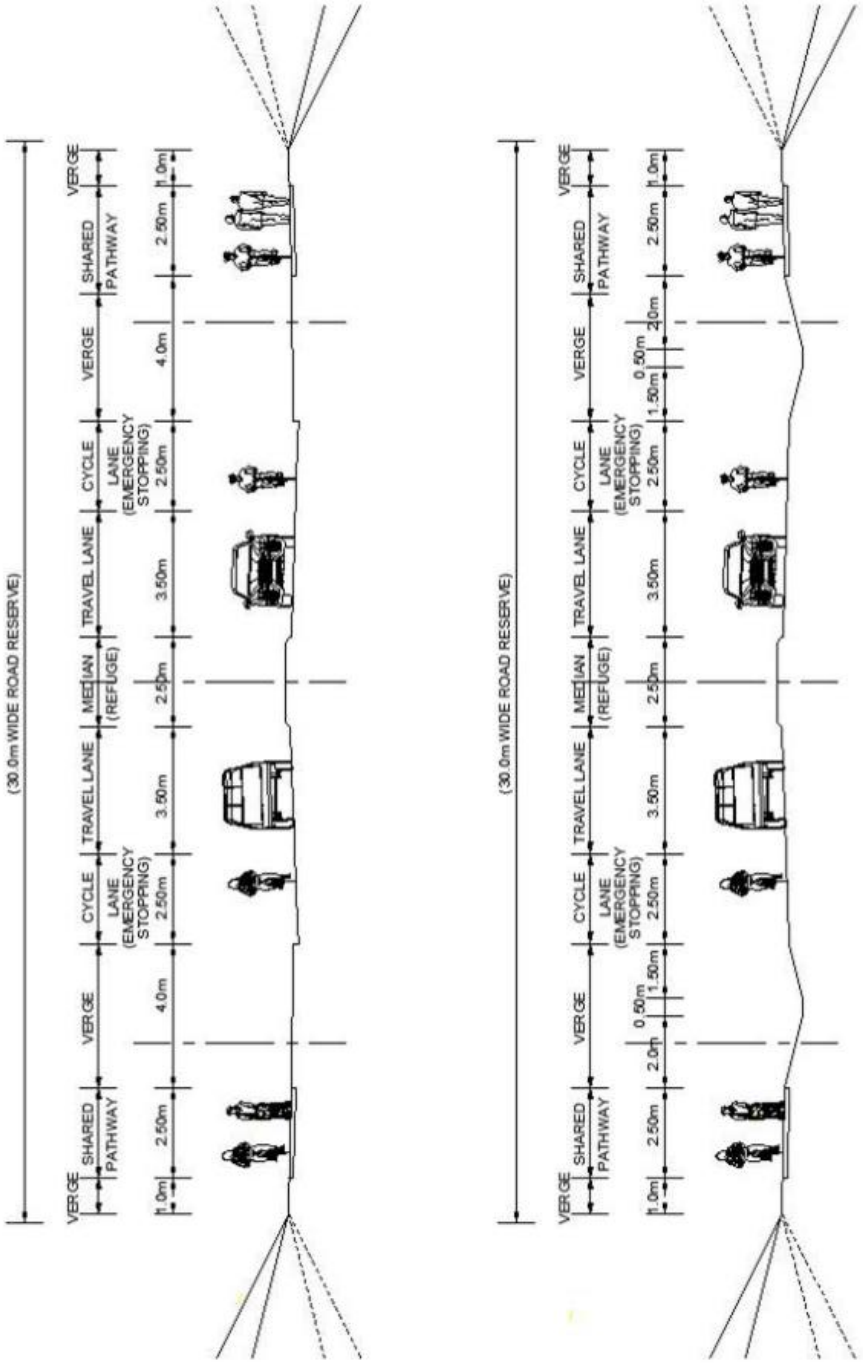


Figure 4.50 – FUTURE DESIGN CROSS SECTION, SANCROX ROAD

4.5.2 Sancrox Road & Rawdon Island Road Intersection

There is no requirement to upgrade the intersection of Sancrox Road and Rawdon Island Road based on either traffic volumes or roadway capacity. However, from a road safety point of view it is not ideal to have an uncontrolled four way intersection.

Therefore is it recommended the existing uncontrolled intersection be replaced with a roundabout. The geometric layout of the roundabout should generally conform to:-

- a central island diameter of 16.0m,
- a circulating roadway width of 9.0m,
- single lane entry / exit on all legs,

- offroad cyclist access on all legs, and
- pedestrian refuges on the Sancrox Rd (west) and Rawdon Island Road (north) legs.

4.5.3 Sancrox Road & Riverbend Road Intersection

The existing intersection of Sancrox Road and Riverbend Road generally conforms to a BAR/BAL T junction layout. Given this location is recognised as an area for future residential development (ie north and south of Sancrox Road) this location should be upgraded for the future residential requirements. Again, there is no requirement to upgrade this intersection based on either traffic volumes or roadway capacity.

However, from a road safety point of view it is not ideal to have an uncontrolled four way intersection. Therefore is it recommended the existing uncontrolled intersection be replaced with a roundabout. The geometric layout of the roundabout should generally conform to:-

- a central island diameter of 16.0m,
- a circulating roadway width of 9.0m,
- single lane entry / exit on all legs,
- offroad cyclist access on all legs, and
- pedestrian refuges on the Sancrox Rd (west) and Riverbend Road (south) legs.

4.5.4 Sancrox Road & Verdun Drive Intersection

The existing intersection of Sancrox Road and Verdun Drive generally conforms to a BAR/BAL T junction layout with some shoulder widening for the left turn out and right turn in movements.

Based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings the following assessment of the future traffic flows at the intersection have been assessed for the 30 year design horizon.

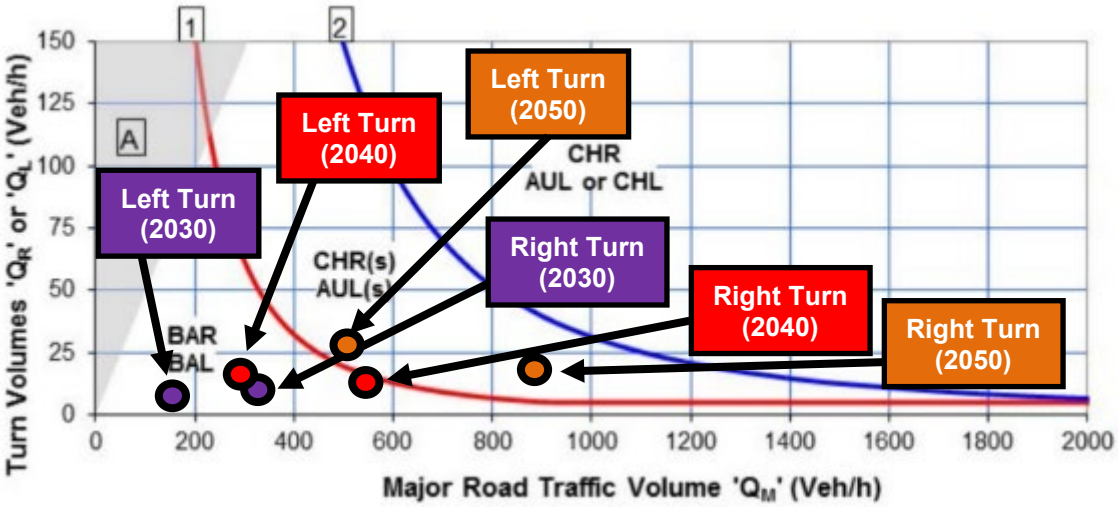


Figure 4.51 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS (SANCROX RD & VERDUN DRIVE INTERSECTION DESIGN HORIZON)

Based on the warrant assessment above, the intersection of Sancrox Road and Verdun Drive will need to be upgraded to a minimum standard of a Type CHR(s)

treatment by the year 2050. For the purposes of this assessment a Type CHR(s) / AUL intersection layout will be modelled in SIDRA software modelling.

Figure 4.52 – SANCROX ROAD & VERDUN DRIVE T JUNCTION INTERSECTION LAYOUT (WITH LEFT SLIP OUT)

The following inputs were used in the setup of the model: -

- Posted speed limits, Sancrox Road = 60km/h, and Verdun Drive = 60km/h;
- SIDRA default values used unless noted otherwise.
- GAP acceptance for sign-controlled intersections adopted from Appendix E of RMS Traffic Modelling Guidelines v1.0 (2013), and are summarised in the table below:

Movement	Gap Acceptance (s)	Follow Up Headway (s)
Right turn from Major Rd	4.0	2.0
Left Turn from Minor Rd	4.5	2.5
Right Turn from Minor Rd	5.5	3.5

Table 4.50 – GAP Acceptance for Controlled Intersections

Assumptions

- HV % of 5% on all legs;
- SIDRA default values for Peak Flow Factor (95%) and Peak Period (30 minutes per hour); and
- Model Type = New South Wales.

Table 4.51 provides a summary of the 30 year design horizon SIDRA modelling results for the future intersection arrangement.

	2030	2040	2050	2050 No Slip Lane
Average Delay (secs)	0.80	1.2	1.30	**1.60**
LOS	A	A	A	**A**
95% percentile queue (m)	1.0	1.0	3.0	**4.0**
Degree of Saturation	0.096	0.157	0.280	**0.280**

Table 4.51 – SIDRA MODELLING SUMMARY FOR 30 YEAR DESIGN HORIZON

The Sancrox Road and Verdun Drive intersection will operate adequately and within capacity for all modelled scenarios.

Further to the assessment above, SIDRA software modelling was completed to determine if a left slip (acceleration) lane out of Verdun Drive will be required as part of the intersection upgrade. Table 4.51 summarises this modelling indicating the originally proposed left slip out of Verdun Drive is not required. See Figure 4.52 for revised proposed upgraded intersection layout.

Figure 4.53 –REVISED SANCROX ROAD & VERDUN DRIVE INTERSECTION LAYOUT

4.5.5 Sancrox Road & Le Clos Access Intersection

The existing Le Clos Access Road intersection will be replaced in the redevelopment of the site with two access locations. No further assessment of this intersection will be undertaken. See section 5 of this assessment for further detailed assessment of the proposed access locations.

4.5.6 Sancrox Road & Bushlands Drive Intersection

The existing intersection of Sancrox Road and Bushlands Drive generally conforms to a BAR/BAL T junction layout.

Based on Figure 2.26c of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings the following assessment of the future traffic flows at the intersection have been assessed for the 30 year design horizon.

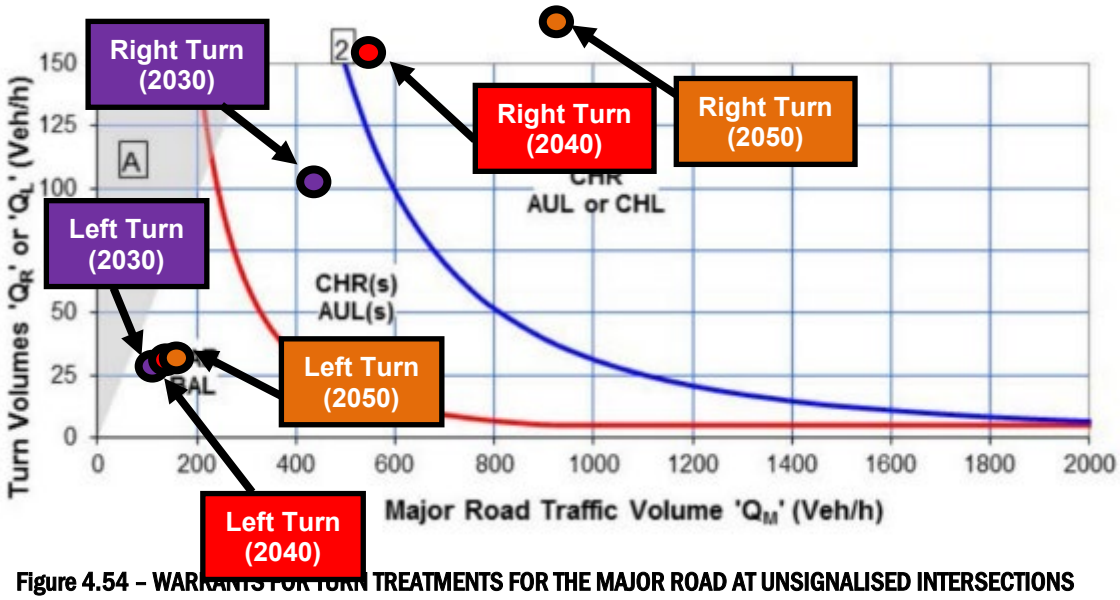


Figure 4.54 – WARRANTS FOR TURN TREATMENTS FOR THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS (SANCROX RD & BUSHLANDS DRIVE INTERSECTION DESIGN HORIZON)

Based on the warrant assessment above, the intersection of Sancrox Road and Bushlands Drive will need to be upgraded to a minimum standard of a Type CHR(s) treatment by the year 2030. Consideration will need to be given beyond the year 2040 for the signalisation of the intersection due to the eastbound through and right turn movements at the intersection.

Figure 4.55 – SANCROX ROAD & BUSHLANDS DRIVE CHANNELISED INTERSECTION LAYOUT

In order to do this, SIDRA software modelling was used to assess the proposed intersection layout.

The following inputs were used in the setup of the model: -

- Posted speed limits, Sancrox Road = 60km/h, and Bushlands Drive = 60km/h;
- SIDRA default values used unless noted otherwise.
- GAP acceptance for sign-controlled intersections adopted from Appendix E of RMS Traffic Modelling Guidelines v1.0 (2013), and are summarised in the table below:

Movement	Gap Acceptance (s)	Follow Up Headway (s)
Right turn from Major Rd	4.0	2.0
Left Turn from Minor Rd	4.5	2.5
Right Turn from Minor Rd	5.5	3.5

Table 4.52 – GAP Acceptance for Controlled Intersections

Assumptions

- HV % of 5% on all legs;
- SIDRA default values for Peak Flow Factor (95%) and Peak Period (30 minutes per hour); and
- Model Type = New South Wales.

Table 4.53 provides a summary of the 30 year design horizon SIDRA modelling results for the future intersection arrangement.

	2030	2040	2050	2050 No Seagull
Average Delay (secs)	1.80	2.0	2.10	2.60
LOS	A	A	A	A
95% percentile queue (m)	3.0	5.0	9.0	9.0
Degree of Saturation	0.139	0.258	0.430	0.430

Table 4.53 – SIDRA MODELLING SUMMARY FOR 30 YEAR DESIGN HORIZON (SANCROX ROAD & BUSHLANDS DRIVE INTERSECTION)

The Sancrox Road and Bushlands Drive intersection will operate adequately and within capacity for all modelled scenarios.

Further to the assessment above, SIDRA software modelling was completed to determine if channelization (seagull) of the intersection will be required into the future as part of the intersection upgrade. Table 4.53 summarises this modelling indicating the originally proposed channelization of the intersection will not be required as a future upgrade.

However, from a road safety point of view channelization of the intersection will make it safe for turning traffic at the intersection by minimising any merge conflicts on the departure side of the right turn out of Bushlands Drive.

4.5.7 Sancrox Road & Frogs Road Intersection (Roundabout)

The existing roundabout at the intersection of Sancrox Road and Frogs Road was constructed as part of the Pacific Highway upgrade where a grade separated interchange was provided for local access.

4.6 Future Road Corridor Plan – Pedestrian Access

Currently there is no formal provision for pedestrians along Sancrox Road or within the study area in question. As a minimum connection should be provided along the length of Sancrox Road with internal connections via future land developments.

Figure 4.40 provides an indication of the design cross section to be implemented for the Sancrox Road Corridor. In summary, a 2.50m wide shared path to be located 2 to 4.0m from the edge of the shoulder. This shared path will provide a safer experience

for the inexperienced cyclists plus provide pedestrian connection along the Sancrox Road corridor.

Crossing points (pedestrian / cyclist refuges) are to be provided at a number of locations along Sancrox Road to provide east / west and north / south connections across the road alignment. See Appendix E for indicative locations of pedestrian / cyclist refuges.

4.7 Future Road Corridor Plan – Cyclist Access

Currently there is no formal provision for cyclists along Sancrox Road or the study area in question. As a minimum connection should be provided along the length of Sancrox Road with internal connections via future land developments.

Figure 4.40 provides an indication of the design cross section to be implemented for the Sancrox Road Corridor. In summary a 1.50m wide cycle lane is to be provided on each edge of the formation. This width should be increased to 2.0m wide where kerb and gutter is provided so to provide a effective minimum width of 1.50m for a cyclist to travel in. Further to this requirement, 0.50m wide shoulder is to be provided along the outside edge of each cycle lane. This is because, if a vehicle breaks down it can pull over into the cycle lane / shoulder without obstructing traffic in the travel lane thus minimising any road safety issues.

Also to be included as part of the design cross section, is the construction of a 2.50m wide shared path to be located 2 to 4.0m from the edge of the shoulder. This shared path will provide a safer experience for the inexperienced cyclists plus provide pedestrian connection along the Sancrox Road corridor.

4.8 Future Road Corridor Plan – Public Transport

Currently there is no provision for public transport along Sancrox Road or within the study area in question. As development increases in the area planning for public transport will need to be included in any future strategic planning for the area.

As a minimum consideration will need to be given for bus stop facilities along Sancrox Road in accordance with Port Macquarie Hastings Council's design standards at the time.

The future planning will need to consider connection to residential and commercial areas in relation to ease of access for all users.

4.9 Summary of Sancrox Road Structure / Corridor Plan Requirements

The following summary of the make up of the Sancrox Road Structure / Corridor Plan is based on Future Traffic Generation, Roadway Capacity, Intersection Assessment and Road Safety considerations.
The summary also provides an indication of the upgrade impacts for the local road network that the Le Clos development will create given the timing of other residential development in the area.

4.9.1 Le Clos Development Only Structure / Corridor Plan Upgrade Requirements

As indicated previously the Le Clos development will more than likely generate impacts on the local road network as there is no other residential development planned in the area at the time of this assessment being completed. Based on this

the following recommended upgrades are required to be completed by the development:-

- Minimum design standard to be 70km/h.
- Upgrade design and construction of the Sancrox Road frontage for the Le Clos site to a standard of half the design cross section suggested in Figure 4.50. Southern side of Sancrox Road to carriageway centreline. Future development in the area to be responsible for the upgrade of the northern side of Sancrox Road in this location.
- Design and Construction of 2 roundabouts (Road No.1 and Road No.2). The construction of the northern legs of Roads No.1 and 2 is to be undertaken by others as future development dictates.
- Design and Construction of a Shared Path along the Sancrox Road frontage of the Le Clos site generally in accordance with Figure 4.50. All other shared path facilities are to be constructed by others as future development dictates.
- Provision of Public Transport Facilities (Bus Bay) at each of the proposed development intersections (roundabouts). All other public transport facilities are to be constructed by others as future development dictates.
- The intersection of Sancrox Road and Bushlands Drive will need to upgraded to a type CHR(s) intersection at the year 2030. Any further upgrades to this intersection are to be completed by others as future development in the area dictates.

4.9.2 Whole of Study Area Structure / Corridor Plan Upgrade Requirements

As the area of Sancrox / Rawdon Island develops into the future there will be a requirement to upgrade the local road network based on increased traffic generation / flows and increased possibility of road safety issues relative to these increased flows. Based on the assessments of this report the following recommendations are made for the future upgrade requirements of the local road network (ie. Sancrox Road).

- Minimum design standard to be 70km/h.
- Generally the upgrading of Sancrox Road to the standard indicated in Figure 4.50 of this report by others excluding the Le Clos development as nominated in section 4.9.1.
- Future upgrade of the intersection of Sancrox Road and Rawdon Island to a single lane roundabout on each leg of the roundabout including off road access for cyclists at the roundabout. This is a road safety requirement as four way uncontrolled intersection are not acceptable with regard to road safety. The upgrade of this intersection should be commenced within 10 years of residential development commencing in the area other than that of the Le Clos site.
- Future upgrade of the intersection of Sancrox Road and Riverbend Road to a single lane roundabout on each leg of the roundabout including off road access for cyclists at the roundabout. This upgrade will be dictated by development in the area. Other than that of the Le Clos site. Further detailed assessment will need to be completed to determine the timing of this upgrade requirement.
- Future upgrade of the intersection of Sancrox Road and Verdun Drive to a Type CHR(s) intersection layout including off road access for cyclists and pedestrians at the intersection. This upgrade will be dictated by development

in the area. Other than that of the Le Clos site. Further detailed assessment will need to be completed to determine the timing of this upgrade requirement.

- Construction of Northern leg of the roundabout including off road access for cyclists at the roundabout. (Road No.1) at the Le Clos location. This upgrade will be dictated by development in the area. Other than that of the Le Clos site. Further detailed assessment will need to be completed to determine the timing of this upgrade requirement.
- Construction of Northern leg of the roundabout including off road access for cyclists at the roundabout. (Road No.2) at the Le Clos location. This upgrade will be dictated by development in the area. Other than that of the Le Clos site. Further detailed assessment will need to be completed to determine the timing of this upgrade requirement.
- The intersection of Sancrox Road and Bushlands Drive will need to upgraded to a type CHR channelised seagull intersection beyond the year 2040 once development other than that of the Le Clos site commences. The Le Clos development will require this intersection to be upgraded to a type CHR(s) intersection layout by the year 2040. Any further upgrades (channelised seagull) to this intersection are to be completed by others as future development in the area dictates.
- Future upgrade of the existing roundabout at the intersection of Sancrox Road and Frogs Road to cater for two eastbound entry lane on Sancrox Road including revised provision for off road access for cyclists and pedestrians at the roundabout. This upgrade requirement is driven by road safety with regard to lane changing at the roundabout and the increased likelihood of heavy traffic to and from the north of the roundabout with the future development of the Sancrox Employment Land area. This upgrade should be commenced within 10 years of the employment land starting development. This upgrade will be dictated by development in the area. Other than that of the Le Clos site.
- Design and Construction of a Shared Path along each side of Sancrox Road generally in accordance with Figure 4.50. All shared path facilities are to be constructed by others as future development dictates. Other than that of the Le Clos site.
- Provision of Public Transport Facilities as required by Port Macquarie Hastings Council at the time. All public transport facilities are to be constructed by others as future development dictates. Other than that of the Le Clos site.

5. LE CLOS DEVELOPMENT DETAILED INTERSECTION ASSESSMENT

The Le Clos development proposes to have two access points to service the site. Being,

- Road No.1 (approximately 500m west of the existing access road on Sancrox Road, and
- Road No.2 (approximately 500m west of the Road No.1 intersection on Sancrox Road)

These access points will be in the form of roundabout facilities.

5.1 Road No.1 Intersection Assessment

SIDRA software modelling has been completed for the intersection of Sancrox Road and Road No.1 (Le Clos Development) to determine the Level of Service (LoS) of the future intersection configuration including traffic distribution and assignment for the 30 year design horizon.

Figure 5.10 provides an indication of the roundabout layout assessment by SIDRA.

Figure 5.10 – SANCROX ROAD & Road No.1 ROUNDABOUT LAYOUT

The following inputs were used in the setup of the model: -

- Posted speed limits, Sancrox Road = 60km/h, and Road No.1 = 60km/h;
- SIDRA default values used unless noted otherwise.
- GAP acceptance for sign-controlled intersections adopted from Appendix E of RMS Traffic Modelling Guidelines v1.0 (2013), and are summarised in the table below:

Movement	Gap Acceptance (s)	Follow Up Headway (s)
Right turn from Major Rd	4.0	2.0
Left Turn from Minor Rd	4.5	2.5
Right Turn from Minor Rd	5.5	3.5

Table 5.10 – GAP Acceptance for Controlled Intersections

Assumptions

- HV % of 5% on all legs;
- SIDRA default values for Peak Flow Factor (95%) and Peak Period (30 minutes per hour); and
- Model Type = New South Wales.

Table 5.11 provides a summary of the 30 year design horizon SIDRA modelling results for the future intersection arrangement.

	2030	2040	2050	2050 alternative
Average Delay (secs)	6.2	7.2	49.5	10.1
LOS	A	A	D	A
95% percentile queue (m)	5.0	17.0	419.0	33.0
Degree of Saturation	0.136	0.350	1.090	0.513

Table 5.11 – SIDRA MODELLING SUMMARY FOR 30 YEAR DESIGN HORIZON

The Sancrox Road and Road No.1 intersection will operate adequately and within capacity for all modelled scenarios of 2030 and 2040 with exception of the 2050 period. The Northern leg fails due to the high volume of eastbound traffic.

Further testing revealed that addition of a 30m long left turn lane on the northern leg would provide adequate capacity in 2050 to reduce Average Delay to 10.1s, LOS A, 95th percentile queue of 33m and DoS of 0.513.

Figure 5.11 – REVISED SANCROX ROAD & Road No.1 ROUNDABOUT LAYOUT

5.2 Road No.2 Intersection Assessment

SIDRA software modelling has been completed for the intersection of Sancrox Road and Road No.2 (Le Clos Development) to determine the Level of Service (LoS) of the future intersection configuration including traffic distribution and assignment for the 30 year design horizon.

Figure 5.20 provides an indication of the roundabout layout assessment by SIDRA.

Figure 5.20 – SANCROX ROAD & Road No.2 ROUNDABOUT LAYOUT

The following inputs were used in the setup of the model: -

- Posted speed limits, Sancrox Road = 60km/h, and Road No.1 = 60km/h;
- SIDRA default values used unless noted otherwise.
- GAP acceptance for sign-controlled intersections adopted from Appendix E of RMS Traffic Modelling Guidelines v1.0 (2013), and are summarised in the table below:

Movement	Gap Acceptance (s)	Follow Up Headway (s)
Right turn from Major Rd	4.0	2.0
Left Turn from Minor Rd	4.5	2.5
Right Turn from Minor Rd	5.5	3.5

Table 5.20 – GAP Acceptance for Controlled Intersections

Assumptions

- HV % of 5% on all legs;
- SIDRA default values for Peak Flow Factor (95%) and Peak Period (30 minutes per hour); and
- Model Type = New South Wales.

Table 5.21 provides a summary of the 30 year design horizon SIDRA modelling results for the future intersection arrangement.

	2030	2040	2050
Average Delay (secs)	6.5	6.8	7.5
LOS	A	A	A
95% percentile queue (m)	4.0	7.0	14.0
Degree of Saturation	0.100	0.163	0.278

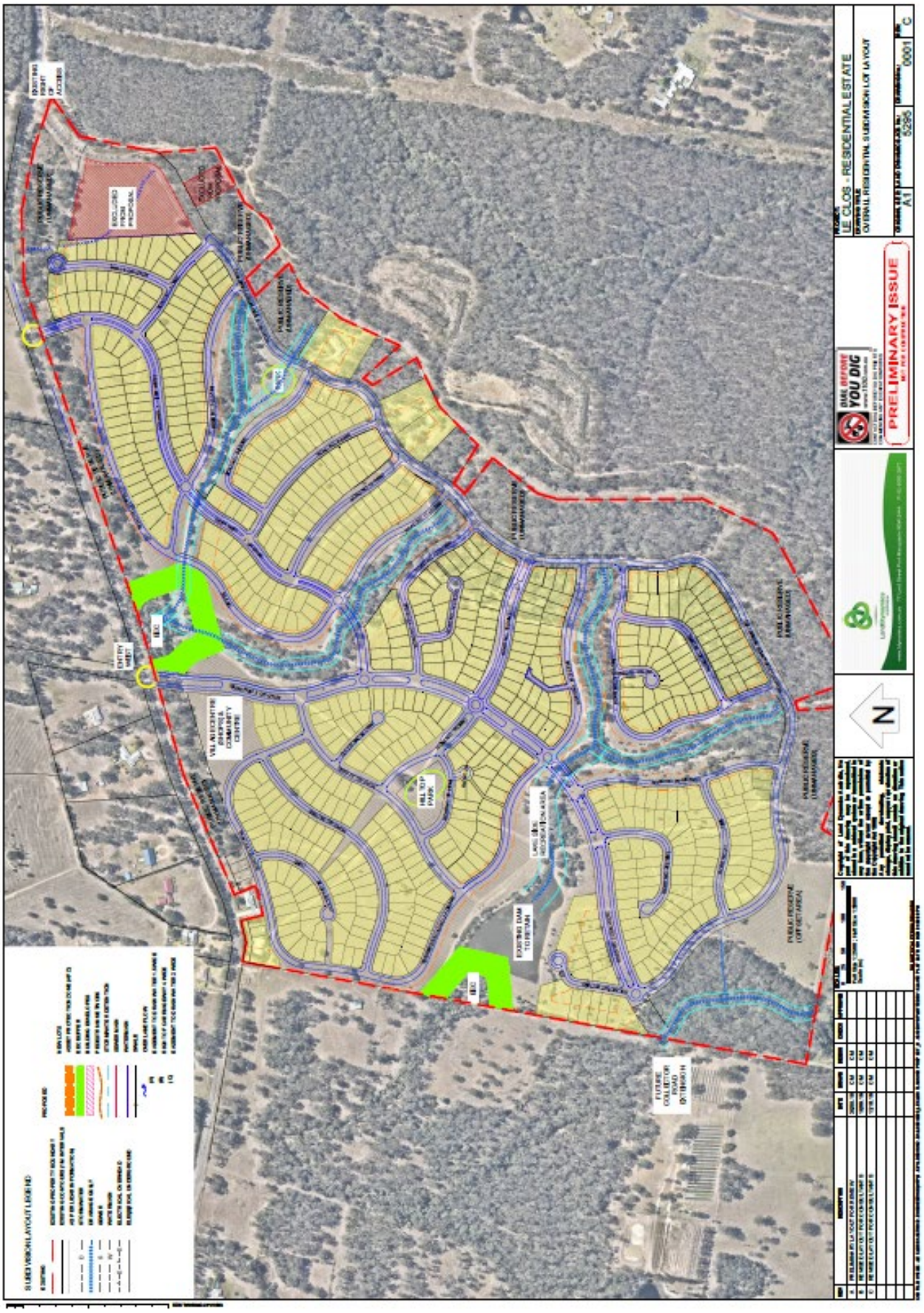
Table 5.21 – SIDRA MODELLING SUMMARY FOR 30 YEAR DESIGN HORIZON

The Sancrox Road and Road No.2 intersection will operate adequately and within capacity for all modelled scenarios of the design horizon period.

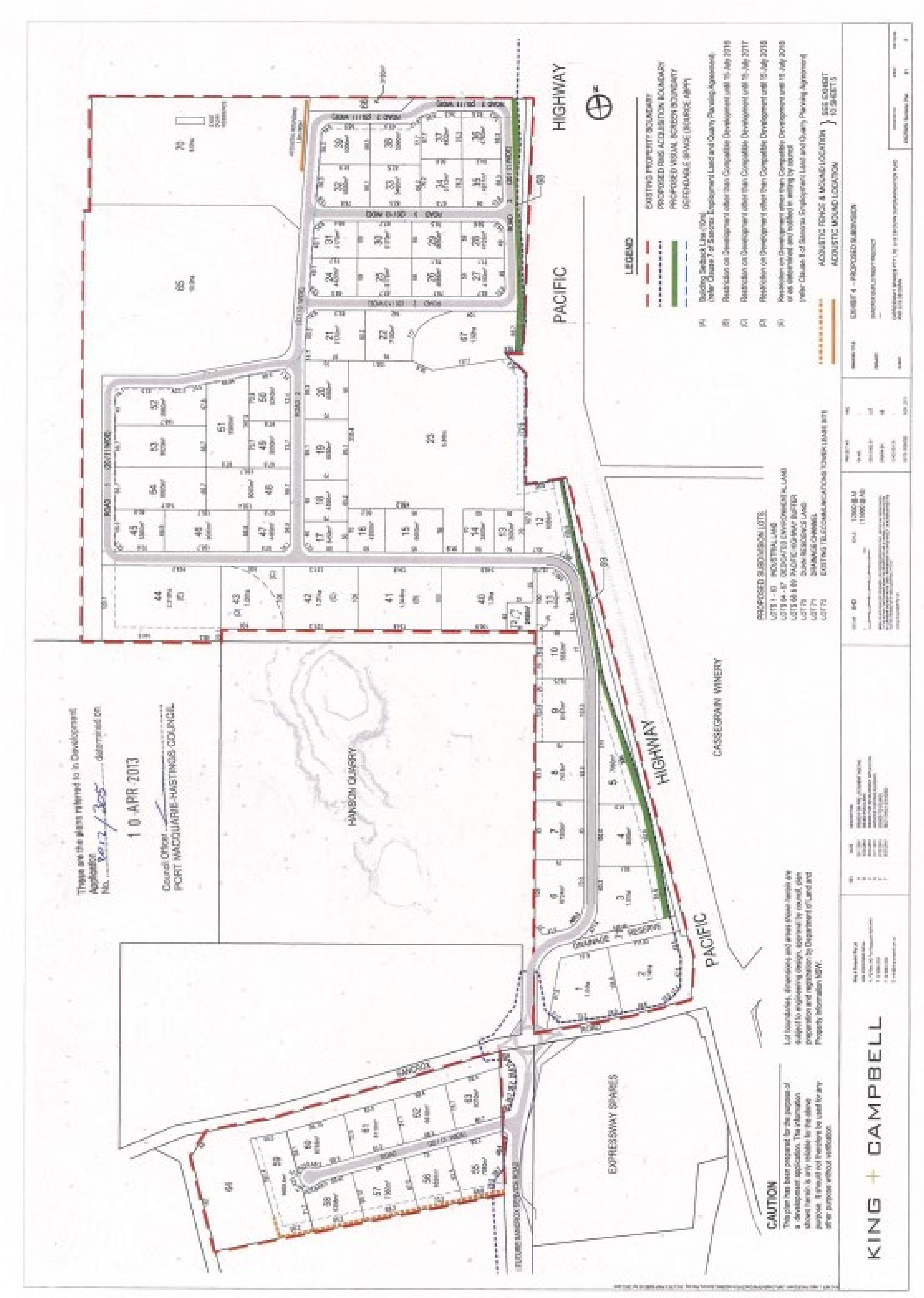
6. RECOMMENDATIONS

- In accordance with the assessments of this report it is recommended the following local road network (Sancrox Road) upgrades be directly attributed to the Le Clos Development and therefore be completed as the development staging requires.
  - In accordance with Figure 4.50 of this report the development is to upgrade Sancrox Road to half width design cross section along full frontage of the site.
  - Provision of 2 roundabouts (Road No.1 and Road No.2). Development staging will determine when each of the roundabouts are to be installed. The construction of the northern legs of Roads No.1 and 2 roundabouts is to be undertaken by others as future development dictates.
  - Provision of a Shared Path along the Sancrox Road frontage of the Le Clos site generally in accordance with Figure 4.50. All other shared path facilities are to be constructed by others as future development dictates.
  - Provision of Public Transport Facilities (Bus Bay) at each of the proposed development intersections (roundabouts). All other public transport facilities are to be constructed by others as future development dictates.
  - The intersection of Sancrox Road and Bushlands Drive will need to upgraded to a type CHR(s) intersection at the year 2030. Any further upgrades to this intersection are to be completed by others as future development in the area dictates.

APPENDIX A
DEVELOPMENT SITE PLAN PROPOSAL

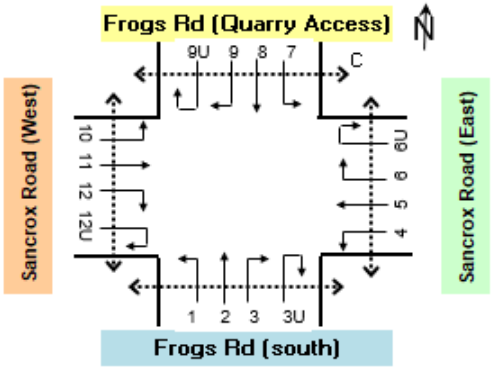

LE CLOS - RESIDENTIAL ESTATE
OVERALL RESIDENTIAL SUBDIVISION LOT LAYOUT
PRELIMINARY ISSUE
EXCLUDED FROM PROPOSAL
N

APPENDIX B
APPROVED SANCROX NORTH INDUSTRIAL SUBDIVISION


PACIFIC HIGHWAY
HANSON QUARRY
CASSEGRAIN WINERY
EXPRESSWAY SPARES
SANCROX ROAD
LEGEND
PROPOSED SUBDIVISION LOTS
CAUTION
These are the plans referred to in Development Application No. 2012/305 determined on 10 APR 2013
Council Officer
PORT MACQUARIE-HASTINGS COUNCIL
KING + CAMPBELL

APPENDIX C
INTERSECTION TRAFFIC COUNT DATA

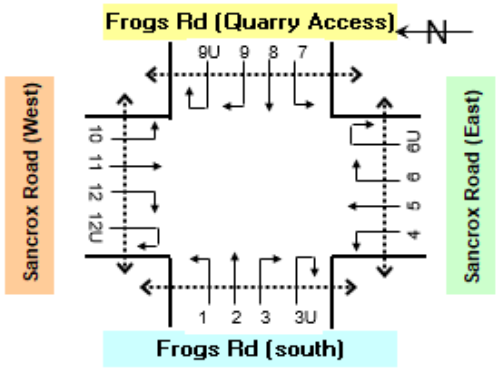
Job No.	82019
Client	Land Dynamics Aust
Suburb	Sancrox
Location	Sancrox Rd & Frogs Rd
Day/Date	Thursday 27 June 2019
Weather	Overcast & Some Showers
Description	Intersection Count



Approach	Frogs Rd (south)																Sancrox Road (East)															
Direction	**1 (Left Turn)**				**2 (Through)**				**3 (Right Turn)**				**3U (U Turn)**				**4 (Left Turn)**				**5 (Through)**				**6 (Right Turn)**				**6U (U Turn)**			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 7:15	1	0	0	**1**	5	0	0	**5**	3	0	0	**3**				**0**	4	1	0	**5**	6	1	0	**7**	8	1	0	**9**				**0**
7:15 to 7:30	2	0	0	**2**	3	2	0	**5**	0	0	0	**0**				**0**	8	1	0	**9**	3	1	0	**4**	1	1	0	**2**				**0**
7:30 to 7:45	1	0	0	**1**	2	1	0	**3**	3	1	0	**4**				**0**	12	1	0	**13**	2	0	0	**2**	3	1	0	**4**				**0**
7:45 to 8:00	2	0	0	**2**	2	2	0	**4**	2	0	0	**2**				**0**	23	4	0	**27**	2	1	0	**3**	3	1	0	**4**				**0**
8:00 to 8:15	1	0	0	**1**	2	0	0	**2**	3	0	0	**3**				**0**	38	2	0	**40**	8	0	0	**8**	1	1	0	**2**				**0**
8:15 to 8:30	3	0	0	**3**	0	0	0	**0**	3	0	0	**3**				**0**	38	3	0	**41**	3	0	0	**3**	0	0	0	**0**				**0**
8:30 to 8:45	0	1	0	**1**	1	0	0	**1**	0	2	0	**2**				**0**	53	2	0	**55**	2	0	0	**2**	0	0	0	**0**				**0**
8:45 to 9:00	1	2	0	**3**	0	0	0	**0**	0	2	0	**2**				**0**	23	0	0	**23**	0	0	0	**0**	0	0	0	**0**				**0**
9:00 to 9:15				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:15 to 9:30				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:30 to 9:45				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:45 to 10:00				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
AM Totals	**11**	**3**	**0**	**14**	**15**	**5**	**0**	**20**	**14**	**5**	**0**	**19**	**0**	**0**	**0**	**0**	**199**	**14**	**0**	**213**	**26**	**3**	**0**	**29**	**16**	**5**	**0**	**21**	**0**	**0**	**0**	**0**

15:00 to 15:15	8	1	0	9	7	0	0	7	1	1	0	2				0	14	0	0	14	0	0	0	0	0	0	0	0				0
15:15 to 15:30	9	1	0	10	4	0	0	4	3	1	0	4				0	21	1	0	22	2	0	0	2	0	0	0	0				0
15:30 to 15:45	5	0	0	5	6	0	0	6	3	0	0	3				0	13	0	0	13	3	0	0	3	0	0	0	0				0
15:45 to 16:00	6	0	0	6	3	0	0	3	1	0	0	1				0	14	3	0	17	1	0	0	1	0	0	0	0				0
16:00 to 16:15	10	1	0	11	0	0	0	0	7	1	0	8				0	18	0	0	18	0	0	0	0	0	0	0	0				0
16:15 to 16:30	5	0	0	5	0	1	0	1	2	0	0	2				0	14	1	0	15	5	1	0	6	0	0	0	0				0
16:30 to 16:45	5	0	0	5	0	0	0	0	0	0	0	0				0	8	0	0	8	11	0	0	11	0	0	0	0				0
16:45 to 17:00	7	0	0	7	0	0	0	0	1	0	0	1				0	10	4	0	14	3	0	0	3	1	0	0	1				0
17:00 to 17:15	7	0	0	7	0	0	0	0	1	0	0	1				0	102	2	0	104	41	0	0	41	0	0	0	0				0
17:15 to 17:30	15	0	0	15	1	0	0	1	0	0	0	0				0	2	0	0	2	5	0	0	5	0	0	0	0				0
17:30 to 17:45	5	0	0	5	0	0	0	0	0	0	0	0				0	4	1	0	5	5	0	0	5	0	0	0	0				0
17:45 to 18:00				0				0				0				0				0				0				0				0
PM Totals	82	3	0	85	21	1	0	22	19	3	0	22	0	0	0	0	220	12	0	232	76	1	0	77	1	0	0	1	0	0	0	0

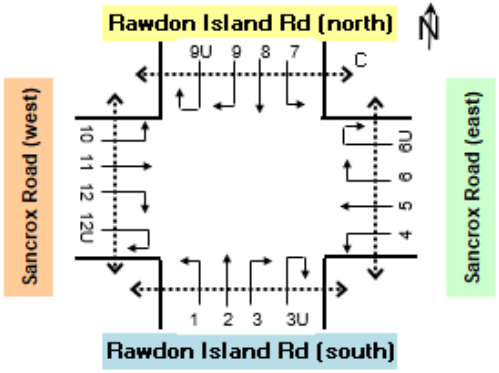
Job No.	82019
Client	Land Dynamics Aust
Suburb	Sancrox
Location	Sancrox Rd & Frogs Rd
Day/Date	Thursday 27 June 2019
Weather	Overcast & Some Showers
Description	Intersection Count



Approach	Frogs Rd (Quarry Access)																Sancrox Road (West)															
Direction	**7 (Left Turn)**				**8 (Through)**				**9 (Right Turn)**				**9U (U Turn)**				**10 (Left Turn)**				**11 (Through)**				**12 (Right Turn)**				**12U (U Turn)**			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 7:15				0				0				0				0	0	1	0	1	7	0	0	7	3	1	0	4				0
7:15 to 7:30				0				0				0				0	0	0	0	0	8	0	0	8	5	0	0	5				0
7:30 to 7:45				0				0				0				0	0	0	0	0	3	0	0	3	12	0	0	12				0
7:45 to 8:00				0				0				0				0	0	0	0	0	1	0	0	1	13	0	0	13				0
8:00 to 8:15				0				0				0				0	0	0	0	0	4	0	0	4	16	0	0	16				0
8:15 to 8:30				0				0				0				0	0	0	0	0	2	0	0	2	19	0	0	19				0
8:30 to 8:45				0				0				0				0	0	0	0	0	5	0	0	5	17	0	0	17				0
8:45 to 9:00				0				0				0				0	0	0	0	0	2	0	0	2	11	0	0	11				0
9:00 to 9:15				0				0				0				0				0				0				0				0
9:15 to 9:30				0				0				0				0				0				0				0				0
9:30 to 9:45				0				0				0				0				0				0				0				0
9:45 to 10:00				0				0				0				0				0				0				0				0
AM Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	32	0	0	32	96	1	0	97	0	0	0	0

15:00 to 15:15				0				0				0				0	0	0	0	0	3	0	0	3	5	0	0	5				0
15:15 to 15:30				0				0				0				0	0	0	0	0	0	0	0	0	4	0	0	4				0
15:30 to 15:45				0				0				0				0	0	0	0	0	0	0	0	0	4	0	0	4				0
15:45 to 16:00				0				0				0				0	0	0	0	0	0	0	0	0	2	0	0	2				0
16:00 to 16:15				0				0				0				0	0	0	0	0	0	0	0	0	6	0	0	6				0
16:15 to 16:30				0				0				0				0	0	0	0	0	1	1	0	2	2	0	0	2				0
16:30 to 16:45				0				0				0				0	0	0	0	0	0	0	0	0	7	0	0	7				0
16:45 to 17:00				0				0				0				0	0	0	0	0	1	0	0	1	9	0	0	9				0
17:00 to 17:15				0				0				0				0	0	0	0	0	3	0	0	3	1	0	0	1				0
17:15 to 17:30				0				0				0				0	0	0	0	0	1	0	0	1	1	0	0	1				0
17:30 to 17:45				0				0				0				0	0	0	0	0	1	0	0	1	9	0	0	9				0
17:45 to 18:00				0				0				0				0				0				0				0				0
PM Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	11	50	0	0	50	0	0	0	0

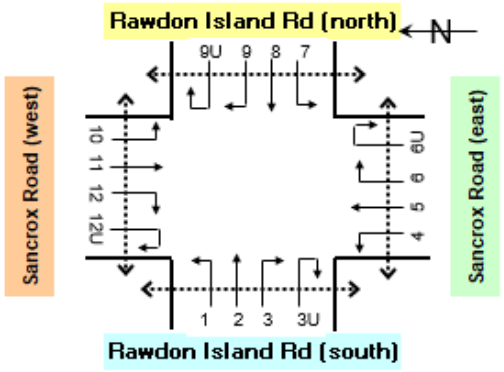
Job No.	82019
Client	Land Dynamics Aust
Suburb	Sancrox
Location	Sancrox Rd & Rawdon Is Rd Rd
Day/Date	Thursday 27 June 2019
Weather	Rain, Cloudy & Overcast
Description	Intersection Count



Approach	Rawdon Island Rd (south)																Sancrox Road (east)															
Direction	**1 (Left Turn)**				**2 (Through)**				**3 (Right Turn)**				**3U (U Turn)**				**4 (Left Turn)**				**5 (Through)**				**6 (Right Turn)**				**6U (U Turn)**			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 7:15	0	0	0	**0**	4	0	0	**4**	2	2	0	**4**				**0**	1	0	0	**1**	0	0	0	**0**	1	2	0	**3**				**0**
7:15 to 7:30	0	0	0	**0**	2	0	0	**2**	6	0	0	**6**				**0**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**				**0**
7:30 to 7:45	0	0	0	**0**	1	1	0	**2**	8	0	0	**8**				**0**	3	1	0	**4**	1	0	0	**1**	1	0	0	**1**				**0**
7:45 to 8:00	1	0	0	**1**	1	0	0	**1**	12	0	0	**12**				**0**	1	0	0	**1**	0	0	0	**0**	1	2	0	**3**				**0**
8:00 to 8:15	3	0	0	**3**	2	0	0	**2**	9	0	0	**9**				**0**	5	0	0	**5**	0	0	0	**0**	2	0	0	**2**				**0**
8:15 to 8:30	0	0	0	**0**	1	0	0	**1**	18	0	0	**18**				**0**	1	0	0	**1**	0	0	0	**0**	2	0	0	**2**				**0**
8:30 to 8:45	0	0	0	**0**	1	3	0	**4**	7	0	0	**7**				**0**	2	0	0	**2**	0	0	0	**0**	2	0	0	**2**				**0**
8:45 to 9:00	0	0	0	**0**	1	0	0	**1**	7	0	0	**7**				**0**	3	1	0	**4**	1	1	0	**2**	1	0	0	**1**				**0**
9:00 to 9:15				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:15 to 9:30				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:30 to 9:45				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:45 to 10:00				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
AM Totals	**4**	**0**	**0**	**4**	**13**	**4**	**0**	**17**	**69**	**2**	**0**	**71**	**0**	**0**	**0**	**0**	**17**	**2**	**0**	**19**	**2**	**1**	**0**	**3**	**11**	**4**	**0**	**15**	**0**	**0**	**0**	**0**

15:00 to 15:15	2	0	0	**2**	0	0	0	**0**	4	0	0	**4**				**0**	5	0	0	**5**	1	0	0	**1**	2	0	0	**2**				**0**
15:15 to 15:30	1	0	0	**1**	2	0	0	**2**	1	0	0	**1**				**0**	4	1	0	**5**	2	1	0	**3**	8	0	0	**8**				**0**
15:30 to 15:45	2	0	0	**2**	7	0	0	**7**	5	0	0	**5**				**0**	3	0	0	**3**	1	0	0	**1**	10	0	0	**10**				**0**
15:45 to 16:00	3	1	0	**4**	3	0	0	**3**	1	0	0	**1**				**0**	6	0	0	**6**	5	0	0	**5**	3	0	0	**3**				**0**
16:00 to 16:15	1	0	0	**1**	0	0	0	**0**	4	0	0	**4**				**0**	8	1	0	**9**	8	1	0	**9**	1	0	0	**1**				**0**
16:15 to 16:30	0	0	0	**0**	4	0	0	**4**	3	0	0	**3**				**0**	1	0	0	**1**	1	0	0	**1**	5	0	0	**5**				**0**
16:30 to 16:45	0	0	0	**0**	3	0	0	**3**	2	0	0	**2**				**0**	5	0	0	**5**	5	0	0	**5**	4	1	0	**0**				**0**
16:45 to 17:00	0	0	0	**0**	4	1	0	**5**	4	0	0	**4**				**0**	4	0	0	**4**	4	0	0	**4**	3	0	0	**3**				**0**
17:00 to 17:15	0	0	0	**0**	3	0	0	**3**	2	0	0	**2**				**0**	35	0	0	**35**	2	0	0	**2**	3	0	0	**3**				**0**
17:15 to 17:30	0	0	0	**0**	4	0	0	**4**	2	0	0	**2**				**0**	9	0	0	**9**	2	0	0	**2**	6	0	0	**6**				**0**
17:30 to 17:45	1	0	0	**1**	5	0	0	**5**	0	0	0	**0**				**0**	1	0	0	**1**	1	0	0	**1**	6	0	0	**6**				**0**
17:45 to 18:00				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
PM Totals	**10**	**1**	**0**	**11**	**35**	**1**	**0**	**36**	**28**	**0**	**0**	**28**	**0**	**0**	**0**	**0**	**81**	**2**	**0**	**83**	**32**	**2**	**0**	**34**	**51**	**1**	**0**	**52**	**0**	**0**	**0**	**0**

Job No.	82019
Client	Land Dynamics Aust
Suburb	Sancrox
Location	Sancrox Rd & Rawdon Is Rd Rd
Day/Date	Thursday 27 June 2019
Weather	Rain, Cloudy & Overcast
Description	Intersection Count

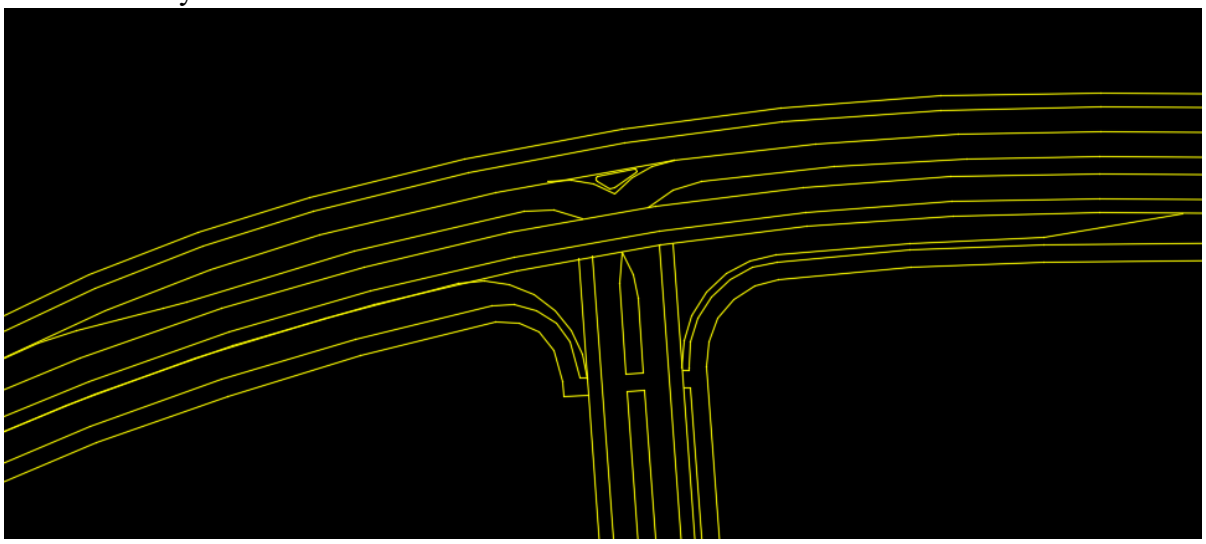


Approach	Rawdon Island Rd (north)																Sancrox Road (west)															
Direction	7 (Left Turn)				8 (Through)				9 (Right Turn)				9U (U Turn)				10 (Left Turn)				11 (Through)				12 (Right Turn)				12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 7:15	4	0	0	**4**	1	3	0	**4**	0	0	0	**0**				**0**	0	0	0	**0**	2	0	0	**2**	0	0	0	**0**				**0**
7:15 to 7:30	3	0	0	**3**	2	5	0	**7**	0	0	0	**0**				**0**	0	0	0	**0**	2	0	0	**2**	2	0	0	**2**				**0**
7:30 to 7:45	4	0	0	**4**	3	1	0	**4**	0	1	0	**1**				**0**	0	0	0	**0**	6	1	0	**7**	0	0	0	**0**				**0**
7:45 to 8:00	4	0	0	**4**	3	3	0	**6**	1	0	0	**1**				**0**	1	0	0	**1**	3	0	0	**3**	1	0	0	**1**				**0**
8:00 to 8:15	13	0	0	**13**	7	0	0	**7**	0	1	0	**1**				**0**	0	0	0	**0**	4	0	0	**4**	0	1	0	**1**				**0**
8:15 to 8:30	7	0	0	**7**	6	0	0	**6**	0	0	0	**0**				**0**	0	0	0	**0**	3	0	0	**3**	2	0	0	**2**				**0**
8:30 to 8:45	7	1	0	**8**	4	0	0	**4**	0	0	0	**0**				**0**	0	0	0	**0**	4	0	0	**4**	3	0	0	**3**				**0**
8:45 to 9:00	3	0	0	**3**	6	0	0	**6**	0	0	0	**0**				**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**				**0**
9:00 to 9:15				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:15 to 9:30				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:30 to 9:45				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
9:45 to 10:00				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
AM Totals	**45**	**1**	**0**	**46**	**32**	**12**	**0**	**44**	**1**	**2**	**0**	**3**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**25**	**1**	**0**	**26**	**8**	**1**	**0**	**9**	**0**	**0**	**0**	**0**

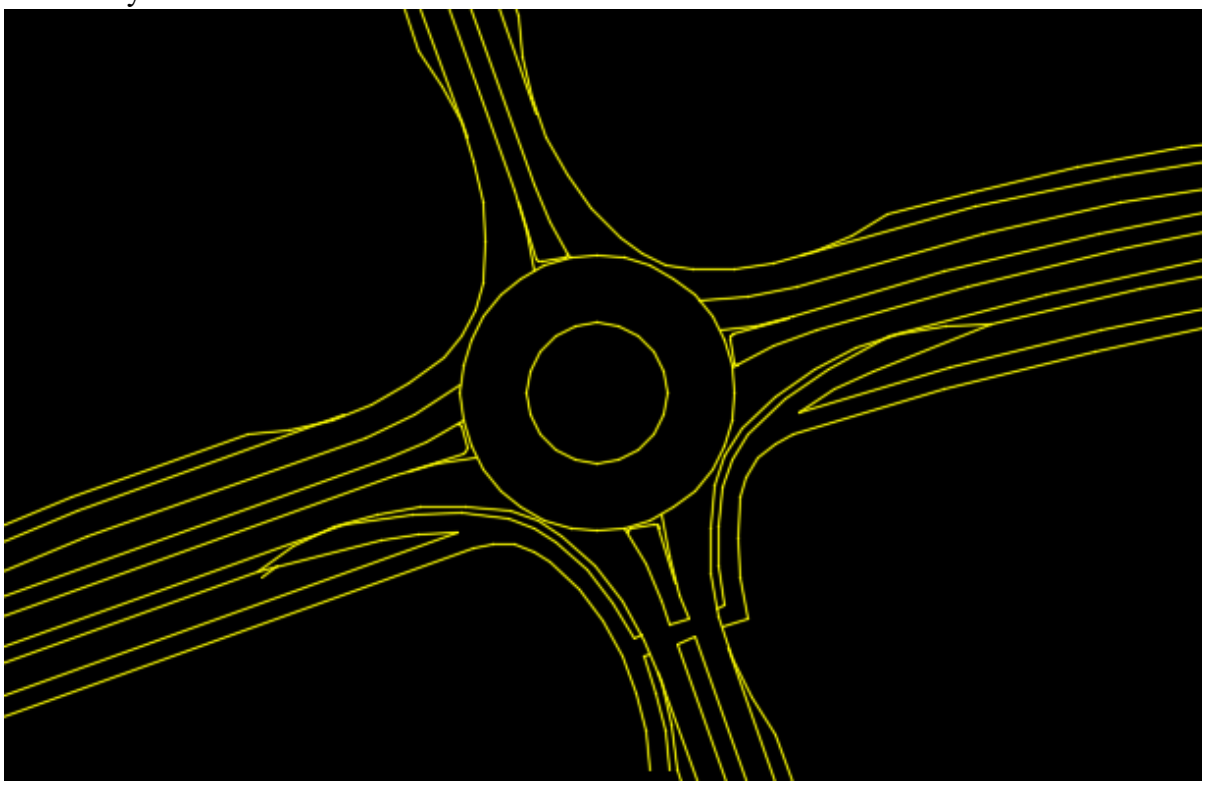
15:00 to 15:15	4	0	0	**4**	4	0	0	**4**	0	0	0	**0**				**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**				**0**
15:15 to 15:30	2	0	0	**2**	5	0	0	**5**	1	0	0	**1**				**0**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**				**0**
15:30 to 15:45	1	0	0	**1**	8	0	0	**8**	0	0	0	**0**				**0**	0	0	0	**0**	0	0	0	**0**	3	0	0	**3**				**0**
15:45 to 16:00	2	0	0	**2**	2	0	0	**2**	0	0	0	**0**				**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**				**0**
16:00 to 16:15	3	0	0	**3**	6	1	0	**7**	0	0	0	**0**				**0**	0	1	0	**1**	0	0	0	**0**	1	0	0	**1**				**0**
16:15 to 16:30	1	2	0	**3**	1	1	0	**2**	1	0	0	**1**				**0**	1	1	0	**2**	0	0	0	**0**	1	0	0	**1**				**0**
16:30 to 16:45	0	0	0	**0**	3	0	0	**3**	1	0	0	**1**				**0**	0	0	0	**0**	3	0	0	**3**	3	0	0	**3**				**0**
16:45 to 17:00	5	0	0	**5**	0	0	0	**0**	0	0	0	**0**				**0**	0	0	0	**0**	1	0	0	**1**	1	0	0	**1**				**0**
17:00 to 17:15	0	0	0	**0**	2	1	0	**3**	0	0	0	**0**				**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**				**0**
17:15 to 17:30	2	0	0	**0**	1	0	0	**1**	0	0	0	**0**				**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**				**0**
17:30 to 17:45	4	0	0	**4**	5	0	0	**5**	0	0	0	**0**				**0**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**				**0**
17:45 to 18:00				**0**				**0**				**0**				**0**				**0**				**0**				**0**				**0**
PM Totals	**24**	**2**	**0**	**26**	**37**	**3**	**0**	**40**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**4**	**7**	**0**	**0**	**7**	**12**	**0**	**0**	**12**	**0**	**0**	**0**	**0**

APPENDIX D
SIDRA MODELLING REPORT

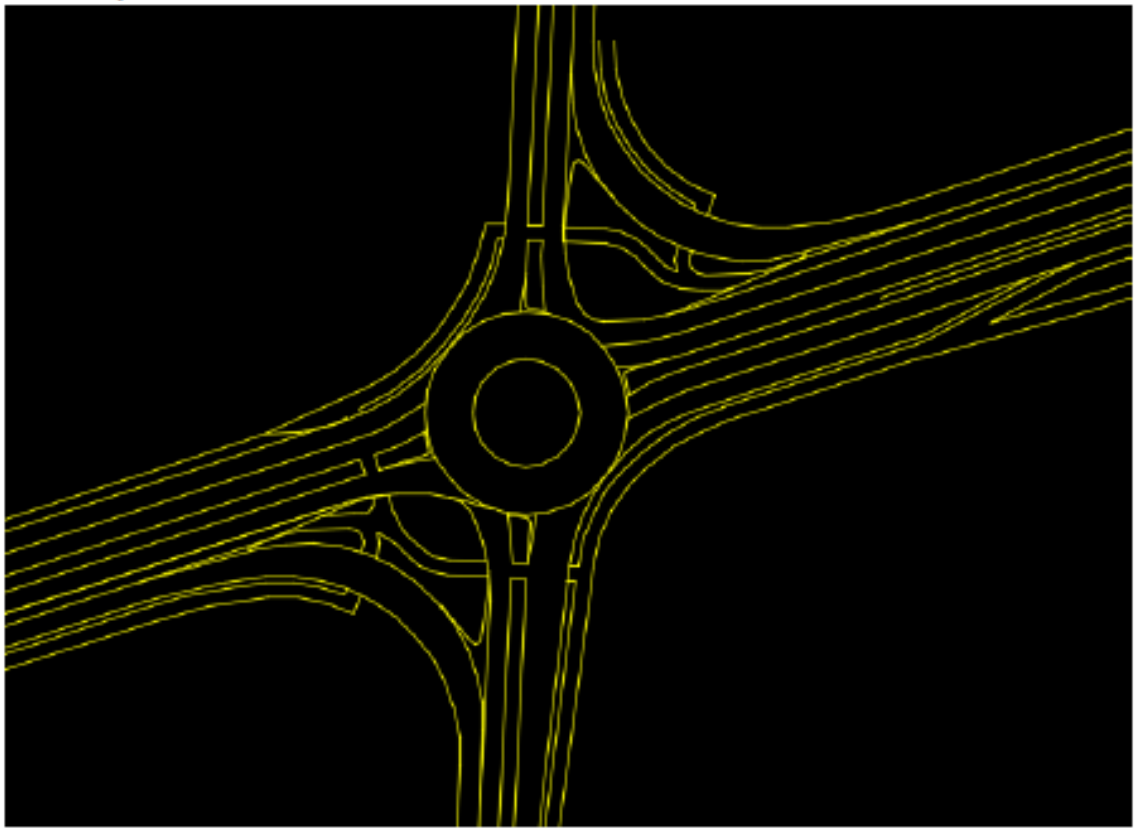
Bushlands Layout



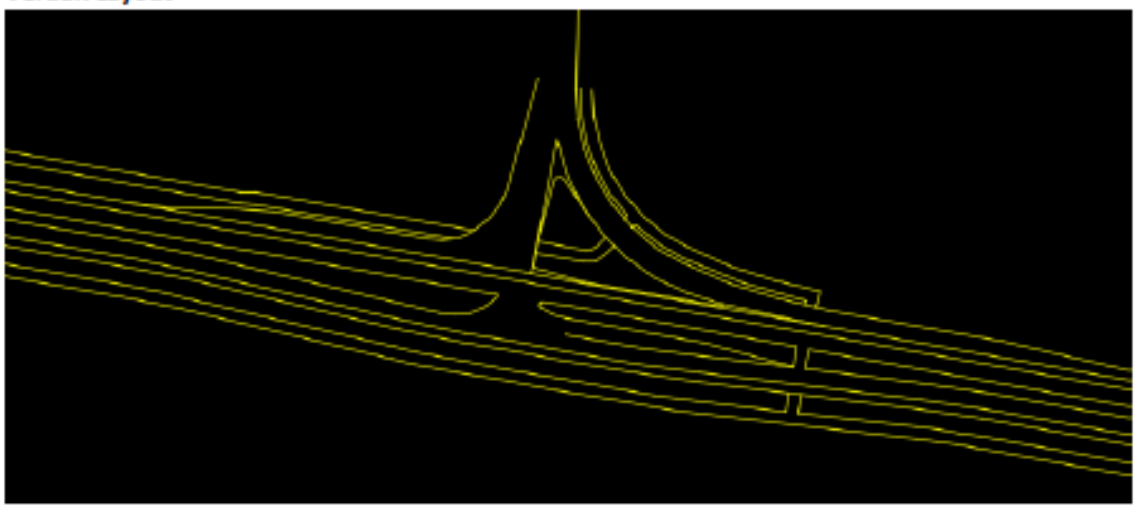
Road 1 layout



Road 2 Layout



Verdun Layout



SIDRA Model Output Summary

Detailed outputs are following, however a summary of outputs is in the table below. The outputs are direct from SIDRA Intersection.

Table 1 - SIDRA output Summary SANCROX ROAD & BUSHLANDS DRIVE INTERSECTION (Seagull)

	2030	2040	2050	2050 No seagull
Average Delay	~~(1.9s)~~ 1.8s	~~(1.9s)~~ 2.0s	~~(2.1s)~~ 2.1s	~~(2.5s)~~ 2.6s
LOS	A	A	A	B
95% percentile queue	3m	5m	9m	9m
Degree of Saturation	0.139	0.258	0.430	0.430

Table 2 - SIDRA output Summary SANCROX ROAD & ROAD 1 INTERSECTION

	2030	2040	2050	2050 alternative
Average Delay	6.2s	7.2s	**49.5s**	10.1s
LOS	A	A	**D**	A
95% percentile queue	5m	17m	**419m**	33m
Degree of Saturation	0.136	0.350	**1.090**	0.513

Table 3 - SIDRA output Summary SANCROX ROAD & ROAD 2 INTERSECTION

	2030	2040	2050
Average Delay	6.5s	6.8s	7.5s
LOS	A	A	A
95% percentile queue	4m	7m	14m
Degree of Saturation	0.100	0.163	0.278

Table 4 - SIDRA output Summary SANCROX ROAD & VERDUN DRIVE INTERSECTION

	2030	2040	2050	2050 No slip lane
Average Delay	0.8s	1.2s	1.3s	1.6s
LOS	A	A	A	A
95% percentile queue	1m	1m	3m	4m
Degree of Saturation	0.096	0.157	0.280	0.280

Bushlands Drive

Removing the seagull acceleration lane increases the average delay for the right out from 8s to 20s in 2050, resulting in a LOS B for the right out. Most other metrics are unchanged or similar.

Road 1

The intersection operates adequately and within capacity for all modelled scenarios with exception of 2050 where the Northern leg fails due to the high volume of eastbound traffic.

Testing of an alternative scenario revealed that the addition of a 30m long left turn lane on the northern leg would provide adequate capacity in 2050 to reduce Average Delay to 10.1s, LOS A, 95th percentile queue of 33m and DoS of 0.513.

Tested alternative layout for 2050 showing additional left turn lane on northern leg is included in Appendix C.

Road 2

The intersection operates adequately and within capacity for all modelled scenarios.

Verdun Drive

The intersection operates adequately and within capacity for all modelled scenarios.

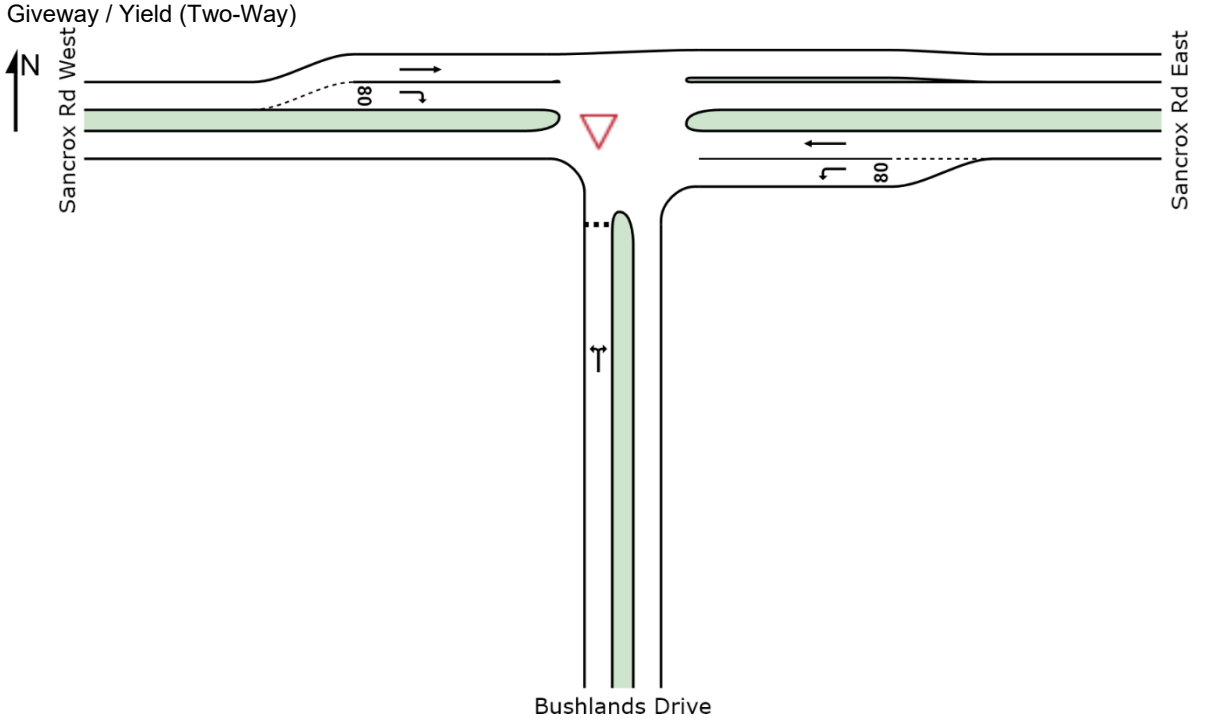
An alternative layout was requested to be tested, with the southbound left turn slip lane removed. This scenario operates adequately in 2050, with the left turn incurring an average delay of 9s with Degree of Saturation of 0.147. The tested alternative layout outputs are in Appendix C.

BUSHLANDS DRIVE - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Bushlands Dr - seagull

Sancrox Road and Bushlands Drive - seagull
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2030 seagull

Sancrox Rd and Bushlands Dr - 2030 seagull
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bushlands Drive											
1	L2	8	5.0	0.027	6.1	LOS A	0.1	0.7	0.28	0.58	52.6
3	R2	20	5.0	0.027	6.6	LOS A	0.1	0.7	0.28	0.58	52.3
Approach		28	5.0	0.027	6.5	LOS A	0.1	0.7	0.28	0.58	52.4
East: Sancrox Rd East											
4	L2	37	5.0	0.021	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
5	T1	148	5.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		185	5.0	0.079	1.1	NA	0.0	0.0	0.00	0.11	58.5
West: Sancrox Rd West											
11	T1	263	5.0	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	113	5.0	0.076	6.1	LOS A	0.4	2.6	0.30	0.58	52.1
Approach		376	5.0	0.139	1.8	NA	0.4	2.6	0.09	0.17	57.4
All Vehicles		589	5.0	0.139	1.8	NA	0.4	2.6	0.07	0.17	57.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2040 seagull

Sancrox Rd and Bushlands Dr - 2040 seagull
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bushlands Drive											
1	L2	13	5.0	0.043	6.1	LOS A	0.1	1.1	0.32	0.61	52.4
3	R2	29	5.0	0.043	7.2	LOS A	0.1	1.1	0.32	0.61	52.2
Approach		42	5.0	0.043	6.9	LOS A	0.1	1.1	0.32	0.61	52.3
East: Sancrox Rd East											
4	L2	40	5.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
5	T1	159	5.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		199	5.0	0.084	1.1	NA	0.0	0.0	0.00	0.12	58.5
West: Sancrox Rd West											
11	T1	487	5.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	208	5.0	0.143	6.2	LOS A	0.7	5.0	0.33	0.59	52.0
Approach		696	5.0	0.258	1.9	NA	0.7	5.0	0.10	0.18	57.3
All Vehicles		937	5.0	0.258	2.0	NA	0.7	5.0	0.09	0.18	57.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2050 seagull

Sancrox Rd and Bushlands Dr - 2050 seagull
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD	Mo	Demand Flows v Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bushlands Drive												
1	L2		22	5.0	0.085	6.1	LOS A	0.3	2.1	0.36	0.65	51.9
3	R2		52	5.0	0.085	8.2	LOS A	0.3	2.1	0.36	0.65	51.7
Approach			74	5.0	0.085	7.6	LOS A	0.3	2.1	0.36	0.65	51.8
East: Sancrox Rd East												
4	L2		40	5.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
5	T1		161	5.0	0.085	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach			201	5.0	0.085	1.1	NA	0.0	0.0	0.00	0.11	58.5
West: Sancrox Rd West												
11	T1		813	5.0	0.430	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2		348	5.0	0.239	6.3	LOS A	1.3	9.1	0.36	0.60	51.9
Approach			1161	5.0	0.430	1.9	NA	1.3	9.1	0.11	0.18	57.2
All Vehicles			1436	5.0	0.430	2.1	NA	1.3	9.1	0.11	0.20	57.1

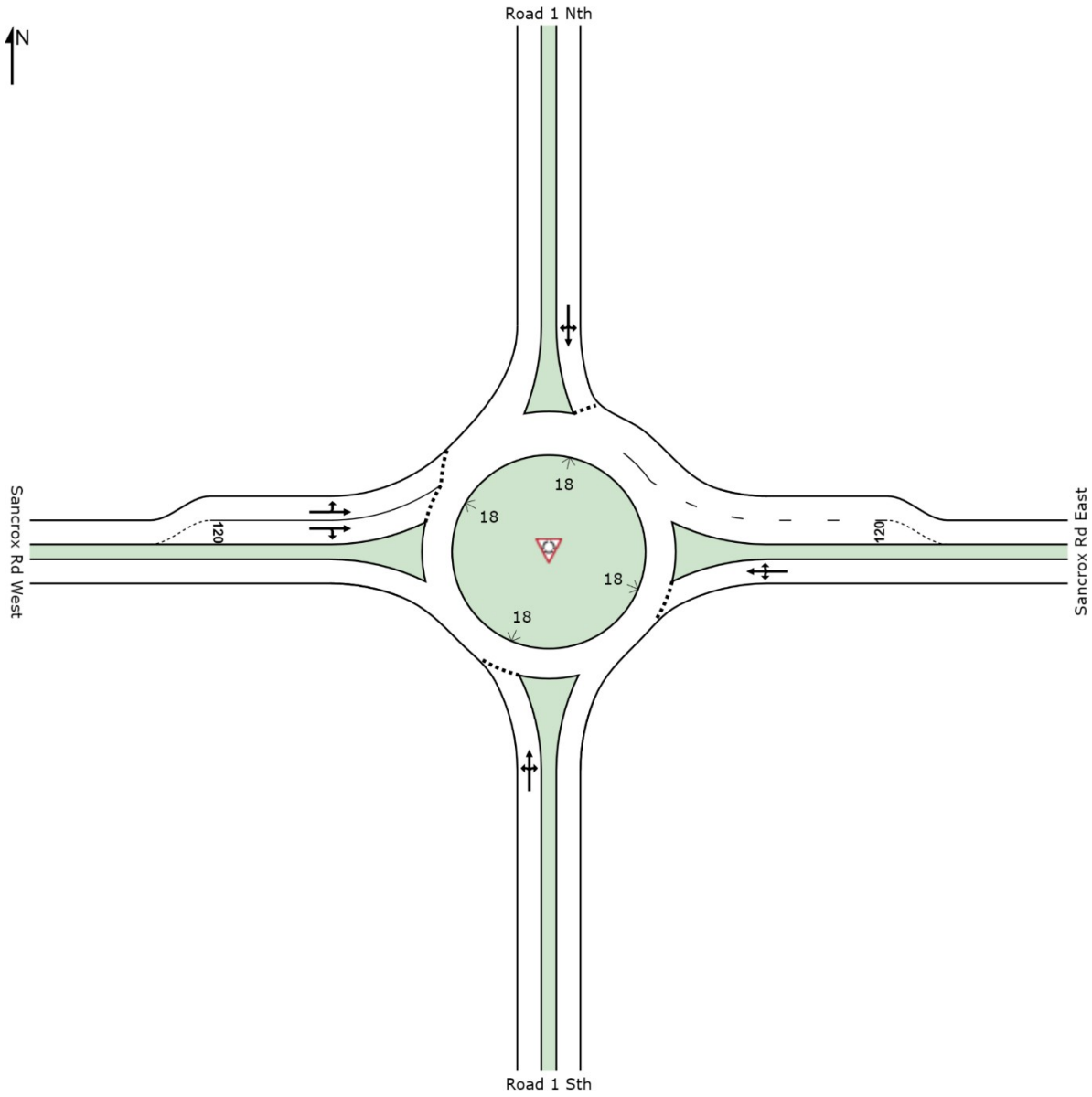
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ROAD 1 - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Road 1 - 2030

Sancrox Rd and Road 1
Roundabout



MOVEMENT SUMMARY

Site: Sancrox Rd and Road 1 - 2030

Sancrox Rd and Road 1
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 1 Sth											
1	L2	34	5.0	0.087	4.4	LOS A	0.4	3.2	0.22	0.58	52.2
2	T1	1	5.0	0.087	4.6	LOS A	0.4	3.2	0.22	0.58	53.5
3	R2	80	5.0	0.087	9.0	LOS A	0.4	3.2	0.22	0.58	53.3
Approach		115	5.0	0.087	7.6	LOS A	0.4	3.2	0.22	0.58	53.0
East: Sancrox Rd East											
4	L2	13	5.0	0.049	4.5	LOS A	0.2	1.8	0.27	0.49	53.5
5	T1	37	5.0	0.049	4.8	LOS A	0.2	1.8	0.27	0.49	54.8
6	R2	13	5.0	0.049	9.2	LOS A	0.2	1.8	0.27	0.49	54.6
Approach		62	5.0	0.049	5.6	LOS A	0.2	1.8	0.27	0.49	54.4
North: Road 1 Nth											

7	L2	59	5.0	0.104	6.0	LOS A	0.5	4.0	0.50	0.62	52.7
8	T1	21	5.0	0.104	6.2	LOS A	0.5	4.0	0.50	0.62	53.9
9	R2	26	5.0	0.104	10.6	LOS A	0.5	4.0	0.50	0.62	53.7
Approach		106	5.0	0.104	7.2	LOS A	0.5	4.0	0.50	0.62	53.2
West: Sancrox Rd West											
10	L2	34	5.0	0.136	4.7	LOS A	0.7	5.3	0.24	0.43	53.9
11	T1	237	5.0	0.136	4.7	LOS A	0.7	5.3	0.24	0.46	55.0
12	R2	67	5.0	0.101	9.1	LOS A	0.5	3.7	0.25	0.55	53.6
Approach		338	5.0	0.136	5.6	LOS A	0.7	5.3	0.24	0.48	54.6
All Vehicles		621	5.0	0.136	6.2	LOS A	0.7	5.3	0.28	0.52	54.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Road 1 - 2040

Sancrox Rd and Road 1
Roundabout

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 1 Sth											
1	L2	52	5.0	0.145	4.8	LOS A	0.8	5.8	0.34	0.60	51.9
2	T1	2	5.0	0.145	5.1	LOS A	0.8	5.8	0.34	0.60	53.1
3	R2	122	5.0	0.145	9.5	LOS A	0.8	5.8	0.34	0.60	52.9
Approach		176	5.0	0.145	8.0	LOS A	0.8	5.8	0.34	0.60	52.6
East: Sancrox Rd East											
4	L2	20	5.0	0.089	5.2	LOS A	0.5	3.4	0.42	0.55	52.9
5	T1	59	5.0	0.089	5.5	LOS A	0.5	3.4	0.42	0.55	54.1
6	R2	20	5.0	0.089	9.9	LOS A	0.5	3.4	0.42	0.55	54.0
Approach		99	5.0	0.089	6.3	LOS A	0.5	3.4	0.42	0.55	53.8
North: Road 1 Nth											
7	L2	157	5.0	0.350	8.6	LOS A	2.3	16.5	0.75	0.81	50.9
8	T1	57	5.0	0.350	8.9	LOS A	2.3	16.5	0.75	0.81	52.1
9	R2	72	5.0	0.350	13.3	LOS A	2.3	16.5	0.75	0.81	51.9
Approach		285	5.0	0.350	9.8	LOS A	2.3	16.5	0.75	0.81	51.4
West: Sancrox Rd West											
10	L2	60	5.0	0.250	4.9	LOS A	1.5	11.2	0.34	0.47	53.5
11	T1	417	5.0	0.250	4.9	LOS A	1.5	11.2	0.34	0.49	54.6
12	R2	119	5.0	0.185	9.5	LOS A	1.0	7.6	0.34	0.57	53.3
Approach		596	5.0	0.250	5.8	LOS A	1.5	11.2	0.34	0.51	54.2
All Vehicles		1156	5.0	0.350	7.2	LOS A	2.3	16.5	0.45	0.60	53.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Road 1 - 2050

Sancrox Rd and Road 1
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 1 Sth											
1	L2	66	5.0	0.206	5.4	LOS A	1.2	9.0	0.48	0.65	51.5
2	T1	2	5.0	0.206	5.6	LOS A	1.2	9.0	0.48	0.65	52.7
3	R2	158	5.0	0.206	10.0	LOS A	1.2	9.0	0.48	0.65	52.5
Approach		226	5.0	0.206	8.6	LOS A	1.2	9.0	0.48	0.65	52.2
East: Sancrox Rd East											
4	L2	28	5.0	0.152	6.4	LOS A	0.9	6.6	0.60	0.66	52.1
5	T1	85	5.0	0.152	6.6	LOS A	0.9	6.6	0.60	0.66	53.4
6	R2	28	5.0	0.152	11.0	LOS A	0.9	6.6	0.60	0.66	53.2
Approach		142	5.0	0.152	7.5	LOS A	0.9	6.6	0.60	0.66	53.1
North: Road 1 Nth											
7	L2	326	5.0	1.090	144.5	LOS F	57.4	419.2	1.00	3.19	17.7
8	T1	119	5.0	1.090	144.7	LOS F	57.4	419.2	1.00	3.19	17.9
9	R2	148	5.0	1.090	149.1	LOS F	57.4	419.2	1.00	3.19	17.9
Approach		594	5.0	1.090	145.7	LOS F	57.4	419.2	1.00	3.19	17.8
West: Sancrox Rd West											
10	L2	97	5.0	0.420	5.3	LOS A	3.1	22.8	0.47	0.52	52.9
11	T1	676	5.0	0.420	5.3	LOS A	3.1	22.8	0.46	0.54	54.0
12	R2	194	5.0	0.311	9.9	LOS A	2.0	14.5	0.45	0.61	52.9
Approach		966	5.0	0.420	6.2	LOS A	3.1	22.8	0.46	0.55	53.7
All Vehicles		1928	5.0	1.090	49.5	LOS D	57.4	419.2	0.64	1.38	33.1

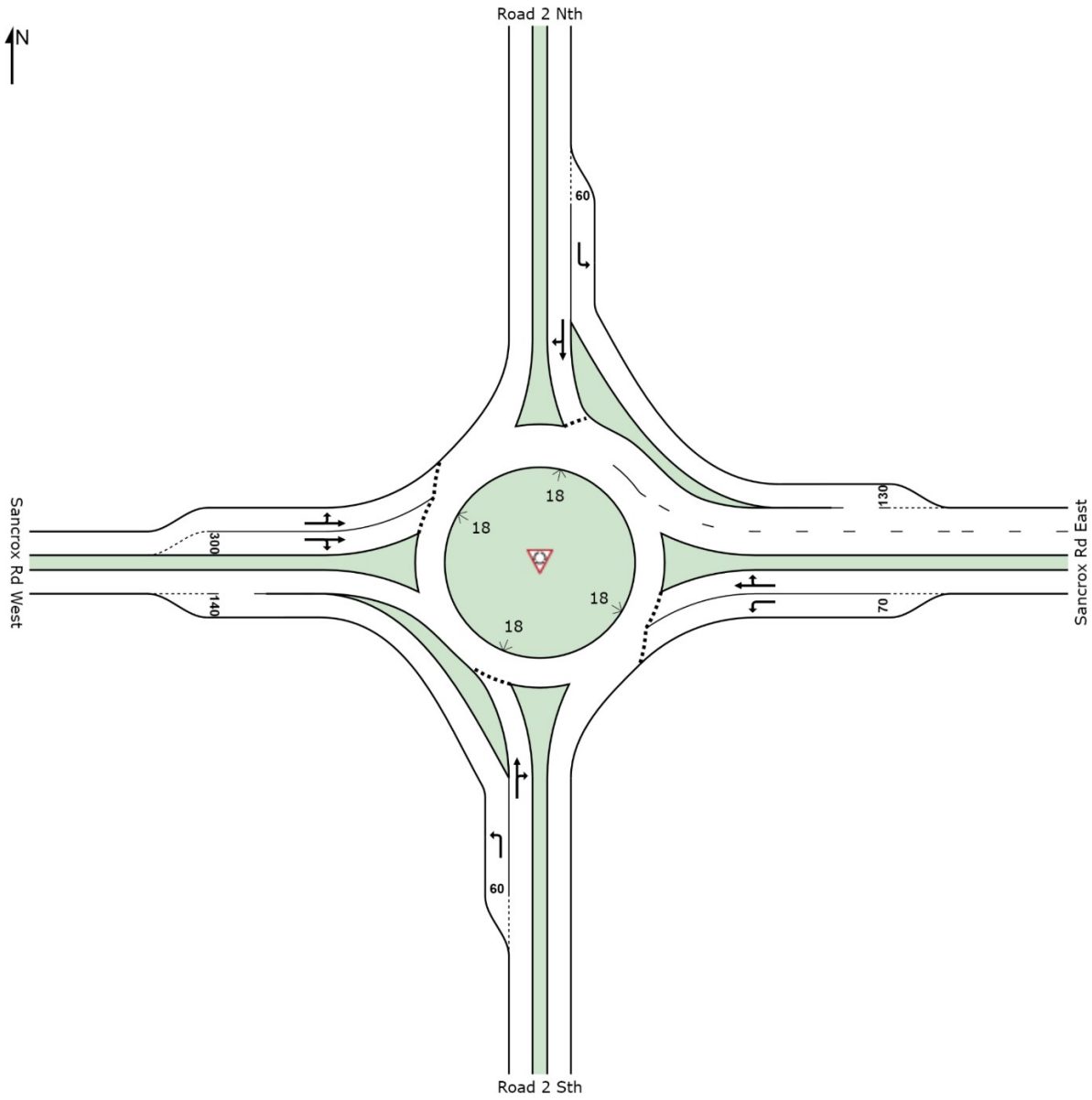
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ROAD 2 - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Road 2

Sancrox Rd and Road 2
Roundabout



MOVEMENT SUMMARY

Site: Sancrox Rd and Road 2 - 2030

Sancrox Rd and Road 2
Roundabout

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 2 Sth											
1	L2	63	5.0	0.034	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
2	T1	2	5.0	0.100	4.6	LOS A	0.5	3.7	0.22	0.60	52.4
3	R2	152	5.0	0.100	9.0	LOS A	0.5	3.7	0.22	0.60	52.3
Approach		217	5.0	0.100	7.4	LOS A	0.5	3.7	0.16	0.56	53.2
East: Sancrox Rd East											
4	L2	29	5.0	0.025	4.8	LOS A	0.1	0.9	0.25	0.48	54.0
5	T1	48	5.0	0.045	4.6	LOS A	0.2	1.6	0.23	0.49	54.6
6	R2	20	5.0	0.045	9.0	LOS A	0.2	1.6	0.23	0.49	54.4
Approach		98	5.0	0.045	5.6	LOS A	0.2	1.6	0.23	0.49	54.4

North: Road 2 Nth											
7	L2	45	5.0	0.024	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
8	T1	17	5.0	0.030	5.5	LOS A	0.2	1.1	0.44	0.58	53.0
9	R2	21	5.0	0.030	9.9	LOS A	0.2	1.1	0.44	0.58	52.9
Approach		83	5.0	0.030	5.6	LOS A	0.2	1.1	0.20	0.52	54.5
West: Sancrox Rd West											
10	L2	2	5.0	0.076	4.9	LOS A	0.4	2.9	0.32	0.45	53.5
11	T1	141	5.0	0.076	4.9	LOS A	0.4	2.9	0.32	0.48	54.5
12	R2	61	5.0	0.076	9.5	LOS A	0.4	2.8	0.33	0.58	53.0
Approach		204	5.0	0.076	6.3	LOS A	0.4	2.9	0.32	0.51	54.1
All Vehicles		602	5.0	0.100	6.5	LOS A	0.5	3.7	0.23	0.53	53.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Road 2 - 2040

Sancrox Rd and Road 2
Roundabout

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		v Total	HV								
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 2 Sth											
1	L2	96	5.0	0.052	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
2	T1	3	5.0	0.163	5.0	LOS A	0.9	6.7	0.35	0.62	52.0
3	R2	231	5.0	0.163	9.4	LOS A	0.9	6.7	0.35	0.62	51.9
Approach		329	5.0	0.163	7.7	LOS A	0.9	6.7	0.25	0.58	52.9
East: Sancrox Rd East											
4	L2	55	5.0	0.051	5.4	LOS A	0.3	1.8	0.37	0.53	53.6
5	T1	91	5.0	0.091	5.0	LOS A	0.5	3.5	0.35	0.52	54.1
6	R2	37	5.0	0.091	9.4	LOS A	0.5	3.5	0.35	0.52	53.9
Approach		182	5.0	0.091	6.0	LOS A	0.5	3.5	0.36	0.52	53.9
North: Road 2 Nth											
7	L2	114	5.0	0.061	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
8	T1	41	5.0	0.086	6.8	LOS A	0.5	3.7	0.61	0.67	52.3
9	R2	52	5.0	0.086	11.2	LOS A	0.5	3.7	0.61	0.67	52.1
Approach		206	5.0	0.086	6.2	LOS A	0.5	3.7	0.28	0.56	54.1
West: Sancrox Rd West											
10	L2	3	5.0	0.148	5.4	LOS A	0.8	6.1	0.43	0.51	53.0
11	T1	252	5.0	0.148	5.4	LOS A	0.8	6.1	0.43	0.54	54.1
12	R2	109	5.0	0.148	10.0	LOS A	0.8	5.9	0.45	0.63	52.6
Approach		364	5.0	0.148	6.8	LOS A	0.8	6.1	0.44	0.56	53.6
All Vehicles		1082	5.0	0.163	6.8	LOS A	0.9	6.7	0.34	0.56	53.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Road 2 - 2050

Sancrox Rd and Road 2
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mo	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 2 Sth											
1	L2	123	5.0	0.066	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
2	T1	4	5.0	0.233	5.7	LOS A	1.4	10.5	0.50	0.67	51.6
3	R2	298	5.0	0.233	10.0	LOS A	1.4	10.5	0.50	0.67	51.4
Approach		425	5.0	0.233	8.2	LOS A	1.4	10.5	0.35	0.61	52.6
East: Sancrox Rd East											
4	L2	91	5.0	0.094	6.1	LOS A	0.5	3.6	0.50	0.60	53.2
5	T1	151	5.0	0.165	5.6	LOS A	1.0	7.1	0.49	0.59	53.5
6	R2	60	5.0	0.165	10.0	LOS A	1.0	7.1	0.49	0.59	53.4
Approach		301	5.0	0.165	6.7	LOS A	1.0	7.1	0.49	0.59	53.4
North: Road 2 Nth											
7	L2	233	5.0	0.125	3.7	LOS A	0.0	0.0	0.00	0.47	55.8
8	T1	40	5.0	0.183	10.1	LOS A	1.3	9.8	0.85	0.81	49.8
9	R2	105	5.0	0.183	14.5	LOS A	1.3	9.8	0.85	0.81	49.7
Approach		378	5.0	0.183	7.4	LOS A	1.3	9.8	0.33	0.60	53.3
West: Sancrox Rd West											
10	L2	6	5.0	0.278	6.0	LOS A	1.8	13.3	0.56	0.58	52.5
11	T1	436	5.0	0.278	6.0	LOS A	1.8	13.3	0.56	0.61	53.5
12	R2	189	5.0	0.278	10.8	LOS A	1.7	12.6	0.58	0.70	52.1
Approach		632	5.0	0.278	7.5	LOS A	1.8	13.3	0.57	0.64	53.1
All Vehicles		1736	5.0	0.278	7.5	LOS A	1.8	13.3	0.45	0.61	53.1

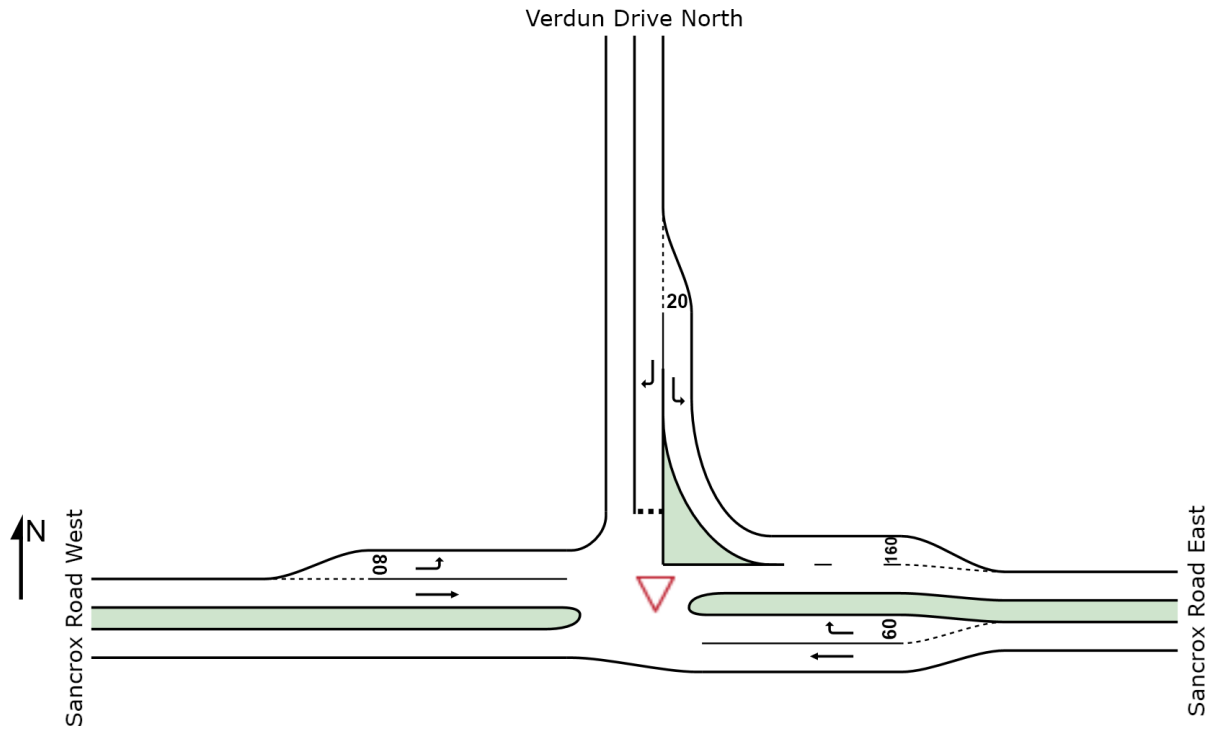
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

VERDUN DRIVE - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Verdun Dr - 2030

Sancrox Rd and Verdun Dr - 2030
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2030

Sancrox Rd and Verdun Dr - 2030
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	125	5.0	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	6	5.0	0.004	6.2	LOS A	0.0	0.1	0.30	0.52	52.5
Approach		132	5.0	0.066	0.3	NA	0.0	0.1	0.01	0.03	59.6
North: Verdun Drive North											
7	L2	23	5.0	0.013	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
9	R2	9	5.0	0.010	6.8	LOS A	0.0	0.2	0.34	0.59	52.2
Approach		33	5.0	0.013	6.0	LOS A	0.0	0.2	0.10	0.54	54.0
West: Sancrox Road		d West									
10	L2	9	5.0	0.005	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	182	5.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		192	5.0	0.096	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		356	5.0	0.096	0.8	NA	0.0	0.2	0.01	0.07	59.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2040

Sancrox Rd and Verdun Dr - 2040
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mo	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	226	5.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	12	5.0	0.009	6.6	LOS A	0.0	0.3	0.39	0.56	52.2
Approach		238	5.0	0.120	0.3	NA	0.0	0.3	0.02	0.03	59.5
North: Verdun Drive North											
7	L2	68	5.0	0.038	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
9	R2	29	5.0	0.040	8.1	LOS A	0.1	0.9	0.46	0.70	51.3
Approach		98	5.0	0.040	6.4	LOS A	0.1	0.9	0.14	0.58	53.7
West: Sancrox Road		d West									
10	L2	16	5.0	0.009	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	297	5.0	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		313	5.0	0.157	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		648	5.0	0.157	1.2	NA	0.1	0.9	0.03	0.11	58.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2050

Sancrox Rd and Verdun Dr - 2050
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mo	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	360	5.0	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	19	5.0	0.020	7.9	LOS A	0.1	0.6	0.53	0.65	51.6
Approach		379	5.0	0.191	0.4	NA	0.1	0.6	0.03	0.03	59.5
North: Verdun Drive											
7	L2	103	5.0	0.058	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
9	R2	44	5.0	0.097	11.7	LOS A	0.3	2.2	0.66	0.86	48.8
Approach		147	5.0	0.097	7.5	LOS A	0.3	2.2	0.20	0.63	52.9
West: Sancrox Road West											
10	L2	27	5.0	0.015	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	528	5.0	0.280	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		556	5.0	0.280	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		1082	5.0	0.280	1.3	NA	0.3	2.2	0.04	0.11	58.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

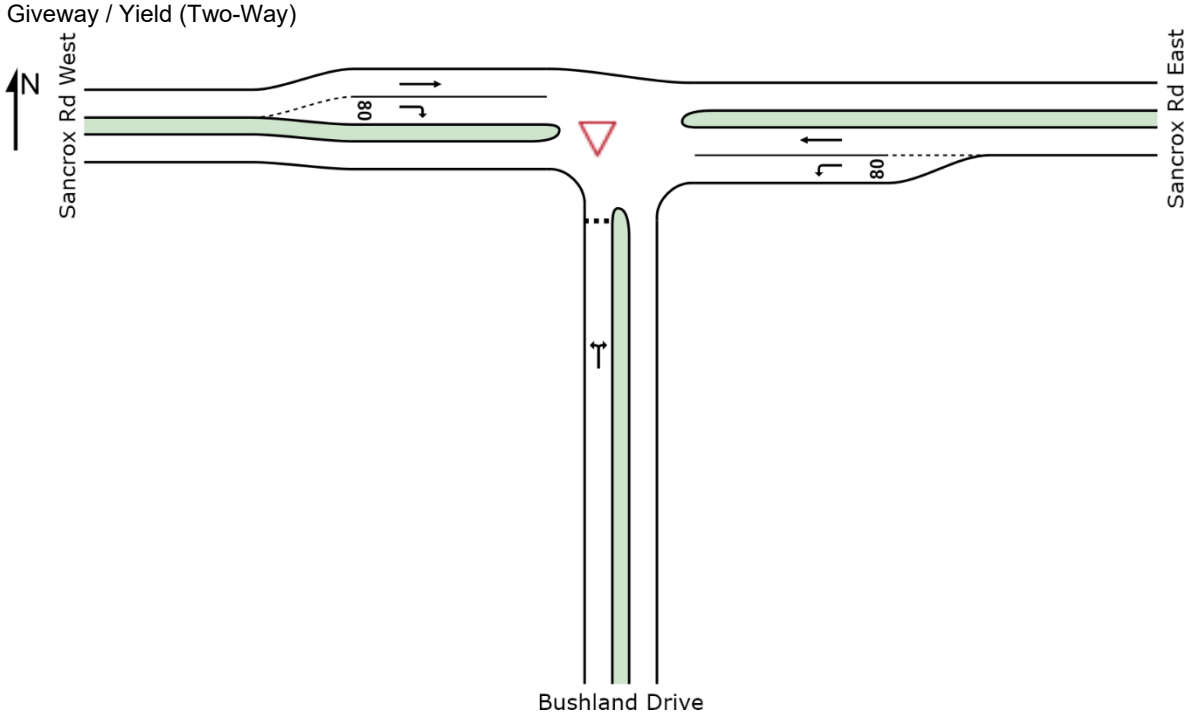
Alternative Layouts

BUSHLAND DRIVE ALTERNATIVE (no seagull) - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Bushlands Dr - 2050 ALT - CHR

New Site
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2030 ALT - CHR

Sancrox Rd and Bushlands Dr - 2030 ALT - CHR
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID		ODMo Demand v Total	Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bushland Drive											
1	L2	8	5.0	0.033	6.1	LOS A	0.1	0.8	0.34	0.62	52.0
3	R2	20	5.0	0.033	8.0	LOS A	0.1	0.8	0.34	0.62	51.8
Approach		28	5.0	0.033	7.4	LOS A	0.1	0.8	0.34	0.62	51.8
East: Sancrox Rd East											
4	L2	37	5.0	0.021	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
5	T1	148	5.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		185	5.0	0.079	1.1	NA	0.0	0.0	0.00	0.11	58.5
West: Sancrox Rd West											
11	T1	263	5.0	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	60.0

12	R2	113	5.0	0.076	6.1	LOS A	0.4	2.6	0.30	0.58	52.1
Approach		376	5.0	0.139	1.8	NA	0.4	2.6	0.09	0.17	57.4
All Vehicles		589	5.0	0.139	1.9	NA	0.4	2.6	0.07	0.18	57.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2040 ALT - CHR

Sancrox Rd and Bushlands Dr - 2040 ALT - CHR
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bushland Drive											
1	L2	13	5.0	0.069	6.1	LOS A	0.2	1.6	0.41	0.69	50.5
3	R2	29	5.0	0.069	11.0	LOS A	0.2	1.6	0.41	0.69	50.3
Approach		42	5.0	0.069	9.5	LOS A	0.2	1.6	0.41	0.69	50.4
East: Sancrox Rd East											
4	L2	40	5.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
5	T1	159	5.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		199	5.0	0.084	1.1	NA	0.0	0.0	0.00	0.12	58.5
West: Sancrox Rd West											
11	T1	487	5.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	208	5.0	0.143	6.2	LOS A	0.7	5.0	0.33	0.59	52.0
Approach		696	5.0	0.258	1.9	NA	0.7	5.0	0.10	0.18	57.3
All Vehicles		937	5.0	0.258	2.1	NA	0.7	5.0	0.09	0.19	57.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Bushlands Dr - 2050 ALT - CHR

Sancrox Rd and Bushlands Dr - 2050 ALT - CHR
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Bushland Drive											
1	L2	22	5.0	0.238	6.8	LOS A	0.8	5.6	0.60	0.77	45.9
3	R2	52	5.0	0.238	21.0	LOS B	0.8	5.6	0.60	0.77	45.7
Approach		74	5.0	0.238	16.7	LOS B	0.8	5.6	0.60	0.77	45.8
East: Sancrox Rd East											
4	L2	40	5.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.58	53.4

5 T1		161	5.0	0.085	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		201	5.0	0.085	1.1	NA	0.0	0.0	0.00	0.11	58.5
West: Sancrox Rd West											
11	T1	813	5.0	0.430	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
12	R2	348	5.0	0.239	6.3	LOS A	1.3	9.1	0.36	0.60	51.9
Approach		1161	5.0	0.430	1.9	NA	1.3	9.1	0.11	0.18	57.2
All Vehicles		1436	5.0	0.430	2.6	NA	1.3	9.1	0.12	0.20	56.7

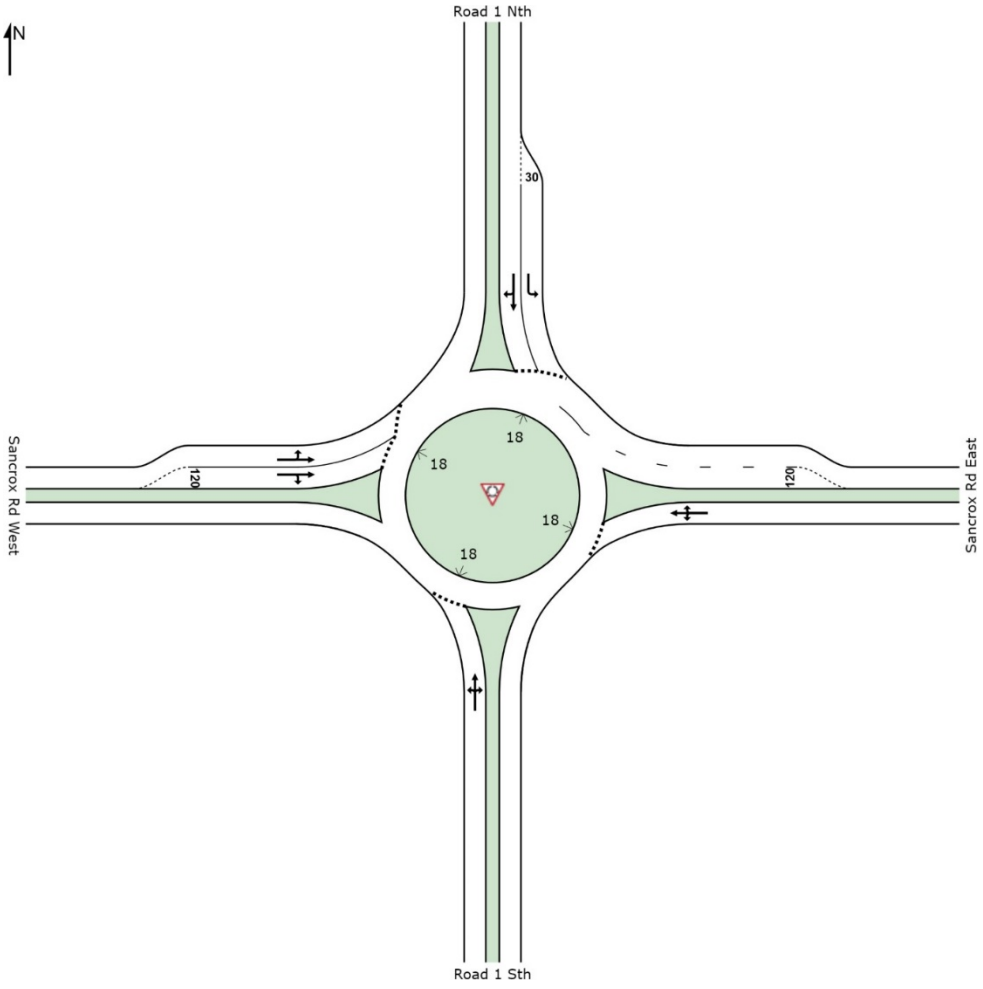
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ROAD 1 ALTERNATIVE (additional lane north leg) - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Road 1 - Alternative

Sancrox Rd and Road 1
Roundabout



MOVEMENT SUMMARY

Site: Sancrox Rd and Road 1 - 2050 - Alternative

Sancrox Rd and Road 1
Roundabout

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Road 1 Sth											
1	L2	66	5.0	0.208	5.5	LOS A	1.2	9.1	0.49	0.65	51.4
2	T1	2	5.0	0.208	5.7	LOS A	1.2	9.1	0.49	0.65	52.6
3	R2	158	5.0	0.208	10.1	LOS A	1.2	9.1	0.49	0.65	52.5
Approach		226	5.0	0.208	8.7	LOS A	1.2	9.1	0.49	0.65	52.2
East: Sancrox Rd East											
4	L2	28	5.0	0.155	6.5	LOS A	0.9	6.8	0.62	0.67	52.1
5	T1	85	5.0	0.155	6.8	LOS A	0.9	6.8	0.62	0.67	53.3
6	R2	28	5.0	0.155	11.2	LOS A	0.9	6.8	0.62	0.67	53.1
Approach		142	5.0	0.155	7.6	LOS A	0.9	6.8	0.62	0.67	53.0
North: Road 1 Nth											
7	L2	326	5.0	0.460	14.3	LOS A	4.2	30.7	0.98	0.99	47.7
8	T1	119	5.0	0.513	19.1	LOS B	4.5	33.2	0.96	1.10	44.9
9	R2	148	5.0	0.513	23.5	LOS B	4.5	33.2	0.96	1.10	44.8
Approach		594	5.0	0.513	17.6	LOS B	4.5	33.2	0.97	1.04	46.3
West: Sancrox Rd West											
10	L2	97	5.0	0.420	5.3	LOS A	3.1	22.9	0.47	0.52	52.9
11	T1	676	5.0	0.420	5.3	LOS A	3.1	22.9	0.46	0.54	54.0
12	R2	194	5.0	0.312	9.9	LOS A	2.0	14.6	0.45	0.61	52.9
Approach		966	5.0	0.420	6.2	LOS A	3.1	22.9	0.46	0.55	53.7
All Vehicles		1928	5.0	0.513	10.1	LOS A	4.5	33.2	0.63	0.72	51.0

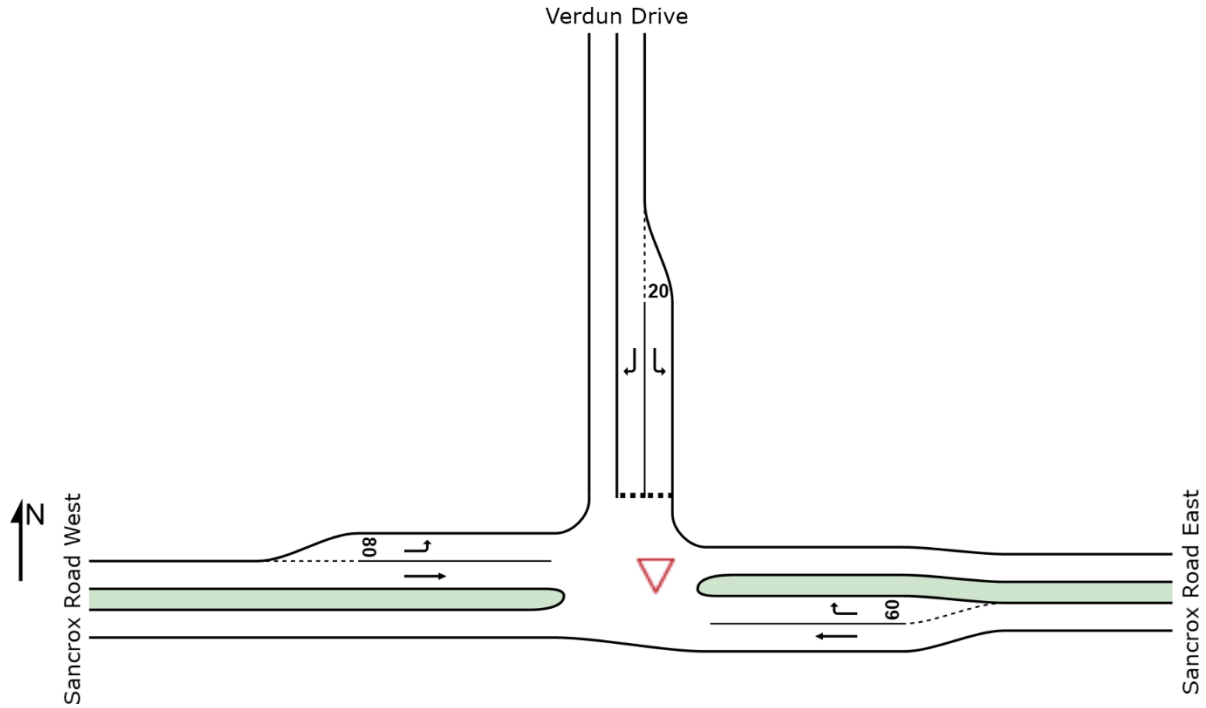
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

VERDUN ROAD ALTERNATIVE (no left slip lane) - Model outputs

SITE LAYOUT

Site: Sancrox Rd and Verdun Dr - ALT no slip

Sancrox Rd and Verdun Dr - ALT no slip
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2030 - ALT no slip

Sancrox Rd and Verdun Dr - 2030 - ALT no slip
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	125	5.0	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	6	5.0	0.004	6.1	LOS A	0.0	0.1	0.30	0.53	52.3
Approach		132	5.0	0.066	0.3	NA	0.0	0.1	0.01	0.03	59.6
North: Verdun Drive											
7	L2	23	5.0	0.021	6.3	LOS A	0.1	0.5	0.27	0.56	52.6
9	R2	9	5.0	0.010	6.8	LOS A	0.0	0.2	0.34	0.59	52.2
Approach		33	5.0	0.021	6.5	LOS A	0.1	0.5	0.29	0.57	52.4
West: Sancrox Road West											
10	L2	9	5.0	0.005	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	182	5.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		192	5.0	0.096	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		356	5.0	0.096	0.9	NA	0.1	0.5	0.03	0.08	58.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2040 - ALT no slip

Sancrox Rd and Verdun Dr - 2040 - ALT no slip
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	226	5.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	12	5.0	0.009	6.6	LOS A	0.0	0.3	0.39	0.56	52.0
Approach		238	5.0	0.120	0.3	NA	0.0	0.3	0.02	0.03	59.5
North: Verdun Drive											
7	L2	68	5.0	0.072	7.0	LOS A	0.3	1.9	0.37	0.63	52.2
9	R2	29	5.0	0.040	8.1	LOS A	0.1	0.9	0.46	0.70	51.3
Approach		98	5.0	0.072	7.3	LOS A	0.3	1.9	0.40	0.65	52.0
West: Sancrox Road West											
10	L2	16	5.0	0.009	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	297	5.0	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		313	5.0	0.157	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		648	5.0	0.157	1.4	NA	0.3	1.9	0.07	0.12	58.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Sancrox Rd and Verdun Dr - 2050 - ALT no slip

Sancrox Rd and Verdun Dr - 2050 - ALT no slip
Giveway / Yield (Two-Way)

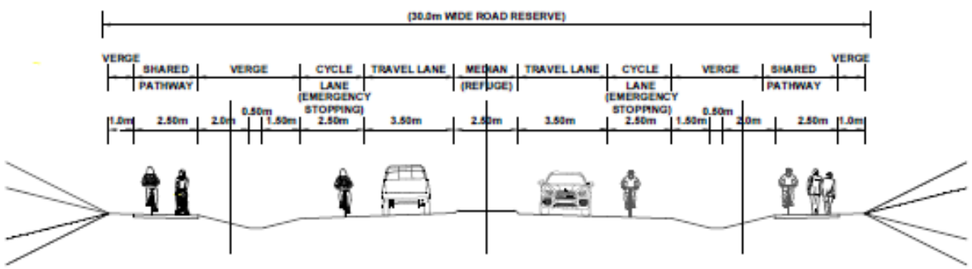
Movement Performance - Vehicles

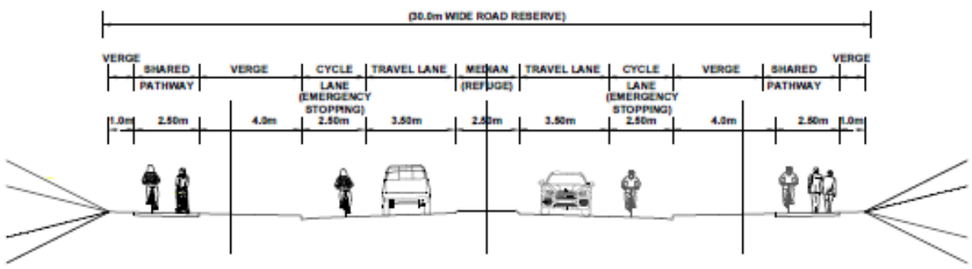
Mov ID	ODMo	Demand Flows v Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Sancrox Road East											
5	T1	360	5.0	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	19	5.0	0.020	7.9	LOS A	0.1	0.6	0.53	0.66	51.4
Approach		379	5.0	0.191	0.4	NA	0.1	0.6	0.03	0.03	59.5
North: Verdun Drive											
7	L2	103	5.0	0.147	8.9	LOS A	0.5	3.8	0.53	0.78	50.9
9	R2	44	5.0	0.097	11.7	LOS A	0.3	2.2	0.66	0.86	48.8
Approach		147	5.0	0.147	9.7	LOS A	0.5	3.8	0.57	0.80	50.3
West: Sancrox Road West											
10	L2	27	5.0	0.015	5.6	LOS A	0.0	0.0	0.00	0.58	53.4
11	T1	528	5.0	0.280	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		556	5.0	0.280	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		1082	5.0	0.280	1.6	NA	0.5	3.8	0.09	0.14	58.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX E
PROPOSED SANCROX CORRIDOR PLAN





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A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

StreetWise Road Safety & Traffic Services
ABN:- 45 604 145 315
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craig@streetwisersa.com.au or
ajd@streetwisersa.com.au

CLIENT
LandDynamics AUSTRALIA

SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 1 of 13

DRAWING No. CORRIDOR PLAN REV. A

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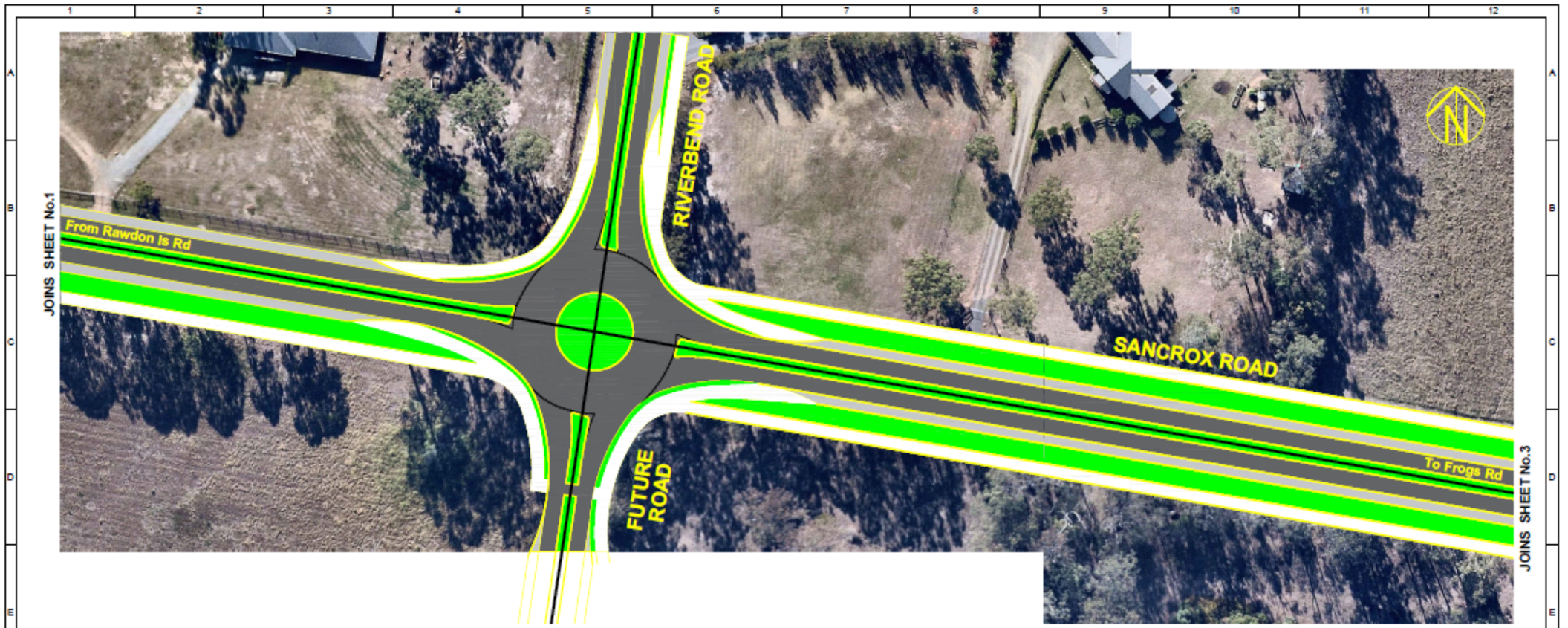

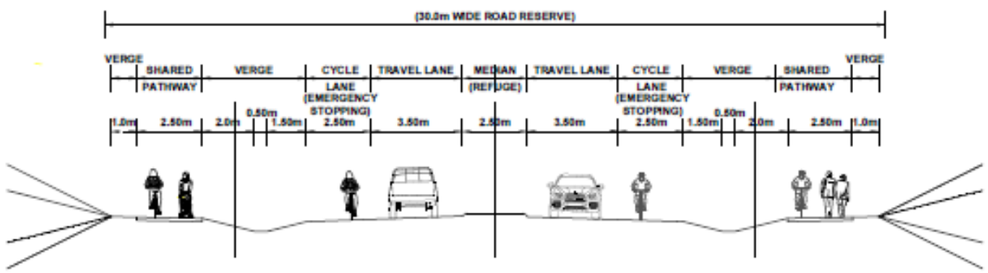

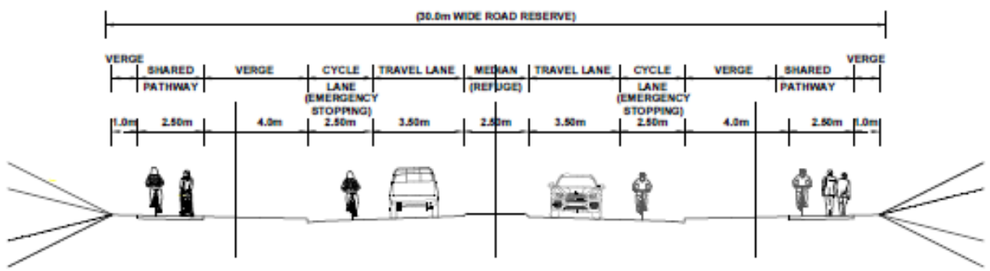

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A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

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andy@streetwiseroads.com.au

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LandDynamics AUSTRALIA

SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 2 of 13

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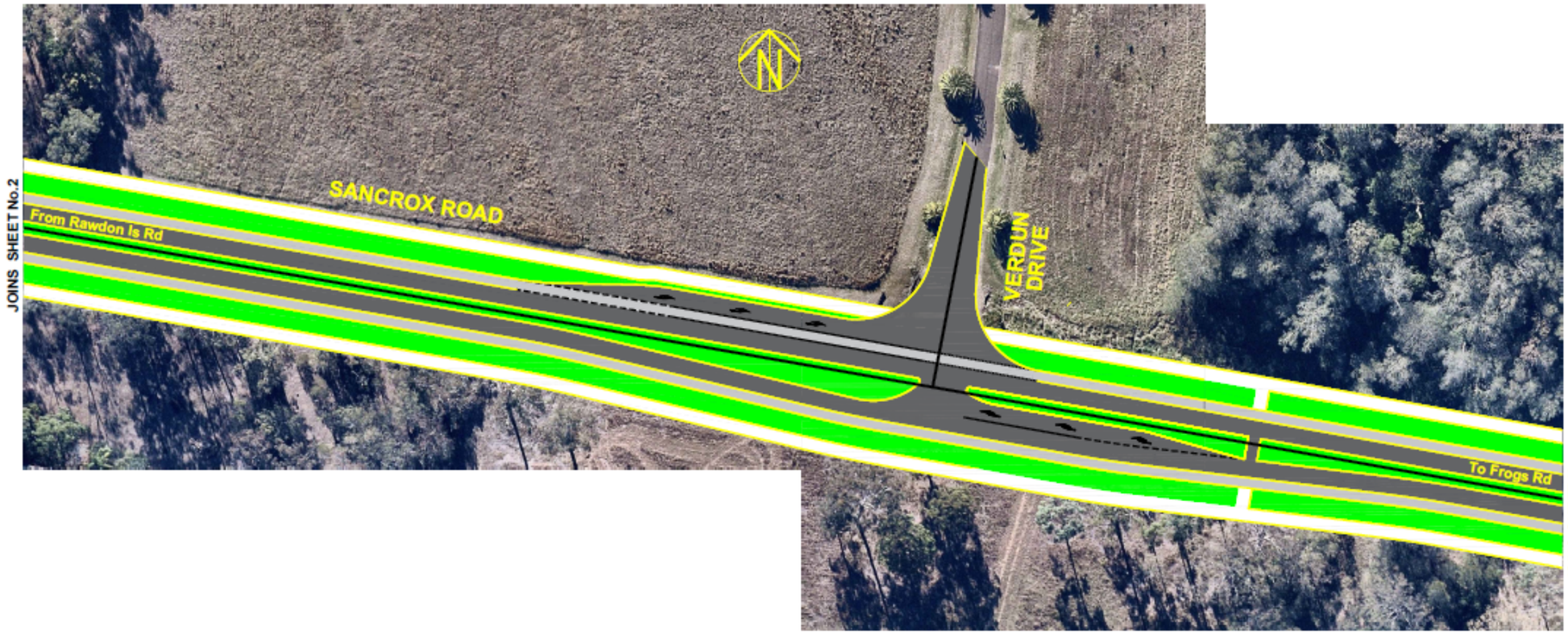

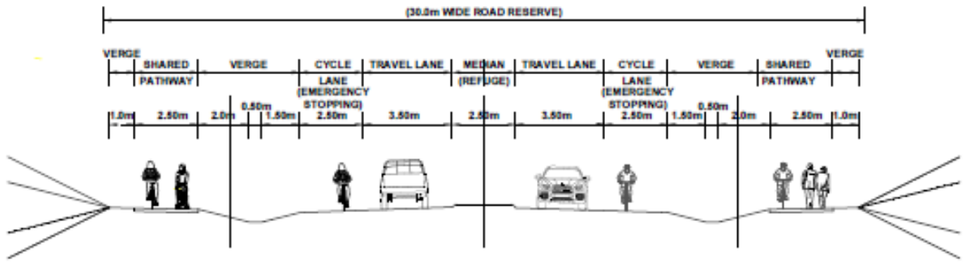

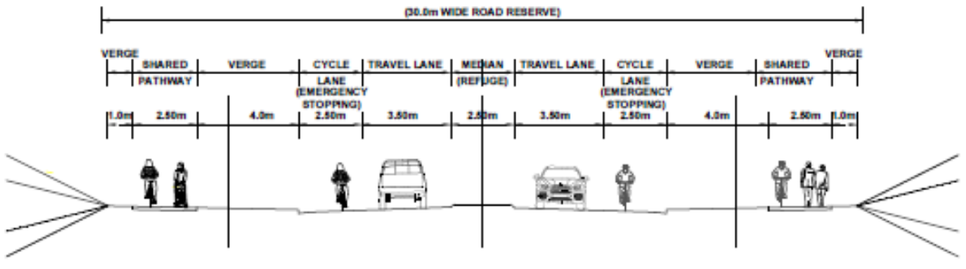

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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 3 of 13

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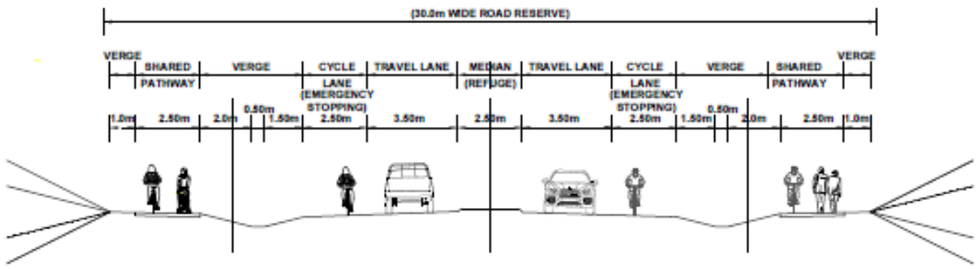

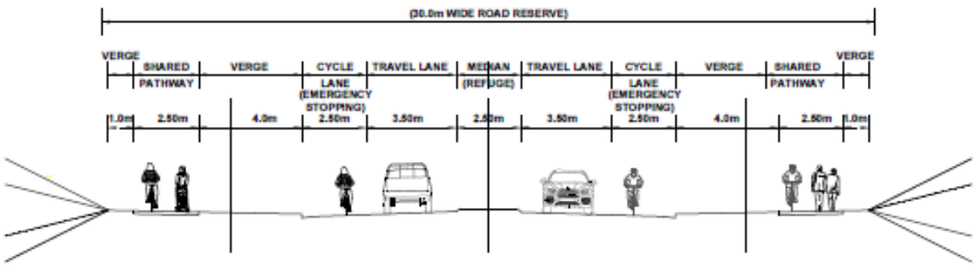

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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 4 of 13

DRAWING No. CORRIDOR PLAN REV. A

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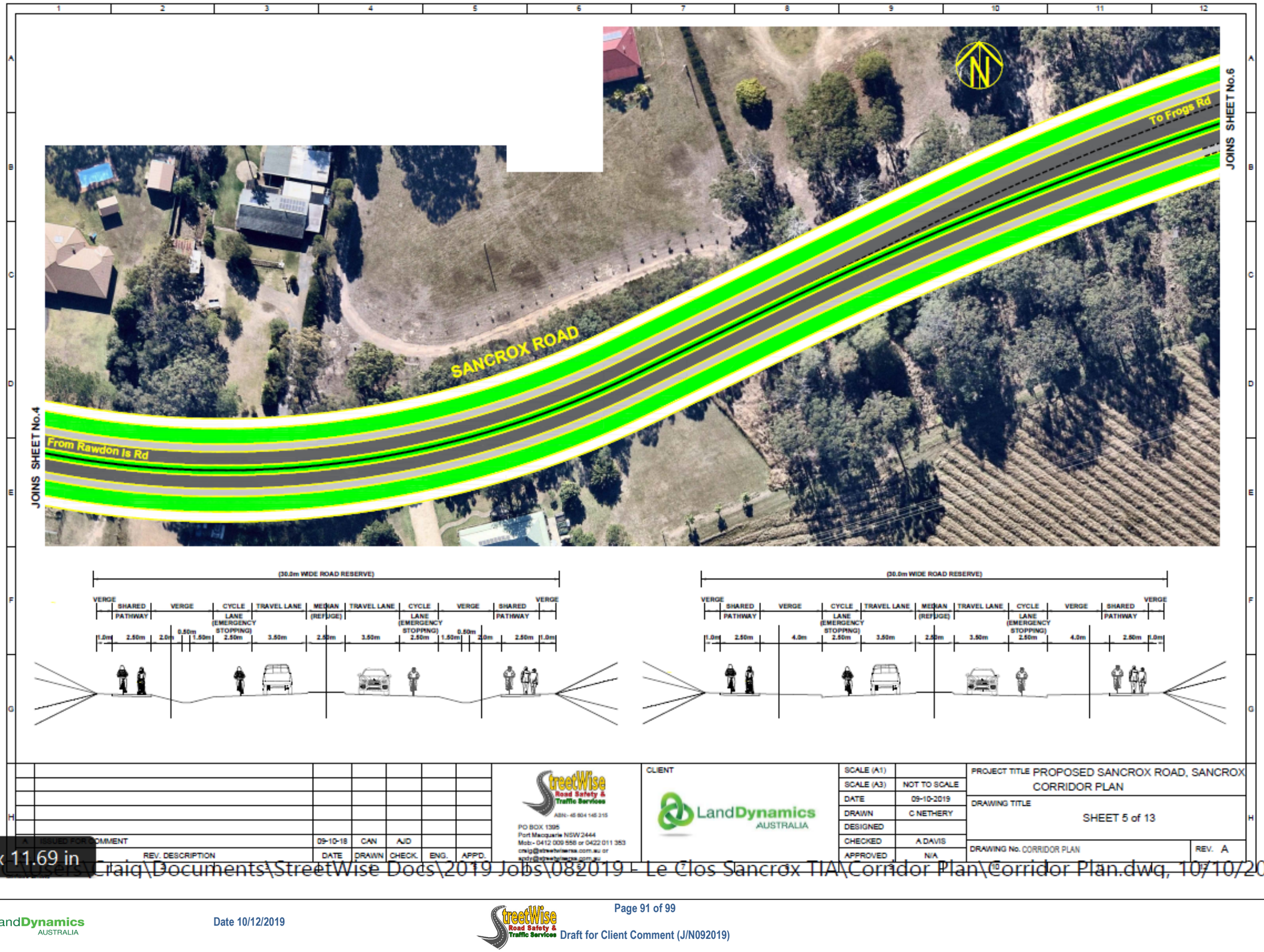
SANCROX ROAD
To Frogs Rd
From Rawdon Is Rd
JOINS SHEET No.6
JOINS SHEET No.4
(30.0m WIDE ROAD RESERVE)
VERGE
SHARED PATHWAY
CYCLE LANE (EMERGENCY STOPPING)
TRAVEL LANE
MEDIAN (REFUGE)
1.0m 2.50m 2.0m 0.50m 1.50m 2.50m 3.50m 2.50m 3.50m 2.50m 1.50m 0.50m 2.0m 2.50m 1.0m
(30.0m WIDE ROAD RESERVE)
1.0m 2.50m 4.0m 2.50m 3.50m 2.50m 3.50m 2.50m 4.0m 2.50m 1.0m
A ISSUED FOR COMMENT 09-10-19 CAN AJD
REV. DESCRIPTION DATE DRAWN CHECK. ENG. APPD.
StreetWise Road Safety & Traffic Services
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PO BOX 1395
Port Macquarie NSW 2444
Mob:- 0412 009 558 or 0422 011 353
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LandDynamics AUSTRALIA
SCALE (A1)
SCALE (A3) NOT TO SCALE
DATE 09-10-2019
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DESIGNED
CHECKED A DAVIS
APPROVED N/A
PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX CORRIDOR PLAN
DRAWING TITLE SHEET 5 of 13
DRAWING No. CORRIDOR PLAN
REV. A
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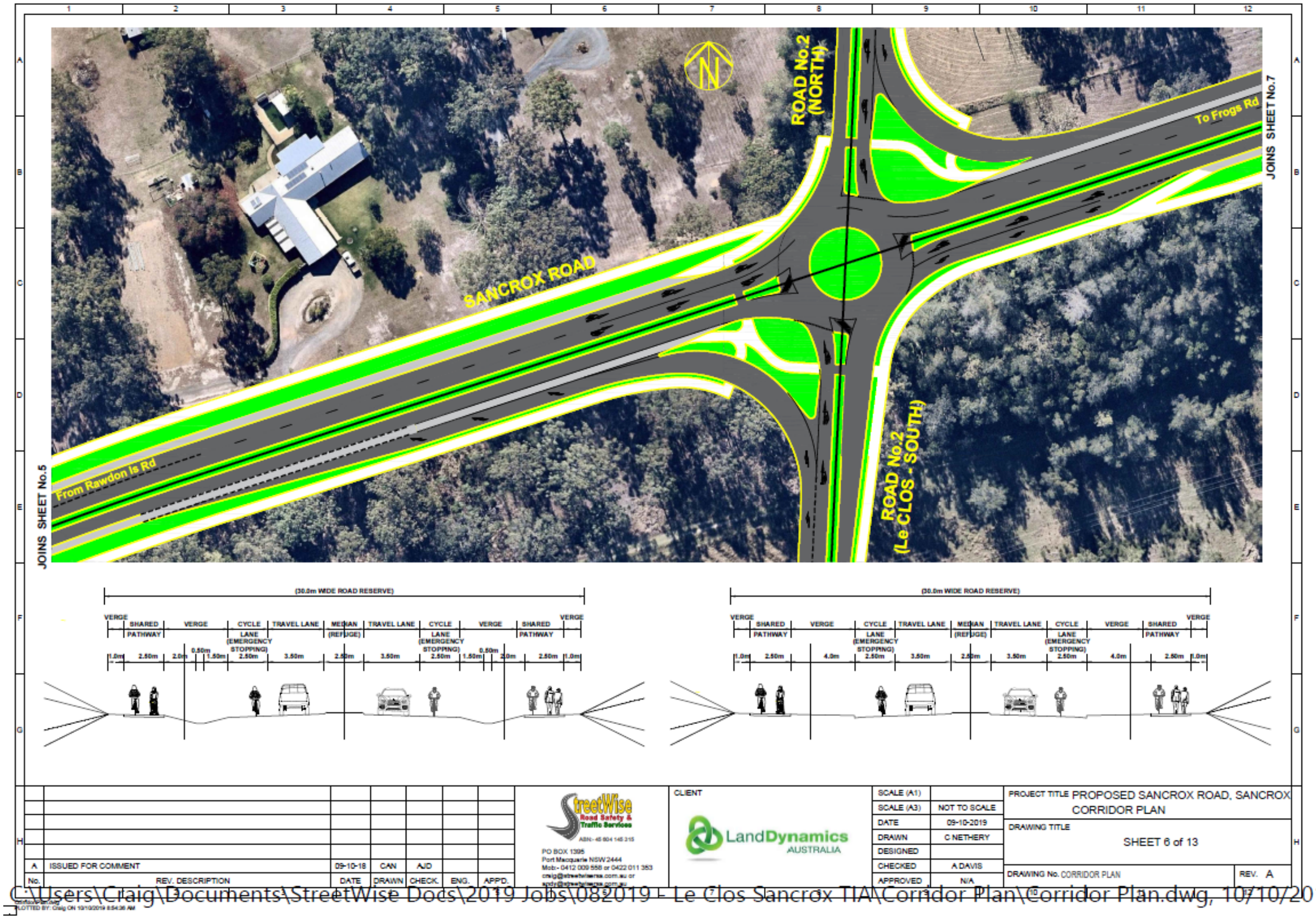

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A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 6 of 13

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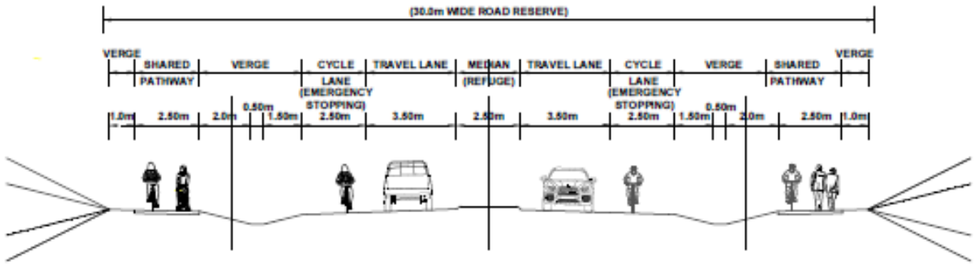

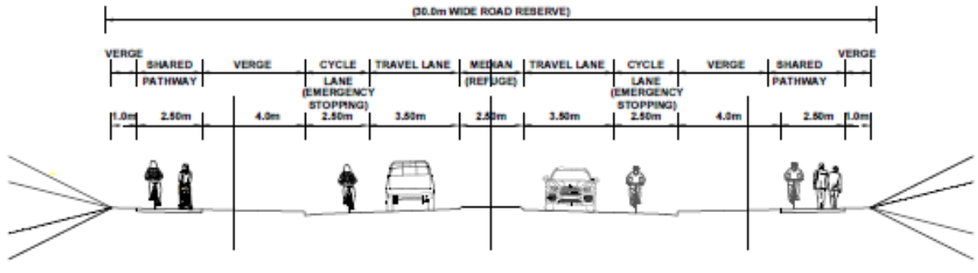

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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
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APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 7 of 13

DRAWING No. CORRIDOR PLAN REV. A

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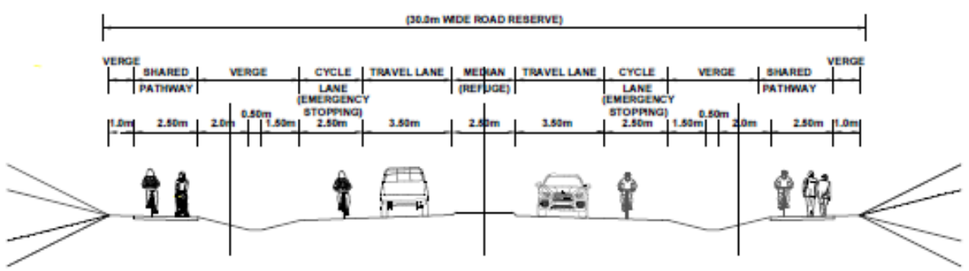

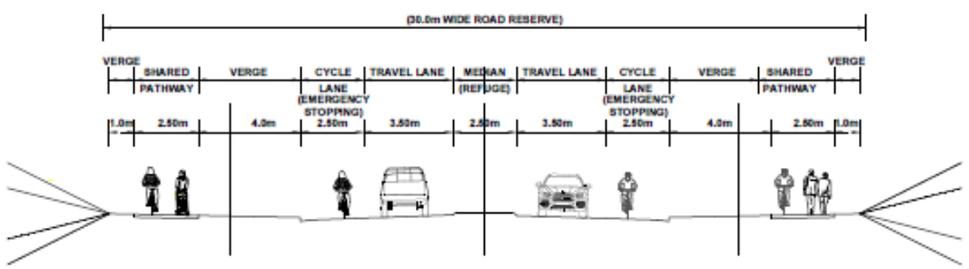

No.	REV. DESCRIPTION	DATE	DRAWN	CHECK.	ENG.	APPD.
A	ISSUED FOR COMMENT	09-10-19	CAN	AJD		

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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 8 of 13

DRAWING No. CORRIDOR PLAN REV. A

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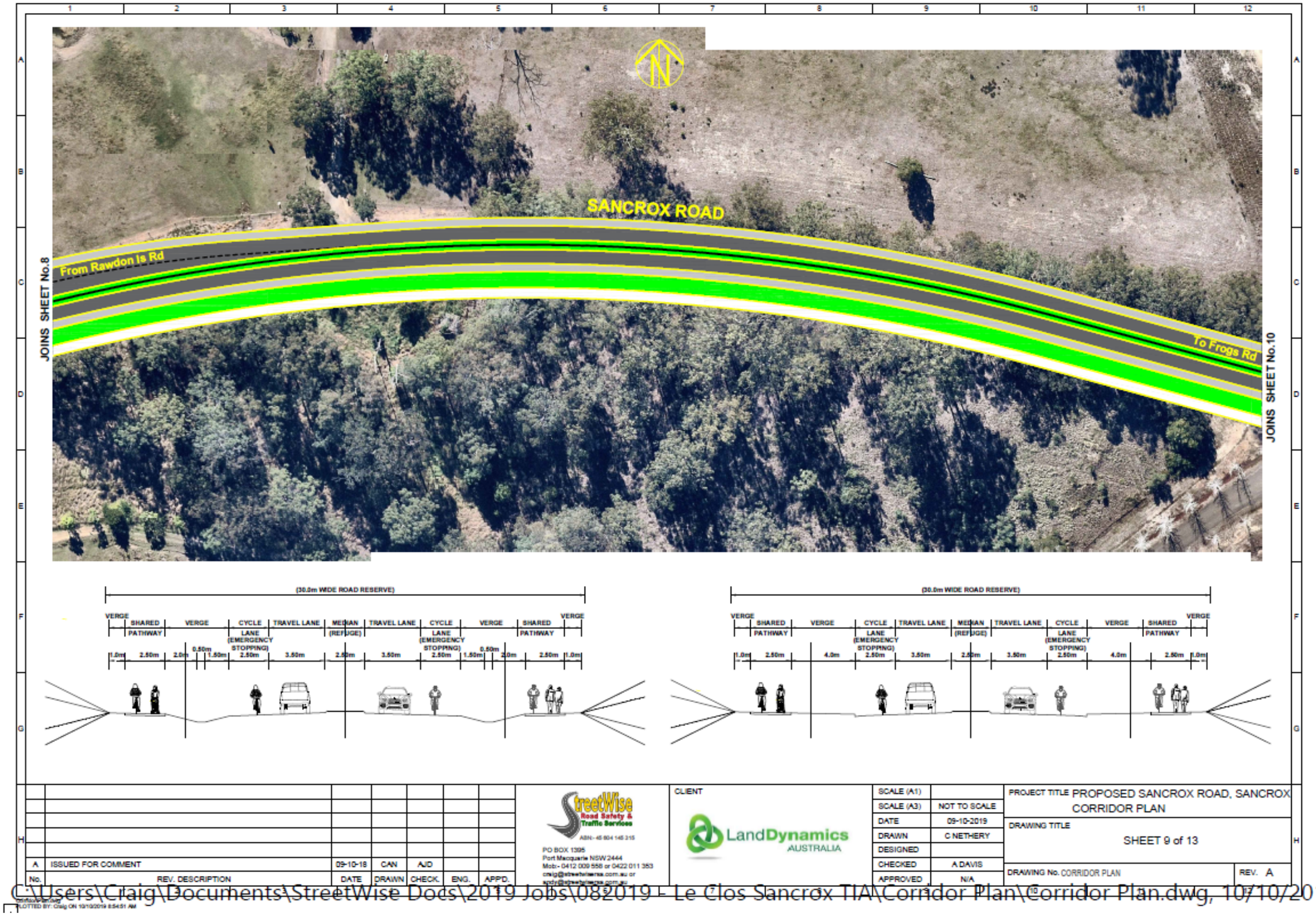
SANCROX ROAD
From Rawdon Is Rd
To Frogs Rd
JOINS SHEET No.8
SHEET No.10
(30.0m WIDE ROAD RESERVE)
VERGE
SHARED PATHWAY
VERGE
CYCLE LANE (EMERGENCY STOPPING)
TRAVEL LANE
MEDIAN (REFUGE)
TRAVEL LANE
CYCLE LANE (EMERGENCY STOPPING)
VERGE
SHARED PATHWAY
VERGE
1.0m 2.50m 2.0m 0.50m 1.50m 2.50m 3.50m 2.50m 3.50m 2.50m 1.50m 0.50m 2.0m 2.50m 1.0m
(30.0m WIDE ROAD RESERVE)
VERGE
SHARED PATHWAY
VERGE
CYCLE LANE (EMERGENCY STOPPING)
TRAVEL LANE
MEDIAN (REFUGE)
TRAVEL LANE
CYCLE LANE (EMERGENCY STOPPING)
VERGE
SHARED PATHWAY
VERGE
1.0m 2.50m 4.0m 2.50m 3.50m 2.50m 3.50m 2.50m 4.0m 2.50m 1.0m
A ISSUED FOR COMMENT 09-10-18 CAN AJD
No. REV. DESCRIPTION DATE DRAWN CHECK. ENG. APPD.
StreetWise Road Safety & Traffic Services
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Port Macquarie NSW 2444
Mob:- 0412 009 558 or 0422 011 353
craig@streetwiserse.com.au or
apdy@streetwiserse.com.au
CLIENT
LandDynamics AUSTRALIA
SCALE (A1)
SCALE (A3) NOT TO SCALE
DATE 09-10-2019
DRAWN C NETHERY
DESIGNED
CHECKED A DAVIS
APPROVED N/A
PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX CORRIDOR PLAN
DRAWING TITLE SHEET 9 of 13
DRAWING No. CORRIDOR PLAN
REV. A
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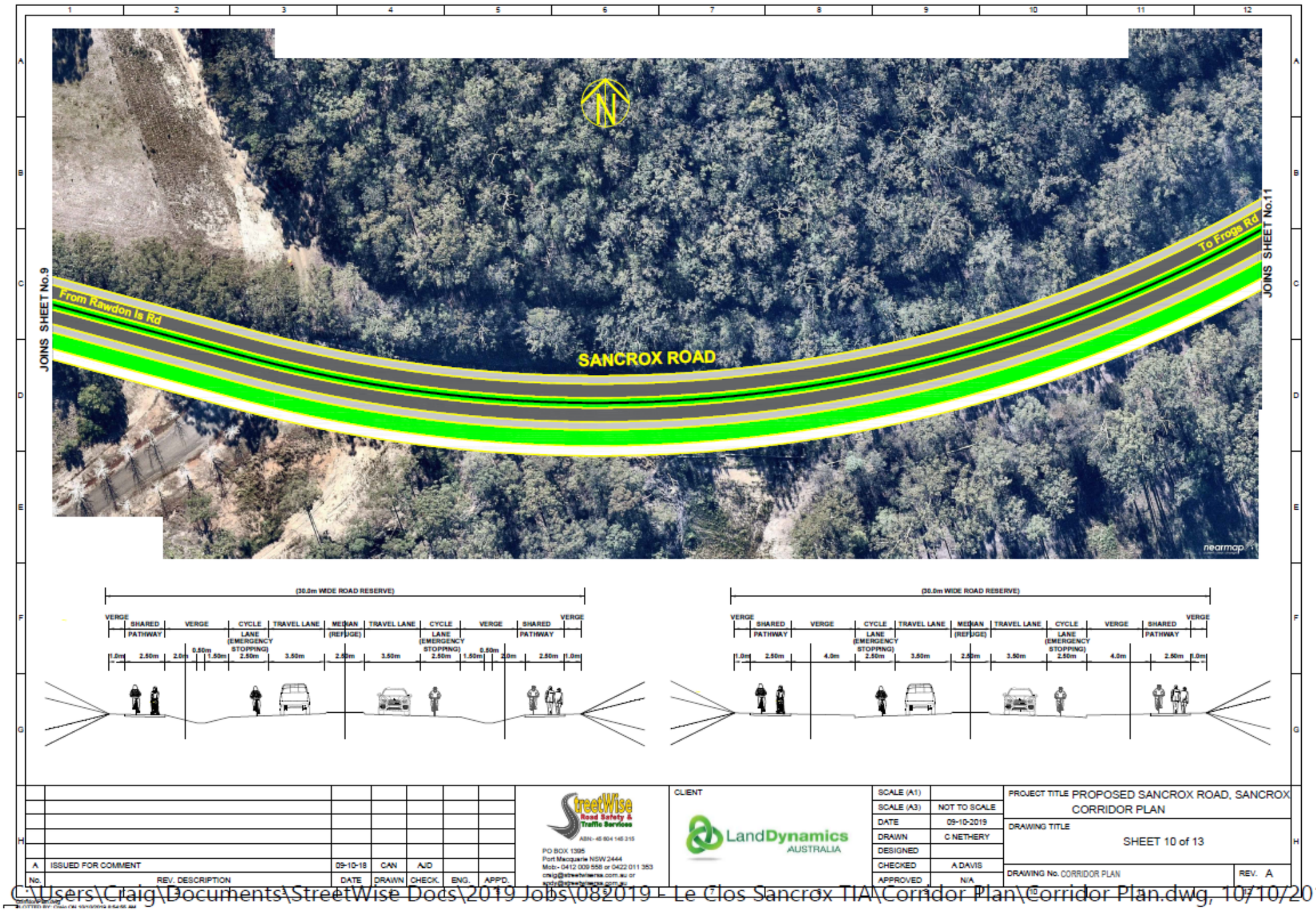

No.	REV. DESCRIPTION	DATE	DRAWN	CHECK.	ENG.	APP'D.
A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

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CLIENT
LandDynamics AUSTRALIA

SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 10 of 13

DRAWING No. CORRIDOR PLAN REV. A

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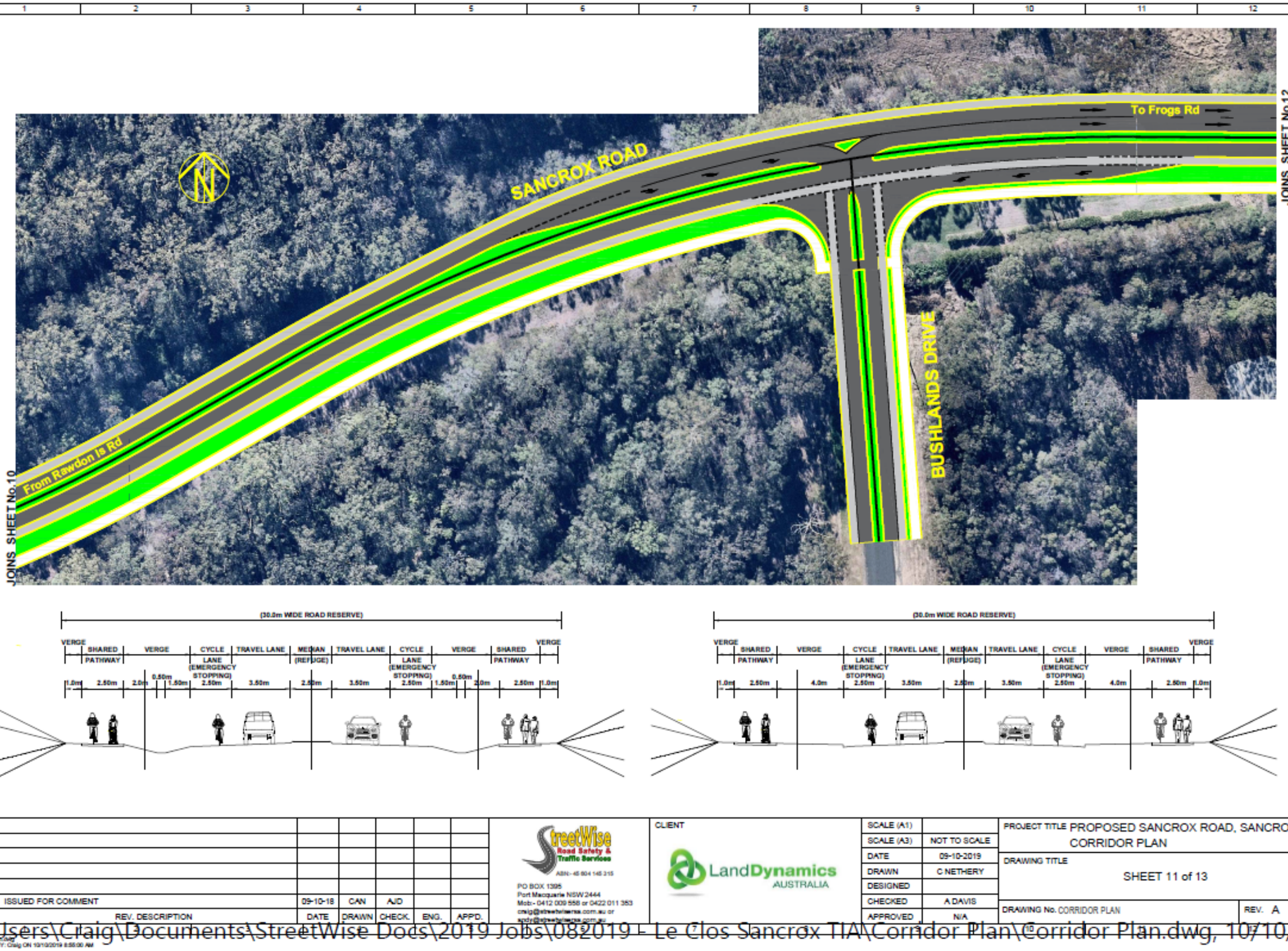

No.	REV. DESCRIPTION	DATE	DRAWN	CHECK.	ENG.	APPD.
A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

StreetWise Road Safety & Traffic Services
ABN:- 45 604 145 315
PO BOX 1395
Port Macquarie NSW 2444
Mob:- 0412 009 558 or 0422 011 353
craig@streetwiseroadsafety.com.au or
andy@streetwiseroadsafety.com.au

CLIENT
LandDynamics AUSTRALIA

SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 11 of 13

DRAWING No. CORRIDOR PLAN REV. A

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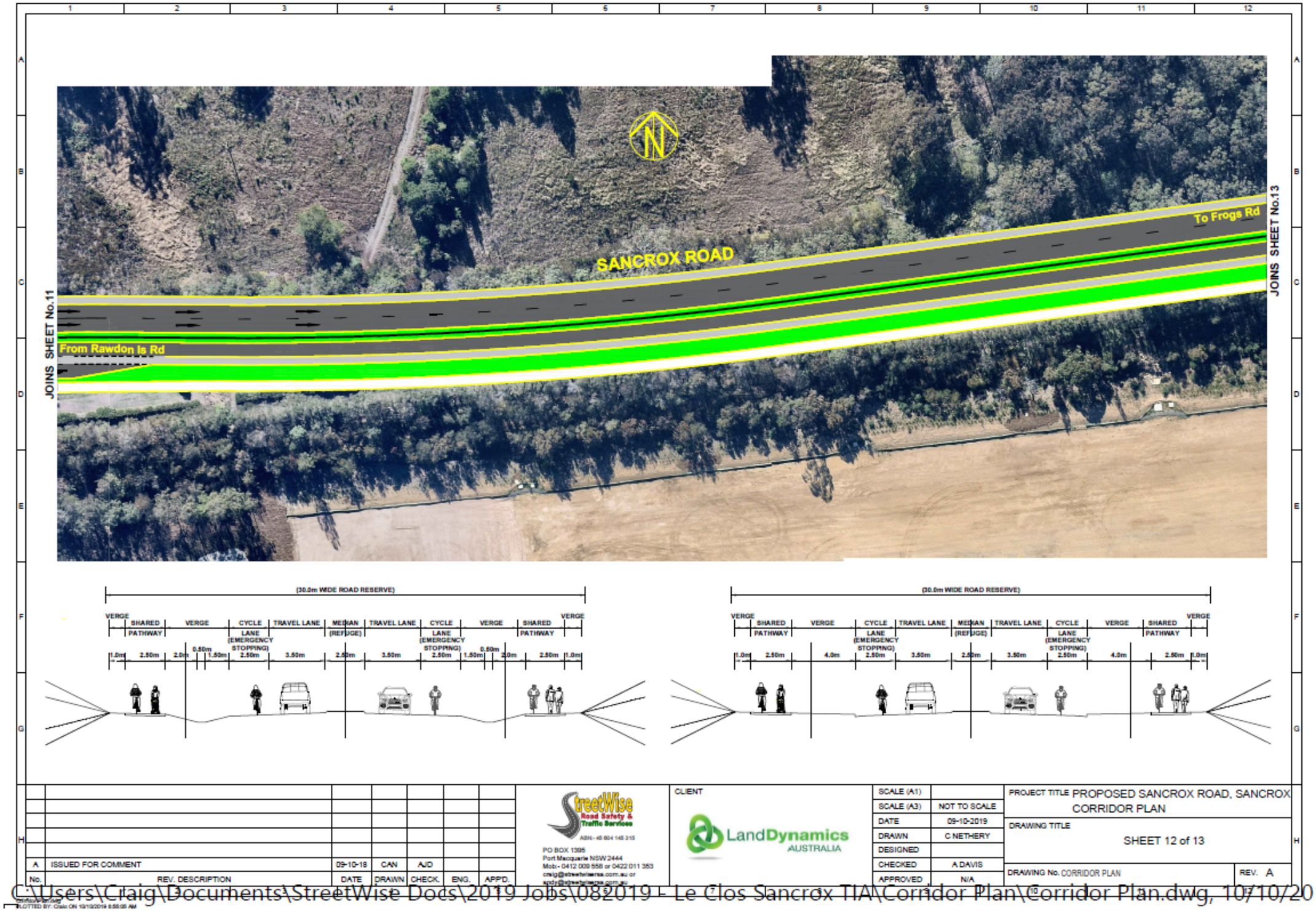

No.	REV. DESCRIPTION	DATE	DRAWN	CHECK.	ENG.	APP'D.
A	ISSUED FOR COMMENT	09-10-18	CAN	AJD		

StreetWise Road Safety & Traffic Services
ABN:- 46 604 145 315
PO BOX 1395
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Mob:- 0412 009 558 or 0422 011 353
craig@streetwiserisk.com.au or andy@streetwiserisk.com.au

CLIENT
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SCALE (A1)	
SCALE (A3)	NOT TO SCALE
DATE	09-10-2019
DRAWN	C NETHERY
DESIGNED	
CHECKED	A DAVIS
APPROVED	N/A

PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN

DRAWING TITLE
SHEET 12 of 13

DRAWING No. CORRIDOR PLAN REV. A

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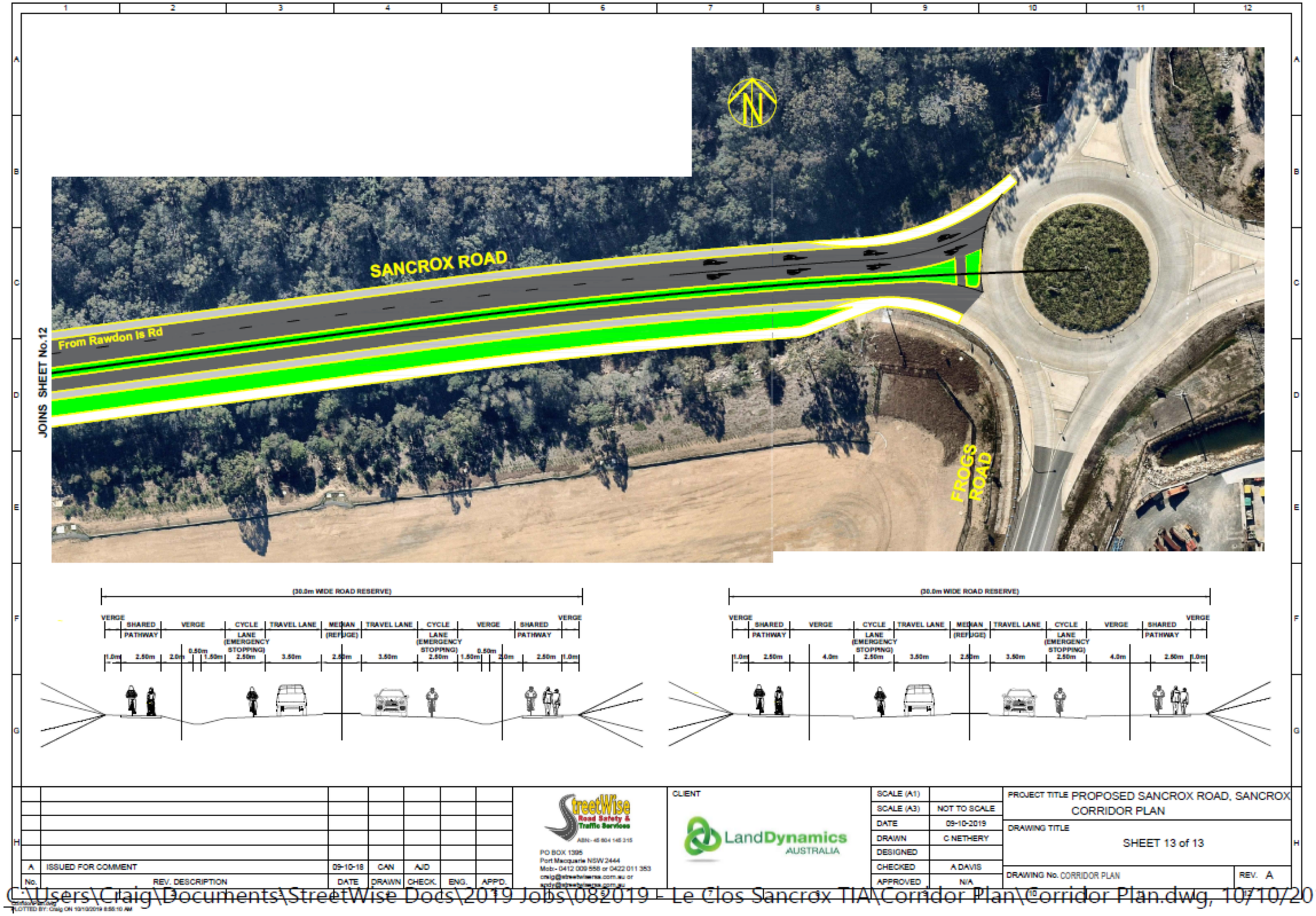
SANCROX ROAD
From Rawdon Is Rd
JOINS SHEET No.12
FROGS ROAD
(30.0m WIDE ROAD RESERVE)
VERGE
SHARED PATHWAY
CYCLE LANE (EMERGENCY STOPPING)
TRAVEL LANE
MEDIAN (REFUGE)
1.0m 2.50m 2.0m 0.50m 1.50m 2.50m 3.50m 2.50m 3.50m 2.50m 1.50m 0.50m 2.0m 2.50m 1.0m
(30.0m WIDE ROAD RESERVE)
1.0m 2.50m 4.0m 2.50m 3.50m 2.50m 3.50m 2.50m 4.0m 2.50m 1.0m
A ISSUED FOR COMMENT 09-10-19 CAN AJD
No. REV. DESCRIPTION DATE DRAWN CHECK. ENG. APPD.
StreetWise Road Safety & Traffic Services
ABN:- 46 604 145 215
PO BOX 1395
Port Macquarie NSW 2444
Mob:- 0412 009 558 or 0422 011 353
craig@streetwiseservices.com.au or
andy@streetwiseservices.com.au
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LandDynamics AUSTRALIA
SCALE (A1)
SCALE (A3) NOT TO SCALE
DATE 09-10-2019
DRAWN C NETHERY
DESIGNED
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APPROVED N/A
PROJECT TITLE PROPOSED SANCROX ROAD, SANCROX
CORRIDOR PLAN
DRAWING TITLE
SHEET 13 of 13
DRAWING No. CORRIDOR PLAN
REV. A
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