TRAFFIC IMPACT ASSESSMENT

PLANNING PROPOSAL – RESIDENTIAL DEVELOPMENT

LOT 273 IN DP 755266

15 MULLOWAY ROAD
CHAIN VALLEY BAY

PREPARED FOR: OPTIMA DEVELOPMENTS PTY LTD

AMENDED OCTOBER 2021

18/151

TRAFFIC IMPACT ASSESSMENT
OPTIMA DEVELOPMENTS

PLANNING PROPOSAL
RESIDENTIAL DEVELOPMENT
LOT 273 IN DP 755266
15 MULLOWAY ROAD, CHAIN VALLEY BAY.

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QUALITY ASSURANCE

This document has been prepared, checked and released in accordance with the Quality Control Standards established by Intersect Traffic Pty Ltd.

Issue	Date	Description	By
A	24/01/19	Draft	PA
B	25/01/19	Edit	JG
C	07/02/19	Final Proof / Client Amendments	JG
D	08/02/19	Approved	JG
E	10/10/21	Reduced lot yield / Approved	JG
F	11/10/21	Planner comments / Approved	JG

This document has been authorised by

Date 11th October 2021

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ATTACHMENTS

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) has been engaged by Optima Developments Pty Ltd on behalf of firstly the previous land owner Mr Noel Smith and prepared a Traffic Impact Assessment (October 2016) for a planning proposal (PP) for a residential development proposal on Lot 273 in DP 755266 15 Mulloway Road, Chain Valley Bay. Following a Gateway determination, the property was sold with the new owners (JG Developments Pty Ltd) proceeding with the PP investigations via their planning consultant Optima Developments Pty Ltd. The current proposal reflecting consideration of environmental constraints will yield in the order of 93 (R2) low density residential lots, a small (E3) Environmental Management lot and two (E2) Environmental Conservation lots. The E2 lots covering the Conservation and Corridor lands without any recognition of a dwelling entitlement.

The planning proposal includes the half width road pavement construction of Mulloway Road along the site frontage and the construction of new public roads accessing the residential subdivision from both Mulloway Road at the northern end of the site and an extension of Teraglin Road at the western side of the property. The road upgrading / improvements are to be in accordance with Central Coast Council requirements and it is noted a developer contributions plan is to be prepared by Council for this area and for which the subject lot will be liable to contribute to. The proposed concept development plan is shown in ***Attachment A***.

This report is required to support a planning proposal and future development application to the Department of Planning and Environment and Central Coast Council respectively. It will in particular allow the Council and Transport for NSW (TfNSW) to assess the proposal in regard to its traffic impacts on the local and state road network.

This report presents the findings of the traffic assessment and includes the following.

1. An outline of the existing situation in the vicinity of the site.
2. An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
3. Determines any triggers for the provision of additional infrastructure.
4. Reviews parking, public transport, pedestrian, and cycle way requirements for the proposed development, including assessment against Council's DCP and Australian Standard requirements.
5. Addresses issues raised by NSW RMS in their gateway determination advice dated 8th August 2018 (see ***Attachment D***).
6. Presentation of conclusions and recommendations.

2.0 SITE LOCATION

The subject site is located on the southern side of Mulloway Road, Chain Valley Bay. The centre of the site is approximately 600 metres west of Chain Valley Bay Road, approximately 2.0 kilometres from the Pacific Highway south of the site and 500 metres east of the Lake Macquarie foreshore parkland with its boat ramp and jetty. Residential developments adjoin its eastern and western borders, whilst Karignan Creek forms the southern boundary of the property.

The only vehicular access to the site constructed as a rural access crossing is located close to the centre of the site frontage on Mulloway Road. ***Figure 1*** below shows the site location from a local context.

The site contains the land title of Lot 273 in DP 755266, is addressed as 15 Mulloway Road, Chain Valley Bay and has a total area of approximately 17 ha. A single dwelling and sheds are currently located on the site.

Pursuant to the Wyong LEP (2013) the site is currently zoned E3 – Environmental Management covering approximately 80% of the property (at the northern end) and E2 - Environmental Conservation covering approximately 20% of the property (at the southern end). ***Photograph 1*** shows the existing conditions at the site while ***Photograph 2*** shows the existing vehicular access to the site.

Figure 1 – Site Location

Photograph 1 – Development site from Chain Valley Bay Road

Photograph 2 – Existing vehicular access to the site

3.0 EXISTING ROAD NETWORK

3.1 Pacific Highway

The Pacific Highway would currently be classified as an arterial road under a functional road classification and as such is under the care and control of TfNSW. The Pacific Highway is a major transport route and connects the southern suburbs of Newcastle and the Central Coast suburbs. In the vicinity of the site it is a median separated (dual carriageway) four lane two-way road with each carriageway having a sealed width of approximately 12.5 metres. Lane widths are approximately 3.7 metres with break down / shoulder sealed widths of 4.0 metres (approx.) adjacent to the inside lane and 0.3 to 1.0 metre (approx.) adjacent to the outside lane. ***Photograph 3*** below shows the standard of the Pacific Highway in this location. At the time of inspection, the Pacific Highway was in good condition and an 80 km/h speed zone applied in this location.

Photograph 3 – The Pacific Highway adjacent to Chain Valley Bay Road

3.2 Chain Valley Bay Road

Chain Valley Bay Road is a local collector road under the care and control of Central Coast Council. In the vicinity of the site it is two-way two-lane rural road with a sealed carriageway width of approximately 6.5 metres. Sealed lane widths vary between 3.0 and 3.5 metres and the grassed and / or gravel shoulders are generally 1.5 metres wide. Chain Valley Bay Road provides access to other local roads and to properties along its length and connects to the Pacific Highway approximately 1.5 km south of Mulloway Road. The intersection with the Pacific Highway is constructed as a rural channelised right turn (CHR) / auxiliary left turn (AUL) T- intersection with a U-turn facility for eastbound traffic.

A 50 km/h speed zoning applies to Chain Valley Bay Road adjacent to its intersection with Mulloway Road and an 80 km/h speed zoning applies to Chain Valley Bay Road adjacent to the Pacific Highway intersection. At the time of inspection Chain Valley Road was found to be in fair

condition. ***Photograph 4*** shows Chain Valley Bay Road in the vicinity of Mulloway Road and ***Photograph 5*** shows Chain Valley Bay Road in the vicinity of the Pacific Highway.

Photograph 4 – Chain Valley Bay Road in the vicinity of Mulloway Road

Photograph 5 – Chain Valley Bay Road in the vicinity of the Pacific Highway

3.3 Mulloway Road

Mulloway Road is an urban road with a sealed carriageway varying between 6.5 and 10 metres wide (approximately). The varying widths are due to the presence of kerb and gutter for various lengths on either side of the street in front of the existing residential areas. In other locations grass and / or gravel shoulders of various widths with the presence of grassed verges / table drains exist. Under a functional road hierarchy, it would be classified as a local road and therefore is under the care and control of Central Coast Council. It provides access to properties along its length and connects to Chain Valley Bay Road to the east of the site and nearby streets and the foreshore of Lake Macquarie to the west. Its intersection with Chain Valley Bay Road is constructed as a modified rural basic right turn (BAR) / basic left turn (BAL) give way-controlled T-intersection.

A 50 km/h speed zone exists along Mulloway Road. On inspection Mulloway Road was observed to be in fair condition. ***Photograph 6*** below shows Mulloway Road at the southern end of the proposed development.

Photograph 6 – Mulloway Road in the vicinity of the site

4.0 ROAD NETWORK IMPROVEMENTS

No proposed road network improvements are known in the vicinity of the site that would increase the capacity of the road network. Upgrading works as part of Central Coast Council's and TfNSW forward works programs including the future developer contributions plan covering Chain Valley Bay may occur in the future.

5.0 TRAFFIC VOLUMES

To determine existing traffic volumes on the road network, Intersect Traffic undertook traffic counts at the Chain Valley Bay Road and Mulloway Road T intersection during the AM and PM peak traffic periods on Thursday 8th September 2016. These counts are updated from the original gateway traffic assessment and as requested by Council and TfNSW. Counts were undertaken from 8 am to 9 am and 4.30 pm to 5.30 pm as the likely peak hour traffic periods for residential development. Northern Transport Planning and Engineering (NTPE) on behalf of Intersect Traffic undertook traffic counts at the Pacific Highway / Chain Valley Bay Road intersection on Monday 5th December 2016 during both the AM and PM peak traffic periods. The manual count sheets for both these locations are provided in ***Attachment B.*** NTPE on behalf of Intersect Traffic also undertook traffic classifier counts on the Pacific Highway (300 east of the Elizabeth Bay Drive intersection) and on Chain Valley Bay Road (200 metres north of the Pacific Highway) for a 1-week period between 8th December 2016 and 14th December 2016.

These counts have been used to determine both 2019 and 2029 traffic volumes by adopting a 2 % per annum background traffic growth on Chain Valley Bay Road and Mulloway Road and a 1.5 % per annum background traffic growth on the Pacific Highway. The resulting peak traffic volumes determined and used in this assessment are shown in ***Table 1*** below.

Table 1 – Peak Hour Traffic Data

Road	Section	2019 AM peak vtph	2019 PM peak vtph	2029 AM peak vtph	2029 PM peak vtph
Mulloway Road	West of Chain Valley Bay Road	194	197	237	241
Mulloway Road	west of site	194	197	237	241
Chain Valley Bay Road	South of Mulloway Road	225	231	274	282
Chain Valley Bay Road	North of Mulloway Road	69	80	84	98
Chain Valley Bay Road	200 metres north of Pacific Highway	266	279	325	340
Chain Valley Bay Road	North of Pacific Highway	223	232	272	283
Pacific Highway	East of Chain Valley Bay Road	2263	2164	2626	2511
Pacific Highway	West of Chain Valley Bay Road	2451	2340	2845	2716
Pacific Highway	300 metres east of Elizabeth Bay Rd	2193	2495	2545	2896

It is noted that the peak manual traffic count data for the Pacific Highway were higher than the peak classifier counts while the Chain Valley Bay Road peak classifier counts were approximately 18 % higher than the peak manual intersection count data though traffic volumes were relatively light. Therefore, it is considered suitable to use the peak manual count traffic data for Sidra Intersection modelling purposes.

6.0 ROAD CAPACITY

The capacity of urban and rural roads is generally determined by the capacity of intersections. However, Tables 4.3, 4.4 & 4.5 of the *RTA's Guide to Traffic Generating Developments* provides some guidance on mid-block capacities for urban and rural roads and likely levels of service. These tables are reproduced below.

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

The data for Table 4.5 assumes the following criteria:

- *terrain level* with 20% no overtaking.
- *rolling* with 40% no overtaking.
- *mountainous* with 60% no overtaking.
- 3.7 m traffic lane width with side clearances of at least 2m.
- 60/40 directional split of traffic.

Source: - RTA's Guide to Traffic Generating Developments (2002).

The criteria for the roads at the Pacific Highway and Chain Valley Bay Road intersection, are rural road, a level terrain, 5% heavy vehicles and 80 km/h speed zoning. Therefore, the use of Table 4.5 above is warranted, noting the level of service (LoS), vehicles per hour, require factoring by 0.9 for a reduction of the speed travel from 100 km/h to 80 km/h. A desirable level of service on a rural road is generally considered to be a level of service (LoS) C or better however on an arterial road such as the Pacific Highway a LoS D is still considered acceptable. Utilising this criterion and from Table 4.5 above a LoS E for two-way two lane of flow occurs when mid-block traffic volumes exceed 2,500 vtph x 0.9 = 2,250 vtph. Therefore, the two-way two-lane mid-block traffic volume threshold for a LoS D is 2,250 vph. This means the two-way four lane mid-block traffic volume threshold for a LoS D for the Pacific Highway is approximately 4,500 vtph. Therefore, it is considered that the Pacific Highway in the vicinity of the site as a four-lane two-way rural road has a two-way mid-block road capacity of 4,500 vtph.

Similarly, for a LoS C on a two-way two-lane flow occurs when mid-block traffic volumes exceed 1,550 x 0.9 vtph = 1,395 vtph, the two-way two-lane mid-block traffic volume threshold for a LoS C is 1,395 vtph. This means the two-way two-lane mid-block traffic volume threshold for a LoS C for Chain Valley Bay Road is 1,395 vph.

The roads at the Chain Valley Road and Mulloway Road, have a 50km/h speed zoning are two-way two lane, local urban roads. Therefore, the use of Table 4.4 urban roads above is warranted. As above, a LoS C for a one lane of traffic flow is exceeded when mid-block traffic volumes exceed the LoS D of 900 vtph. The two-way two-lane mid-block traffic volume threshold for a LoS C is therefore 1,800 vtph. This means the two-way two-lane mid-block traffic volume threshold for a LoS C for Chain Valley Bay Road and Mulloway Road are 1,800 vtph.

Due to their being residences along Mulloway Road the environmental capacity guidelines of TfNSW (Table 4.6 of the *RTA's Guide to Traffic Generating Developments (2002)*) may apply and as such as a collector road a 500 vtph maximum threshold would apply.

From the traffic data sourced and calculated in ***Section 5*** and noting the likely technical two-way mid-block road capacities of the Pacific Highway, Chain Valley Bay Road and Mulloway Road are well in excess of the existing 2019 traffic volumes and the predicted 2029 traffic volumes on the road network it is considered that the adjacent road network is operating within its technical capacity and has scope to cater for additional traffic generated by the new development.

7.0 ALTERNATE TRANSPORT MODES

Busways Central Coast operates public transport (bus) services to the area. Buses on Route 98 (Lake Haven to Chain Valley Bay via Blue Haven) and Route 95 (Lake Haven to Morisset via Gwandalan and Mannering Park) travel past the site. The service route includes Mulloway Road, Teraglin Drive and Trevally Avenue which adjoin the proposed development.

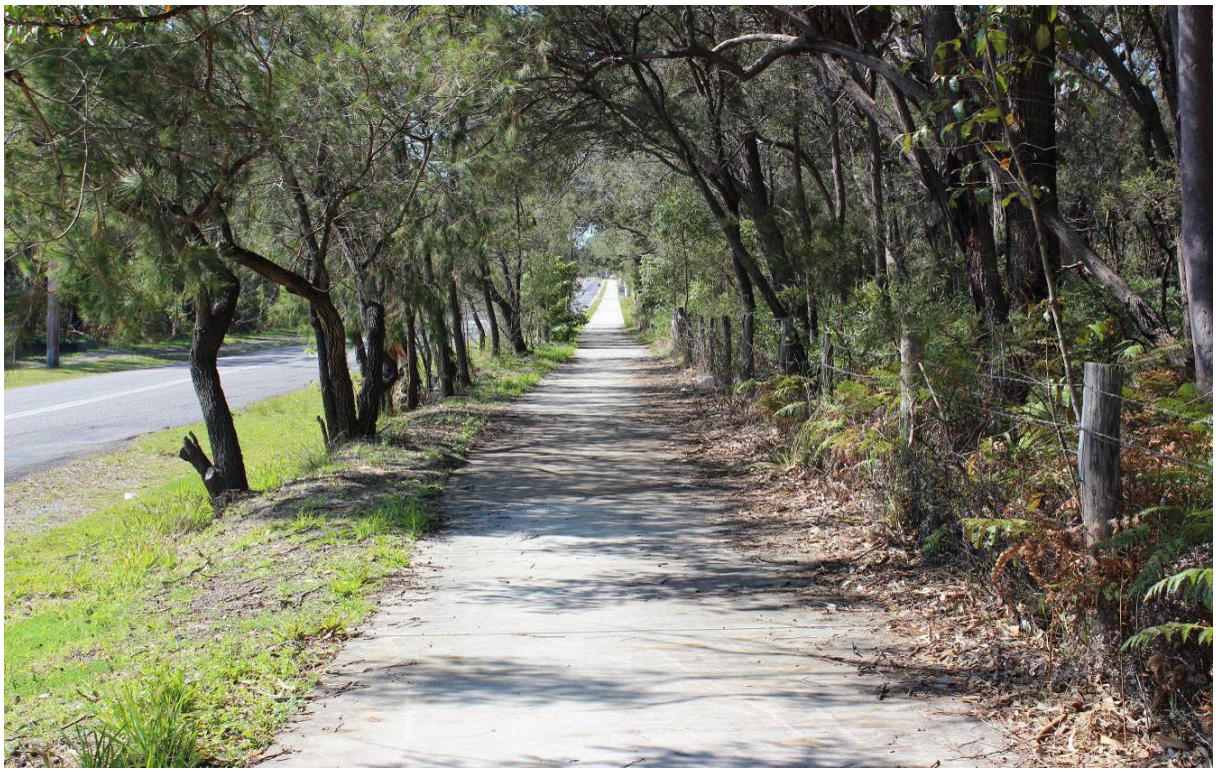
Route 95 and 98 bus route services are provided on morning and evenings and operates on weekdays only. It provides transport to various nearby local suburbs and railway stations as well as to other bus service routes (such as the Route 99 bus service) for bus and train travel to destinations further afield. Route 99 which provides a regular service to Swansea and Charlestown on weekdays also provides a very infrequent weekend only service to Mulloway Road in the vicinity of the proposed development.

The nearest bus stop is located on Mulloway Road approximately 250 metres west of the site as shown in ***Photograph 7***. The local bus route map (extract) is provided below in ***Figure 2***.

Figure 2 – Local Bus Routes

Photograph 7 – Bus stop Mulloway Road in the vicinity of the site.

A 2.5-metre-wide concrete pathway on Mulloway Road (***Photograph 8***) commences 150 metres west of Chain Valley Bay Road, is approximately 650-metre-long, is continuous along the full length of the northern frontage of the development and ends at Trevally Avenue. In practice it operates as a shared cycleway / pedestrian path. There are no other pedestrian facilities near the site.



Photograph 8 – Off-road cycle / pedestrian path in Mulloway Road adjacent to the site.

8.0 OTHER DEVELOPMENTS

There are a number of other developments in the area that will contribute traffic to the local and state road network impacted by this development which have been accounted for in this assessment through the adoption of an appropriate background traffic growth rate for the road network. A similar Planning Proposal for a large residential development by the Darkinjung Local Aboriginal Land Council (DLALC) at the Chain Valley Bay / Pacific Highway intersection has been accounted for directly in the assessment as discussed in ***Section 12*** below. The list of known other developments in the area is as follows;

- The current approved substantial additions to Valhalla MHE (noting no requirement for upgrading of Pacific Highway) as part of that determination. Also, possible further future additions to this operation (northern side of Mulloway Road, although not official)
- The amended PP (reduced yield) for the DLALC land also accessing the Pacific Highway;
- A Manufactured Home Estate and small residential subdivision on 45 Mulloway Road proposed by Vivacity Property;
- An extension to the existing Teraglin Lifestyle Village (2 Mulloway Road) proposed by Hometown Australia (78 additional sites); and
- Other possible future development sites in Mulloway Road and Sunset Parade.

9.0 DEVELOPMENT PROPOSAL

The planning proposal involves the rezoning of land titled Lot 273 in DP 755266 - 15 Mulloway Road, Chain Valley Bay North to permit a residential development. The proposal will yield 93 Low Density Residential lots and one (1) small Environmental lot as well as two (2) environmental lots with no dwelling entitlements.

Development works will include the half width road pavement construction of Mulloway Road along the site frontage and the construction of public roads accessing the residential subdivision from Mulloway Road at the northern end of the site and an extension of Teraglin Road at the western side of the property. The proposed concept development plan is shown in ***Attachment A***.

It would be expected that most of traffic generated by the development would utilise Mulloway Road and Chain Valley Bay Road south of Mulloway Road in their trip making as part of their origin / destination travel routes for all purposes.

All new internal roads, connections and other roadside infrastructure would be constructed to the requirements of Central Coast Council as per the Wyong Council DCP (2013) and engineering documentation.

10.0 TRAFFIC GENERATION

The *RTA's Guide to Traffic Generating Development's* provides specific advice on the traffic generation potential of various land uses. However, TfNSW has released a Technical Direction (TDT 2013/4) releasing the results of updated traffic surveys and as a result amended land use traffic generation rates.

In regard to low density residential dwellings the following amended advice is provided within the Technical Direction.

Daily vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas
Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90).
Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85).
*(The above rates do **not** include trips made internal to the subdivision, which may add up to an additional 25 %).*

Adopting an average rate approach for regional areas the following additional development traffic from the planning proposal can be calculated (rounded up)

- *Daily vehicle trips* — *94 x 7.4 =* ***696 vtpd***
- *AM weekday peak hour* — *94 x 0.85 =* ***80 vtph***
- *PM weekday peak hour* — *94 x 0.9 =* ***84 vtph***

11.0 TRIP DISTRIBUTION

Before carrying out any traffic assessment the peak hour traffic generated by the development needs to be distributed through the adjoining road network. This involves making a number of assumptions as to distribution patterns to and from the development. In distributing the generated peak hour traffic through the adjacent road network, the following assumptions have been made for this site.

- In the AM peak period 40% of traffic will enter the site and 60% will exit the site – based on the existing traffic count at the Chain Valley Bay Road / Mulloway Road intersection.
- In the PM peak period 60% of traffic will enter the site and 40% will exit the site– based on the existing traffic count at the Chain Valley Bay Road / Mulloway Road intersection.
- 100% of traffic entering / exiting the site will be via Mulloway Road east.
- Traffic distributed at the intersection of Mulloway Road and Chain Valley Bay Road will have a 100% origin / destination via Chain Valley Bay Road south.
- Traffic at the intersection of Chain Valley Bay Road and the Pacific Highway will be distributed in similar proportions to the traffic count data.
- These assumptions will result in the trip distributions shown in ***Figure 3*** for the relevant traffic movements.

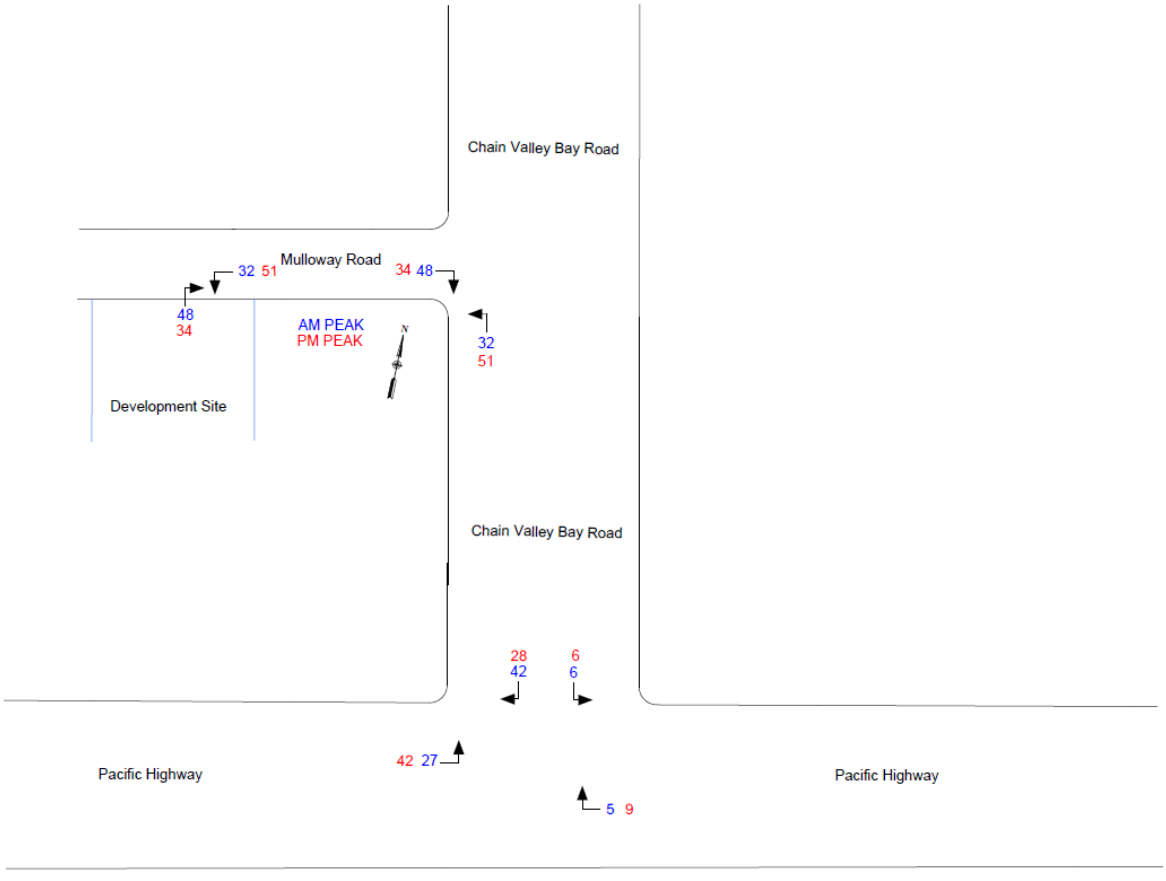


Figure 3 – Development Trip Distribution

12.0 TRAFFIC IMPACTS OF DEVELOPMENT

12.1 Road Network Capacity

It has previously been shown in ***Section 6*** of this report that the local road network is currently operating well within its technical mid-block capacity.

The planning proposal is likely to generate the following additional traffic on the local road network based on the trip distributions shown in ***Figure 3***;

- The Pacific Highway west of Chain Valley Bay Road – 69 vtph in the AM peak and 70 vtph in the PM peak.
- The Pacific Highway east of Chain Valley Bay Road – 11 vtph in the AM peak and 15 vtph in the PM peak.
- Chain Valley Bay Road south of Mulloway Road – 80 vtph in the AM peak and 85 vtph in the PM peak.
- Mulloway Road west of Chain Valley Bay Road – 80 vtph in the AM peak and 85 vtph in the PM peak.

The addition of this traffic onto the 2019 traffic volumes determined in ***Section 5*** will not result in the capacity thresholds for the local road network determined in ***Section 6*** to be reached. Even considering the predicted 2029 traffic volumes these road capacity thresholds are not reached. This is demonstrated in ***Table 2*** below.

Table 2 - Road Capacity Assessment – post development

Road	Section	Capacity vtph	2019 AM peak vtph	2019 PM peak vtph	2029 AM peak vtph	2029 PM peak vtph	Development AM	Development PM
Mulloway Road	West of Chain Valley Bay Road	500	274	282	317	326	80	85
Chain Valley Bay Road	200 metres north of Pacific Highway	1800	346	364	405	425	80	85
Pacific Highway	East of Chain Valley Bay Road	4500	2274	2179	2637	2526	11	15
Pacific Highway	West of Chain Valley Bay Road	4500	2520	2410	2914	2786	69	70
Pacific Highway	300 metres east of Elizabeth Bay Rd	4500	2262	2565	2614	2966	69	70

Therefore, in analysing the assessment shown in ***Table 2*** above it can be concluded that the local road network subject to suitable intersection controls being in place has sufficient spare capacity to cater for the additional traffic generated by the planning proposal.

It is noted that all roads within the planning proposal will need to be constructed in accordance with Central Coast Council's DCP requirements with pavement and shoulder widening along the site frontage on Mulloway Road required due to the additional traffic generated by the development. Additional traffic volumes on Chain Valley Bay Road and Teraglin Road will be minimal therefore pavement and shoulder widening on these roads are not warranted or reasonable considering the existing traffic on these roads. It is also likely that the section of Chain Valley Bay near the Pacific Highway will be upgraded as part of a proposed residential development by Darkinjung LALC.

12.2 Intersection Capacity

In assessing intersection performance, the main intersections of concern will be the Pacific Highway / Chain Valley Bay Road give way-controlled T-intersection (with eastbound U-turn bay) and the Chain Valley Bay Road / Mulloway Road give way-controlled T-intersection.

Pacific Highway / Chain Valley Bay Road

The impacts of the development are best assessed using the SIDRA INTERSECTION modelling software. This software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of TfNSW shown below;

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

Source: - RTA's Guide to Traffic Generating Developments (2002).

Assumptions made in this modelling were;

- The intersection layout will remain as per current conditions.
- Traffic volumes used in the modelling were collected by NTPE in December 2016.
- 2019 and 2029 traffic volumes have been predicted using a 2 % per annum background traffic growth on the local roads and a 1.5 % per annum background traffic growth rate on the state road network.
- Traffic generated by the planning proposal is distributed as per ***Figure 3.***
- The modelling also considers the impacts of other known developments in the area described in ***Section 8***. The traffic generation for these developments based on lot and site yields for these developments is shown in ***Table 3*** below.

The results of the modelling are summarised in ***Table 4*** below showing the 'all vehicles' summary results except for the LoS for the give way-controlled intersections which is the worst result for any movement. The Sidra Movement Summary Tables are provided in ***Attachment C***.

Table 3 – Other development traffic generation.

Development	No. Lots	No. MHE sites	peak hour traffic generation (vtph)
2 Mulloway Road	0	78	31.2
10 Mulloway Road	54	0	48.6
15 Mulloway Road	94		84.6
45 Mulloway Road	16	140	70.4
Darkinjung Pacific Hwy	450	150	465
20 Mulloway Road	50		39
48 Sunset Parade	29		26.1
		Total	**764.9**

Table 4 – The Pacific Highway / Chain Valley Bay Road T Intersection – Sidra Modelling – Results Summary

Model Scenario	Degree of Saturation (v/c)	Average Delay (s)	LoS	95% back of Queue Length (cars)
2019 AM + all development	4.896	500.6	F	235.2
2019 AM + subject development only	2.179	90.6	F	83.0
2019 AM + all development - signals	0.903	38.6	C	30.4
2029 AM + all development - signals	0.907	43.4	D	44.8
2019 PM + all development	5.874	375.9	F	155.7
2019 PM + all development - signals	0.903	28.9	C	32.9
2029 PM + all development - signals	0.906	31.6	C	44.6
2029 PM + all development – roundabout	0.622	10.0	A	7.1
2029 AM + all development - roundabout	0.865	16.2	B	17.2

This modelling shows that the Pacific Highway / Chain Valley Bay Road intersection does not currently operate satisfactorily during both the AM and PM peak periods and obviously would continue to do so post development and in 2029. Whilst average delays, LoS and 95 % back of queue lengths for the majority of movements at the intersection remain at acceptable levels based on the TfNSW assessment criteria listed above the right turn movement from Chain Valley Bay Road has unacceptable average delays, LoS and 95 % back of queue lengths. The intersection would therefore require upgrading with a higher level of intersection control required.

The intersection was then converted to both a signalised intersection and a roundabout and basic modelling undertaken for these intersections. The modelling showed that upgrading of the Pacific Highway / Chain Valley Bay Road intersection to traffic signals or a roundabout would result in the intersection operating satisfactorily post development through to beyond 2029 with all relevant performance criteria within the thresholds for satisfactory performance determined by TfNSW. Given the current road geometry of the Pacific Highway and the likely relative costs for both options it is considered the traffic signals provides the most economic upgrading option.

Chain Valley Bay / Mulloway Road

In assessing the performance of the Chain Valley Bay Road / Mulloway Road intersection it is noted that by observation this intersection is currently operating with uninterrupted flow conditions. Further existing and future traffic volumes (major leg – 352 vtph and minor leg – 106 vtph (2029PM)) will remain below the thresholds contained in the following table taken from Austroads *Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2009)* for which the guide states a detailed analysis to demonstrate adequate capacity is available is unlikely to be necessary as uninterrupted flow conditions would prevail.

Major road type[1]	Major road flow (vph)[2]	Minor road flow (vph)[3]
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Notes:

1. Major road is through road (i.e. has priority).
2. Major road flow includes all major road traffic with priority over minor road traffic.
3. Minor road design volumes include through and turning volumes.

Source: - Austroads Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2009)

On this basis it is concluded that the planning proposal will not result in a change to uninterrupted flow conditions through the Chain Valley Bay Road / Mulloway Road intersection and further intersection analysis is not required.

However the intersection is likely to require some upgrading to convert the intersection from a rural style to an urban style intersection with upright kerb and gutter formalising the intersection in an urban environment. The intersection operation would also benefit from a change in give way priority with priority given to the Chain Valley Bay south to Mulloway Road travel route and vice versa. Again the cost of this work should be shared by all developments in the area and a suitable developer contributions plan is to be prepared by Council to facilitate this process.

Conclusion

Overall it is concluded that subject to the Pacific Highway / Chain Valley Bay Road intersection being upgraded to a signalised intersection the planning proposal will not adversely impact on the operation of the local and state road network intersections. It is noted therefore that a developer contributions plan or State Voluntary Planning Agreement should be prepared for the upgrading of the intersection and include all other known future developments in the area so they also contribute to the intersection upgrading. As of the date of this report update (October 2021) TfNSW are currently undertaking the design of a signalised intersection at the Pacific Highway / Chain Valley Bay Road intersection and once completed will be advising the known developments in the area of the required monetary contribution required from each benefitting development for the construction of these signals.

12.3 Access / Safe Intersection Sight Distance

The new subdivision access intersection to Mulloway Road has been inspected and the available sight distance at the intersection is well in excess of the Austroad requirements for safe intersection sight distance (*Table 3.2 of Austroads Guide to Road Design – Part 4A Unsignalised and signalised intersections*) of approximately 100 metres for a 50 km/h design speed. This minimum safe intersection sight distance is also achieved at the connection to the extension of Teragalin Drive. Both sight distances would need to be checked again at Construction Certificate stage however there is no physical constraint with the site that would not allow for both the Safe Intersection Sight Distance and the Approach Stopping Distance requirements of Austroads to be achieved at all new road network intersections in the design and construction of the subdivision. It is therefore concluded that access to the subdivision can be achieved in a suitably safe manner.

As the residential lots proposed in the subdivision meet the minimum lot size requirements of Central Coast Council's DCP it is also reasonable to conclude that suitable vehicular access to each new residential lot can be provided and constructed to Central Coast Council's requirements.

12.4 Subdivision Road Layout

A review of the subdivision road network has determined that the proposed road layout appears satisfactory and in accordance with current best practice methods given the environmental constraints of the site. Cross-intersections have been avoided with all internal subdivision intersections being T-intersections.

Further the various street reserve, carriageway and verge widths appear to comply with the requirements of the range of road types within Wyong Council DCP (2013) which are presented in the Table of Appendix B of the Subdivision section of the DCP.

Overall it is considered the proposed subdivision road network is suitably safe and in accordance with the requirements of Central Coast Council.

12.5 On-site car parking

On-site car parking in accordance with Central Coast Council as per Wyong Council DCP 2013 needs to be provided within the planning proposal. Whilst this will be assessed in detail in future development applications for development on the individual allotments contained in the planning proposal a general assessment has been carried out in this report.

As the lot sizes in the subdivision meet the minimum lot size requirements of Central Coast Council's DCP it is reasonable to conclude that a dwelling with a suitable covered and uncovered on-site parking space can be provided in accordance with the Wyong Council DCP (2013).

13.0 PEDESTRIAN & CYCLE FACILITIES

The planning proposal will generate pedestrian and bicycle traffic therefore a nexus would exist to provide additional facilities. As stated in ***Section 7*** a shared concrete pedestrian path / cycleway already exists along the full frontage of the proposed development. As such there is no requirement to upgrade this aspect of these facilities. Internal pedestrian pathways on the newly created public roads would need to be provided to Central Coast Council subdivision requirements contained in the Council's relevant DCP.

14.0 PUBLIC TRANSPORT FACILITIES

The proposed development is likely to generate additional public transport usage of the existing service to the area. However, it is noted that very few of the new residential lots will be more than 400 metres away from the existing bus services using Mulloway Road, Teraglin Drive and Trevally Avenue. Therefore, it is considered that the bus service routes would not need to alter in the future if the development proceeds however a bus stop and shelter may need to be provided on Mulloway Road at the front of the development. Determination of a suitable site should be undertaken with Council and the bus company during construction of the subdivision.

Provision of the bus stop and shelter would ensure that the public transport facilities in the area would then be suitable for the additional demand likely to be generated by the development.

15.0 AUTHORITY LIAISON

In regard to the NSW RMS response to the Preliminary Traffic Assessment by Intersect Traffic (October 2016) the following responses to the major issues are provided.

- *An alternative and preferred option could be connecting the development to an adjacent catchment that connects to the Pacific Highway at a TCS intersection, for example via Carters Road or Kanangra Drive.*

Response: - Both these options will require significant sections of new road to be constructed or upgraded that will be at full cost to the developers.

At this stage Council has advised it will not be pursuing an upgraded connection from Chain Valley Bay Road to Kanangra Drive as part of its strategic road network development therefore this connection no longer needs to be considered.

The connection to Carter's Road would be more attractive to the motorists with the difficulties at the Pacific Highway / Chain Valley Bay intersection however this would rely on an 800-metre connection to be constructed through an adjoining owners land. As new road construction within a

new road reserve which needs to be obtained it again would be very difficult to justify this solution over either traffic signals or a roundabout at the Pacific Highway / Chain Valley Bay intersection on a cost benefit basis. With little or no control over timing of the connection and reliance on another developer this would be a constraint rather than an opportunity for the subject development. Further Carter's Road has its own issues with school traffic during the morning and afternoon set down and pick up periods.

Overall it is considered the upgrading of the Pacific Highway / Chain Valley Bay intersection provides the most cost-effective solution for the development as well as providing some certainty and control over the timing of the upgrade.

- *Roads and Maritime recommend that the following be considered with the updated Traffic Impact Statement:*
  o The traffic counts for the Pacific Highway and Chain Valley Bay Road intersection should be updated,
  o The development time period for commencement, completion and plus 10 years scenarios should be realistic given the known constraints,
  o The distribution of the trips generated by the proposed development shall be 100% towards the Highway from Mulloway Drive.
  o The peak hour traffic generation is to be taken at as the maximum and not the minimum, as used within the current traffic report. The minimum is not considered adequate for the residential trips as the site is isolated from schools, shops and employment, and it will be likely that residents will travel external to the site,
  o Various upgrade options being explored, not just TCS at the Chain Valley Bay Road intersection.
- *Updated traffic analysis of the Pacific Highway and Chain Valley Bay Road using Sidra, including submission of files for review for various upgrade options.*

Response: - This traffic impact assessment has taken all these matters into account with more up to date data collected, traffic generation and trip distribution modified as well as considering additional options rather than TCS at the Chain Valley Bay Road intersection. The Sidra analysis of the Chain Valley Bay intersection has also been updated including investigation of a roundabout solution. Sidra files have already been provided to Council and TfNSW for review.

16.0 CONCLUSIONS

This traffic impact assessment for a planning proposal for residential development on Lot 273 in DP 755266 15 Mulloway Road, Chain Valley Bay yielding 93 new residential lots and 1 small environmental management lot has concluded;

- Existing traffic volumes on the local and state road network are within the technical mid-block road capacities determined by Austroads and the TfNSW therefore the local and state road network has capacity to cater for additional traffic associated with new development in the area.
- The planning proposal when fully developed is likely to generate an additional 696 vtpd; as well as 80 vtph during the AM peak and 84 vtph during the PM peak traffic periods.
- The local and state road network currently has sufficient spare two-way mid-block capacity to cater for the traffic generated by this development without adversely impacting on current levels of service experienced by motorists on the local and state road network.
- Sidra modelling of the Pacific Highway / Chain Valley Bay Road intersection has shown that the right-hand turn movement onto the Pacific Highway from Chain Valley Bay Road currently operates with unsatisfactory average delays, LoS and 95 % back of queue lengths which is only exacerbated by the proposed development. Therefore, this intersection will be required to be upgraded to either a signal-controlled or roundabout intersection prior to the first stage of the development occurring. It is noted that TfNSW is currently undertaking

design works for a signalised intersection at this location. Future construction funding is not known as yet therefore TfNSW may require a monetary contribution from this development and other developments in the area, towards the work via a State Voluntary Planning Agreement or similar.

- Preliminary investigation of new road connections to either Kanangra Drive or Carter's Road to solve the traffic issues at the Pacific Highway / Chain Valley Bay Road intersection indicate that Council will not be pursuing the Kanangra Drive link road and the Carter's Road link will not provide any benefit to the developer and likely add to the development costs as well as provide less certainty as to the timing of the development.
- As other known future developments in the area will also need to contribute to future road upgrades in the area a developer contributions plan will need to be prepared for future road works in Chain Valley Bay. It is understood Council is proposed to prepare such a plan in the very near future to cover these works.
- The Chain Valley Bay Road / Mulloway Road intersection currently operates with uninterrupted flow conditions and would continue to do so post development.
- The available sight distance at the proposed subdivision access connections on both Mulloway Road and Teraglin Drive would exceed the Austroad requirements (*Table 3.2 of Austroads Guide to Road Design – Part 4A Unsignalised and signalised intersections*) of approximately 100 metres for a 50 km/h design speed.
- As the residential lots proposed in the subdivision meet the minimum lot size requirements of Central Coast Council's DCP it is also reasonable to conclude that suitable vehicular access to each new residential lot can be provided and constructed to Central Coast Council's requirements.
- The proposed subdivision road network is suitably safe and in accordance with the requirements of Central Coast Council.
- The proposed new lots within the planning proposal are considered large enough to accommodate the car parking requirements of Central Coast Council contained within the Wyong Council DCP 2013.
- The proposed subdivision will generate pedestrian and cycle traffic therefore a nexus would exist to provide additional facilities. However existing facilities in the immediate vicinity of the site are already considered satisfactory for the development whilst internal facilities within the subdivision will be constructed to Central Coast Council's requirements. If future regional pedestrian and bicycle facilities are planned by Council they will be included in the developer contributions plan being prepared for the area.
- The site is likely to generate increased usage for the existing public transport services however the site could be easily serviced via the existing bus routes as all lots are close to 400 metres from these existing bus routes. However, a bus stop and shelter may need to be provided on Mulloway Road at the front of the development. Determination of a suitable site should be undertaken with Council and the bus company during construction of the subdivision.

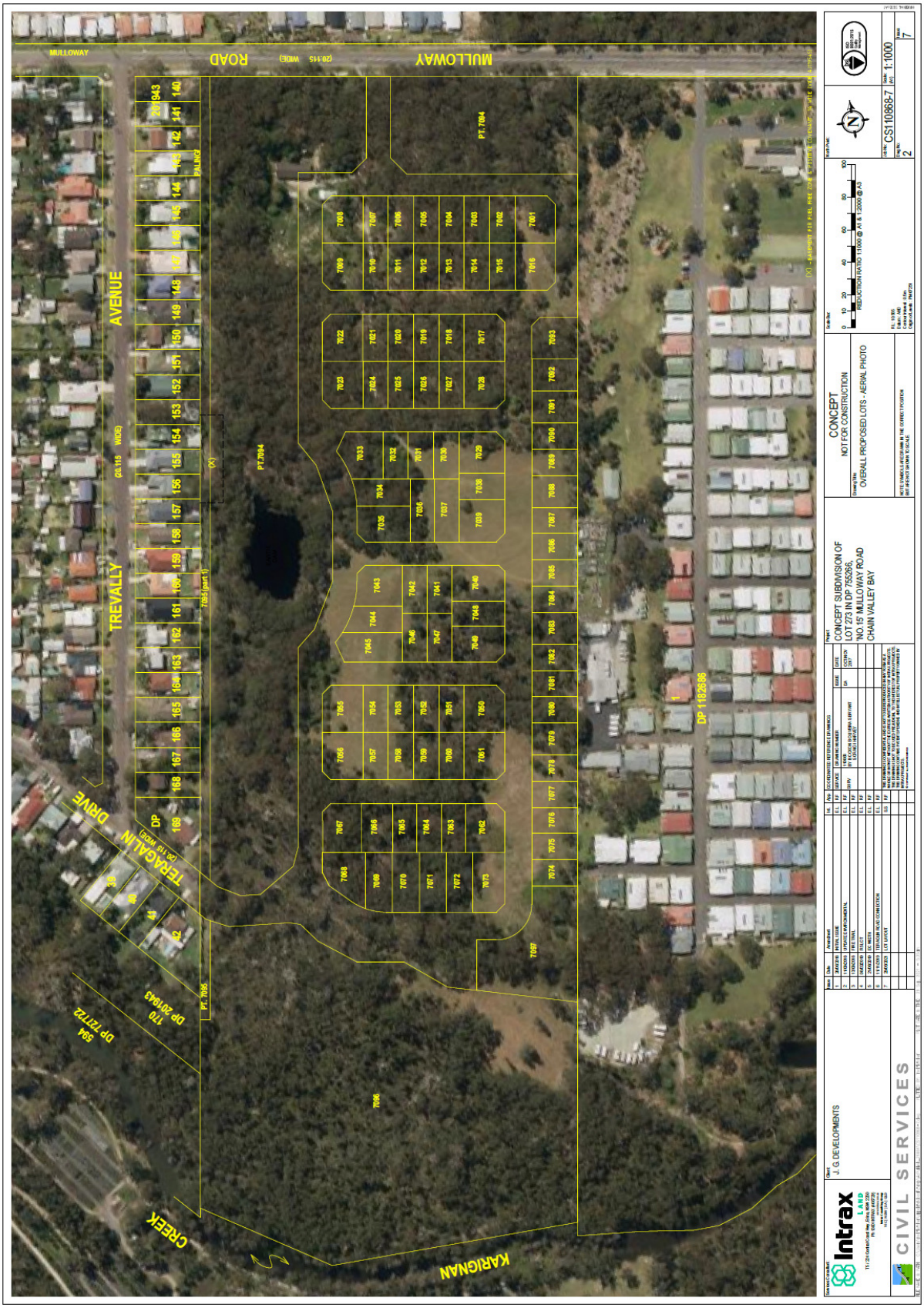
17.0 RECOMMENDATION

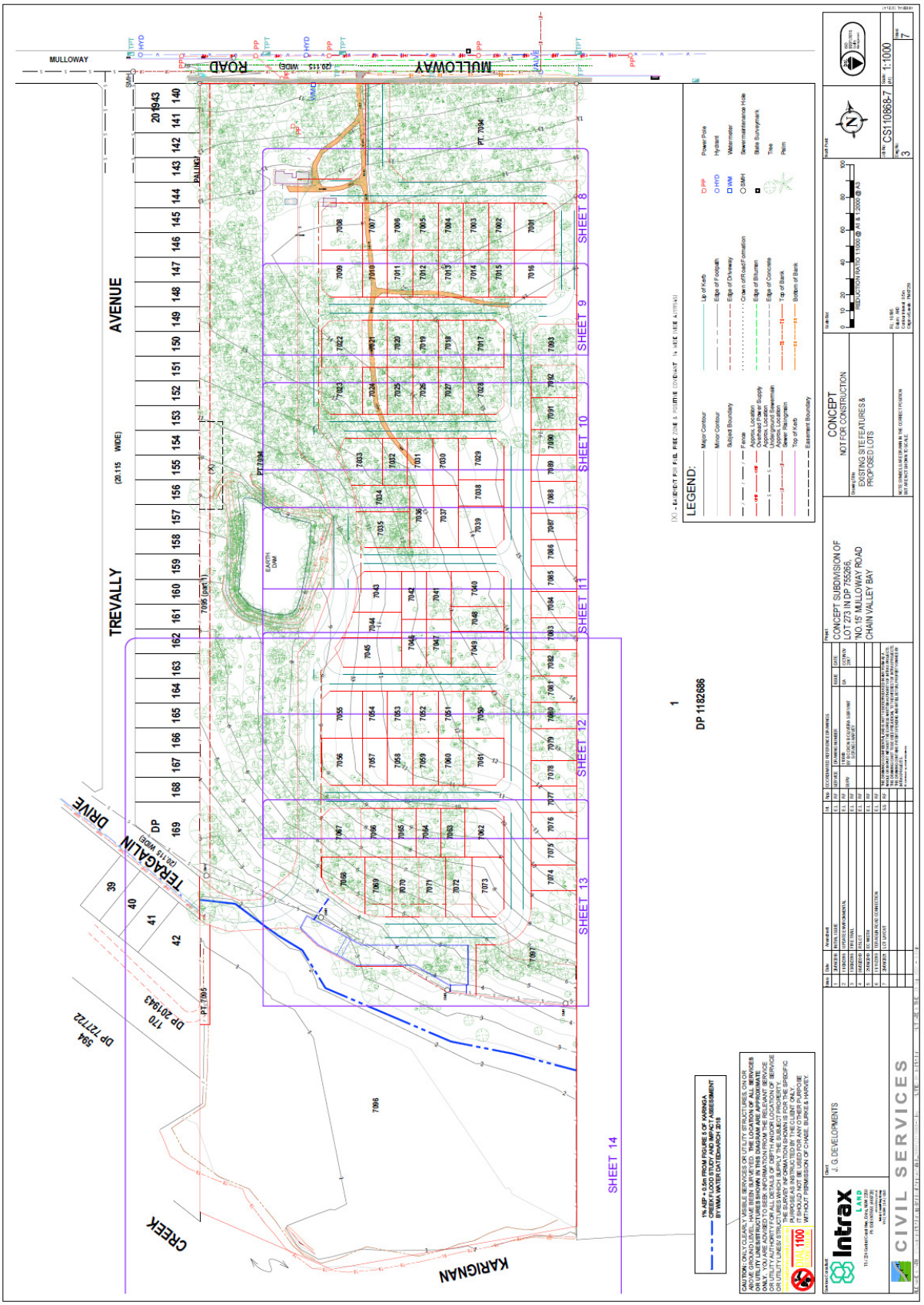
Having carried out this traffic impact assessment for the planning proposal for a residential development yielding 93 new residential lots and 1 small environmental management lot on Lot 273 in DP 755266 Mulloway Road, Chain Valley Bay it is recommended that the proposal can be supported from a traffic impact perspective as subject to the imminent upgrading of the Pacific Highway / Chain Valley Bay Road intersection to traffic signals by TfNSW being completed, it will not adversely impact on the local and state road network and complies with all relevant Central Coast Council, Austroads, and TfNSW requirements.

JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

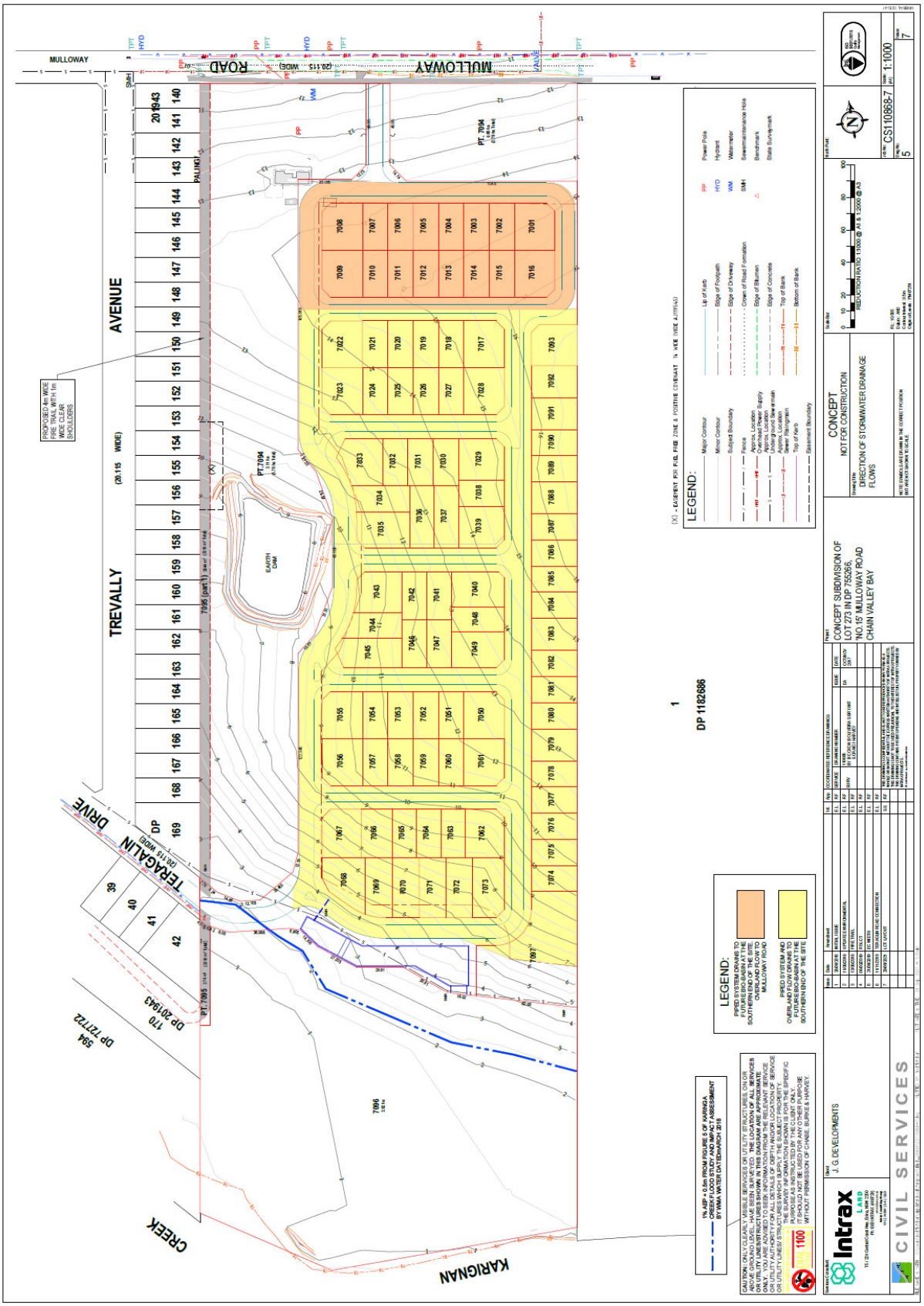
ATTACHMENT A

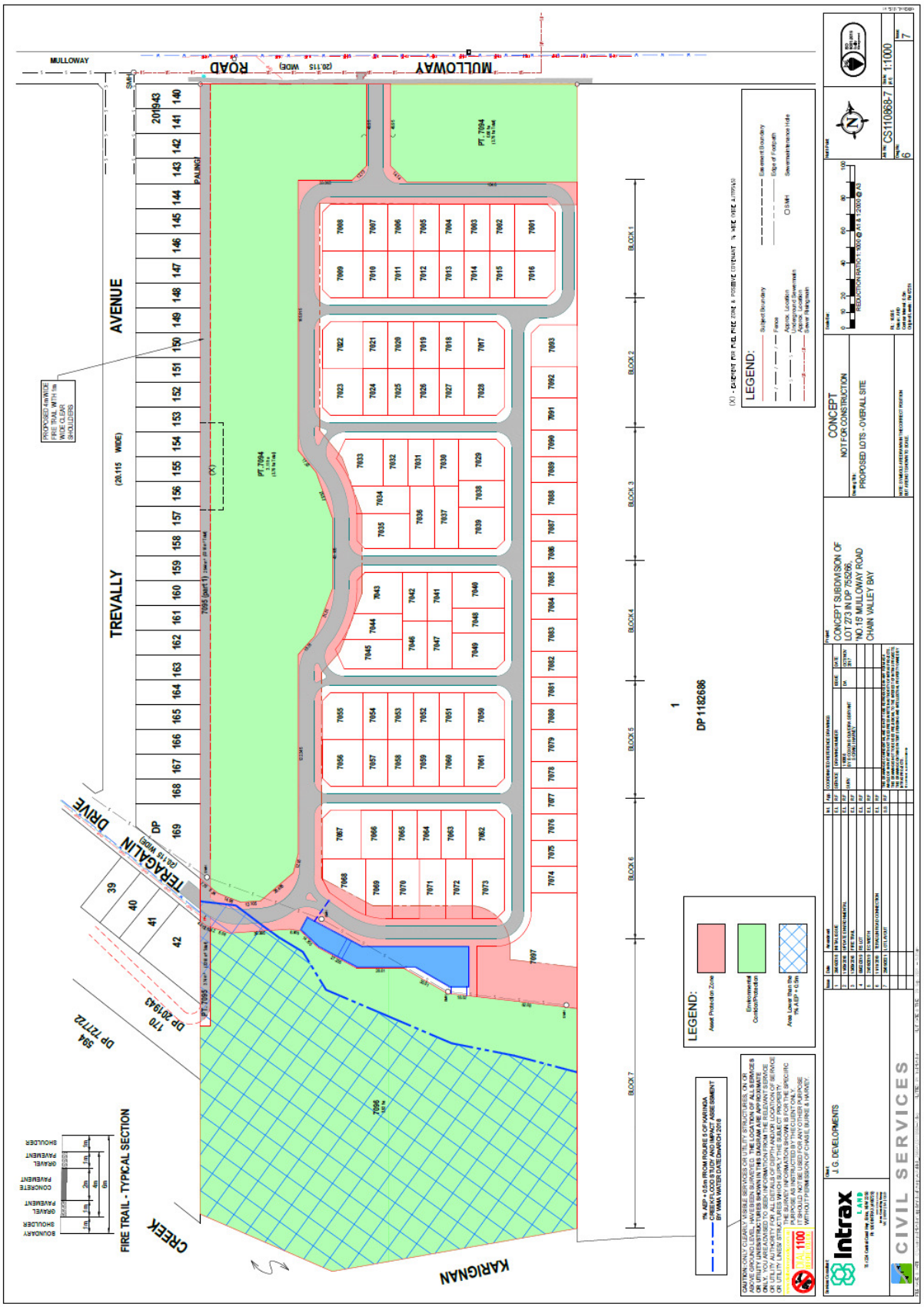
Development Plans

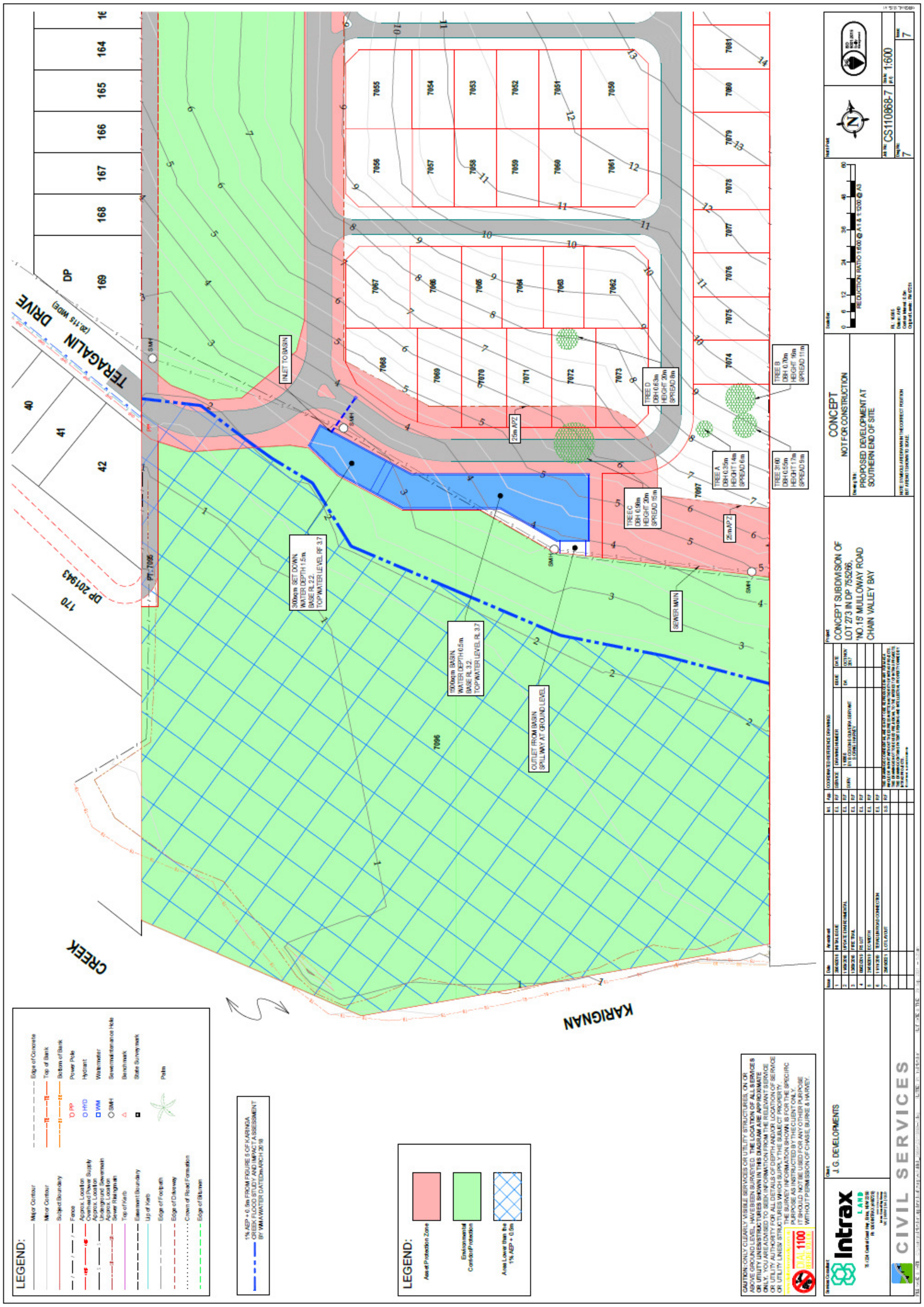

MULLOWAY ROAD
MULLOWAY AVENUE
TREVALLY DRIVE
TERAGALIN DRIVE
KARIGNAN CREEK
PT.7084
PT.7085
DP 1182686
CONCEPT
NOT FOR CONSTRUCTION
OVERALL PROPOSED LOTS - AERIAL PHOTO
CONCEPT SUBDIVISION OF LOT 273 IN DP 755265, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
J.G DEVELOPMENTS
CIVIL SERVICES
Intrax
CS110868-7
1:1000

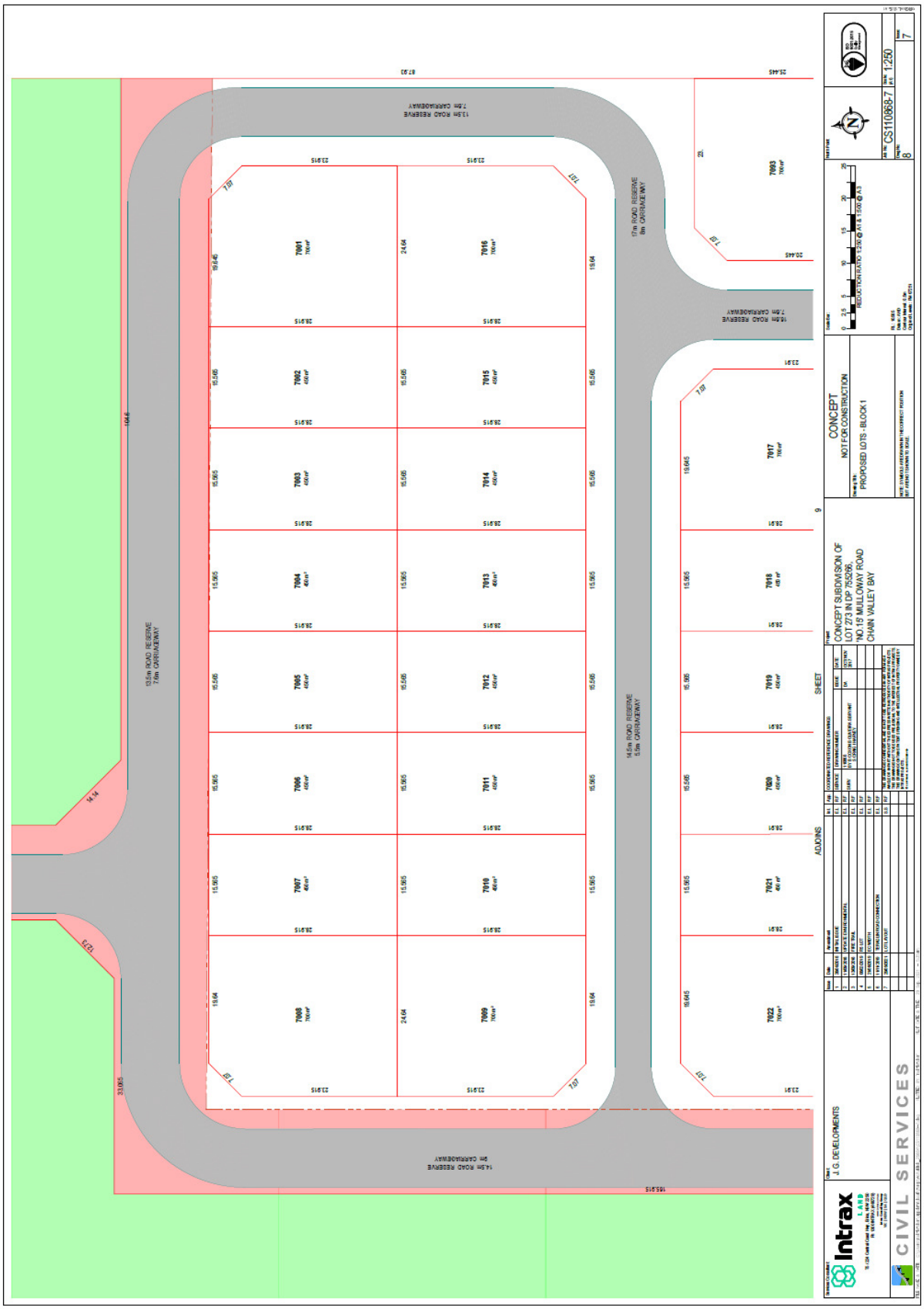

MULLOWAY ROAD
MULLOWAY
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
SHEET 8
SHEET 9
SHEET 10
SHEET 11
SHEET 12
SHEET 13
SHEET 14
LEGEND:
CONCEPT
NOT FOR CONSTRUCTION
EXISTING SITE FEATURES & PROPOSED LOTS
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
CIVIL SERVICES
Intrax
J. G. DEVELOPMENTS

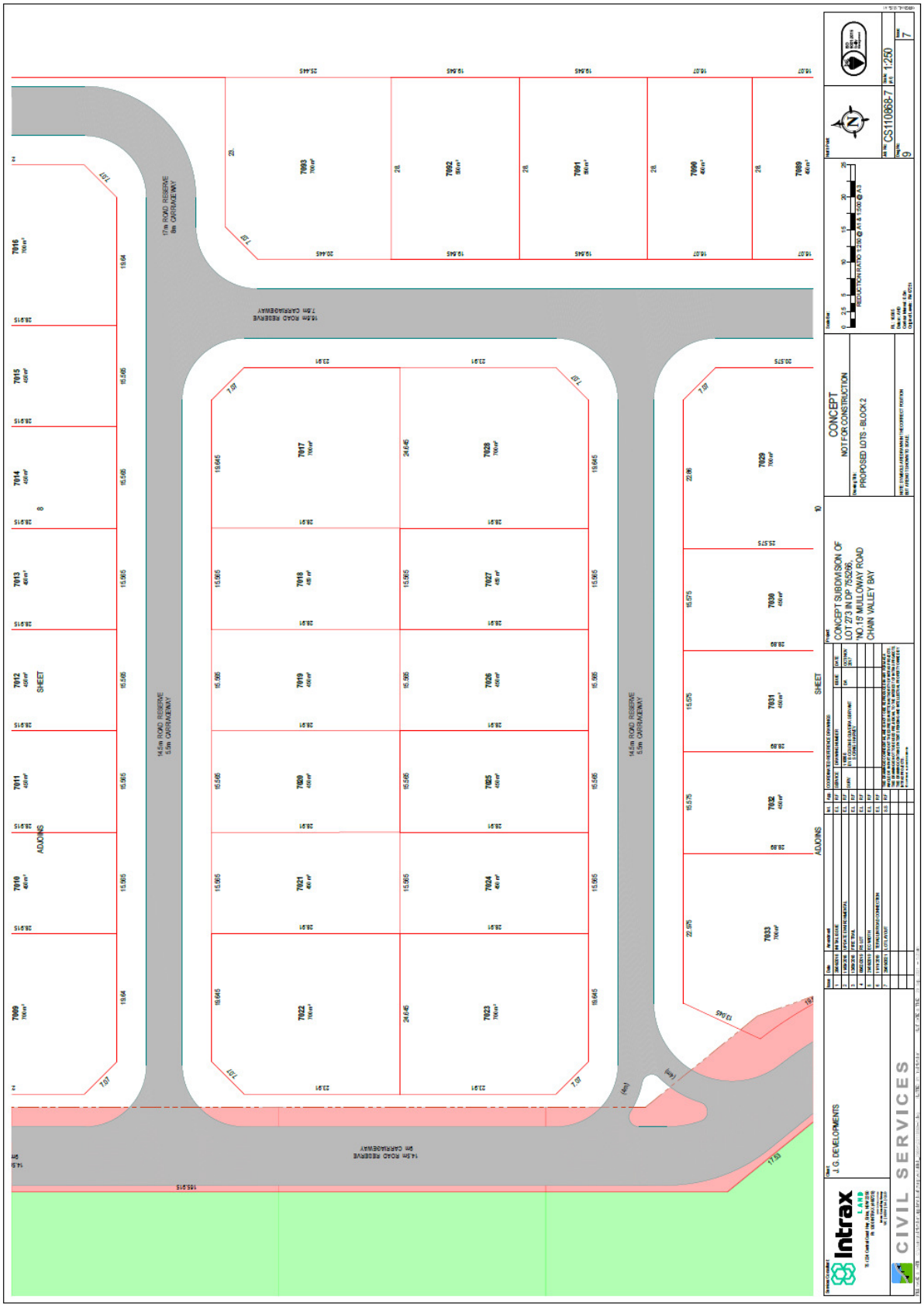

MULLOWAY ROAD
MULLOWAY AVENUE
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
PROPOSED 4m WIDE FIRE TRAIL WITH 1m WIDE CLEAR SHOULDERS
EARTH DAM
DP 1182686
LEGEND:
CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS & CONSTRAINTS
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
FIRE TRAIL - TYPICAL SECTION
CIVIL SERVICES
Intrax
J. G. DEVELOPMENTS
CS110868-7
1:1000

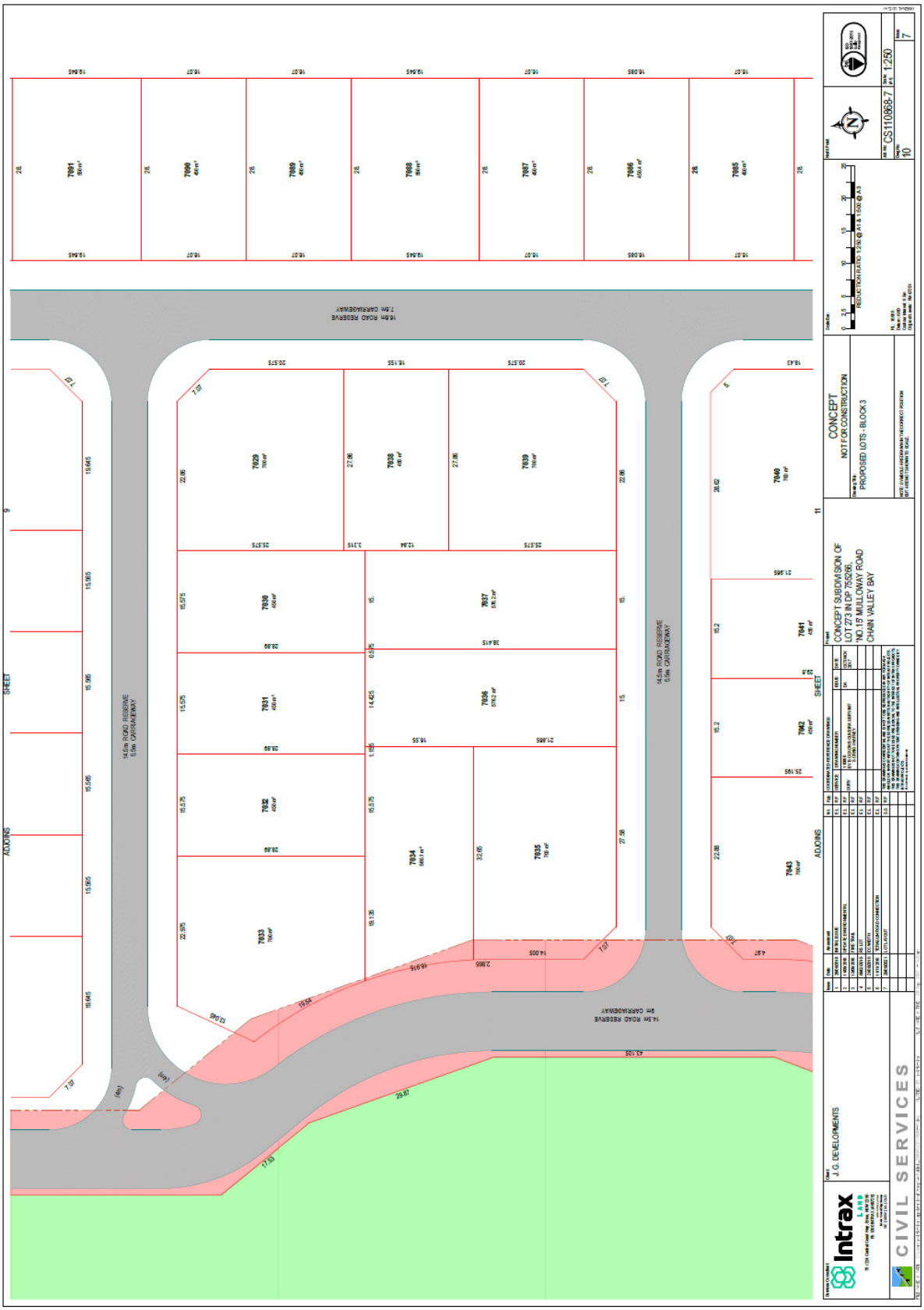

MULLOWAY ROAD
MULLOWAY
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
LEGEND:
CONCEPT
NOT FOR CONSTRUCTION
DIRECTION OF STORMWATER DRAINAGE FLOWS
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
DP 1182686
J. G. DEVELOPMENTS
Intrax
CIVIL SERVICES

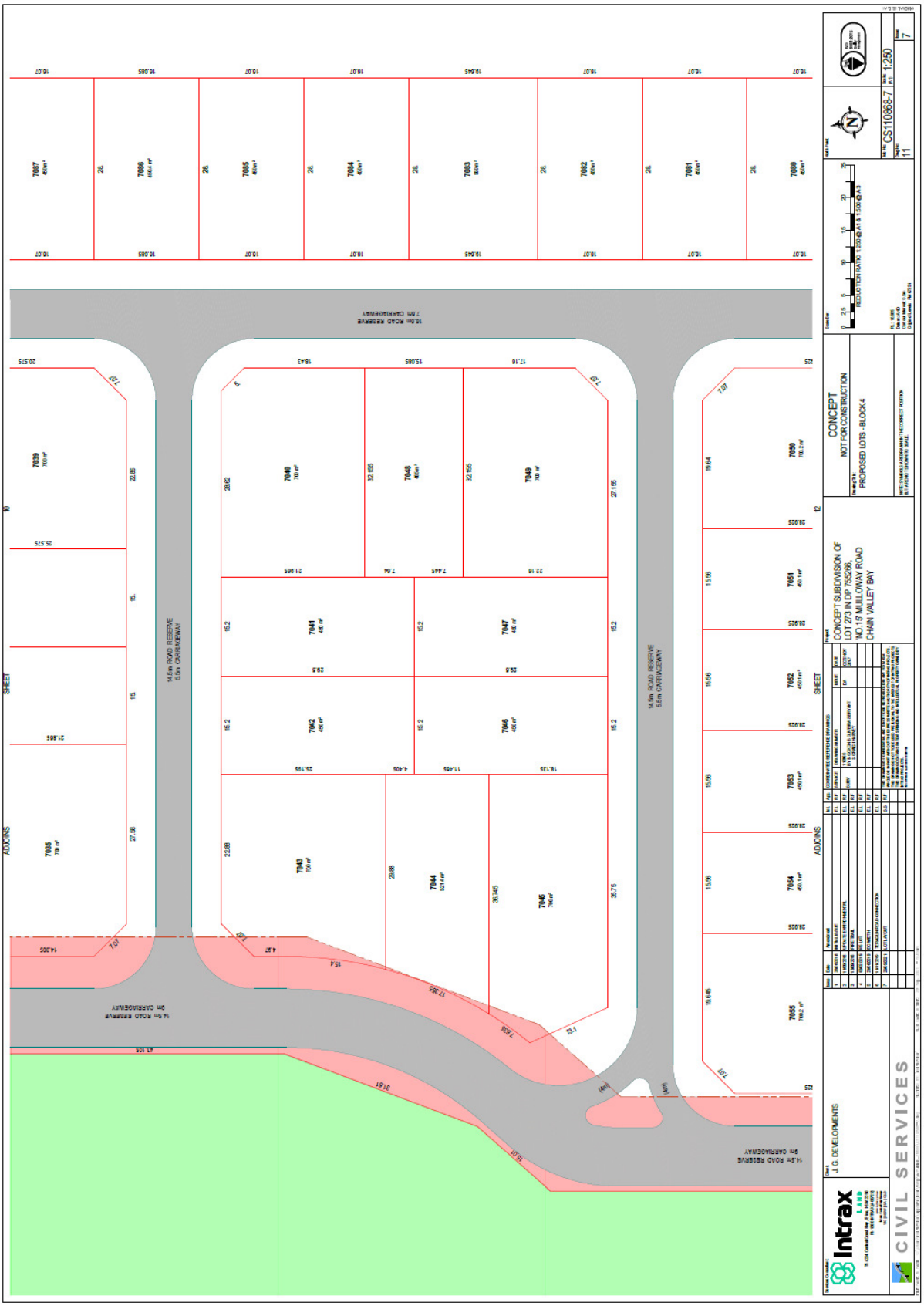

MULLOWAY ROAD
MULLOWAY
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
FIRE TRAIL - TYPICAL SECTION
LEGEND:
CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - OVERALL SITE
CONCEPT SUBDIVISION OF LOT 273 IN DP 752265, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
DP 1182686


CONCEPT
NOT FOR CONSTRUCTION
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266, NO.15 MULLOWAY ROAD CHAIN VALLEY BAY
PROPOSED DEVELOPMENT AT SOUTHERN END OF SITE
J. G. DEVELOPMENTS
CS110868-7
CIVIL SERVICES
TERAGALIN DRIVE
KARIGNAN CREEK
LEGEND:
Asset Protection Zone
Environmental Corridor/Protection
Area Lower than the 1% AEP + 0.5m


CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 1
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266
NO 15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
CS110868-7
1:250
13.5m ROAD RESERVE
7.0m CARRIAGEWAY
17m ROAD RESERVE
9m CARRIAGEWAY
14.5m ROAD RESERVE
5.5m CARRIAGEWAY
ADJOINS
SHEET


CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 2
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
CIVIL SERVICES
Intrax
CS110868-7
1:250
17m ROAD RESERVE
8m CARRIAGEWAY
16m ROAD RESERVE
7.5m CARRIAGEWAY
14.5m ROAD RESERVE
5.5m CARRIAGEWAY
14.5m ROAD RESERVE
9m CARRIAGEWAY
ADJOINS
SHEET


CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 3
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266,
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
14.5m ROAD RESERVE
9m CARRIAGEWAY
16.5m ROAD RESERVE
7.0m CARRIAGEWAY
ADJOINS
SHEET


CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 4
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
14.5m ROAD RESERVE
9m CARRIAGEWAY
SHEET
ADJOINS


CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 5
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
14.5m ROAD RESERVE
9m CARRIAGEWAY
14.5m ROAD RESERVE
5.5m CARRIAGEWAY
16.0m ROAD RESERVE
7.0m CARRIAGEWAY
ADDINS
SHEET
7649
7647
7646
7645
7662
7661
7660
7659
7658
7657
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7655
7663
7664
7665
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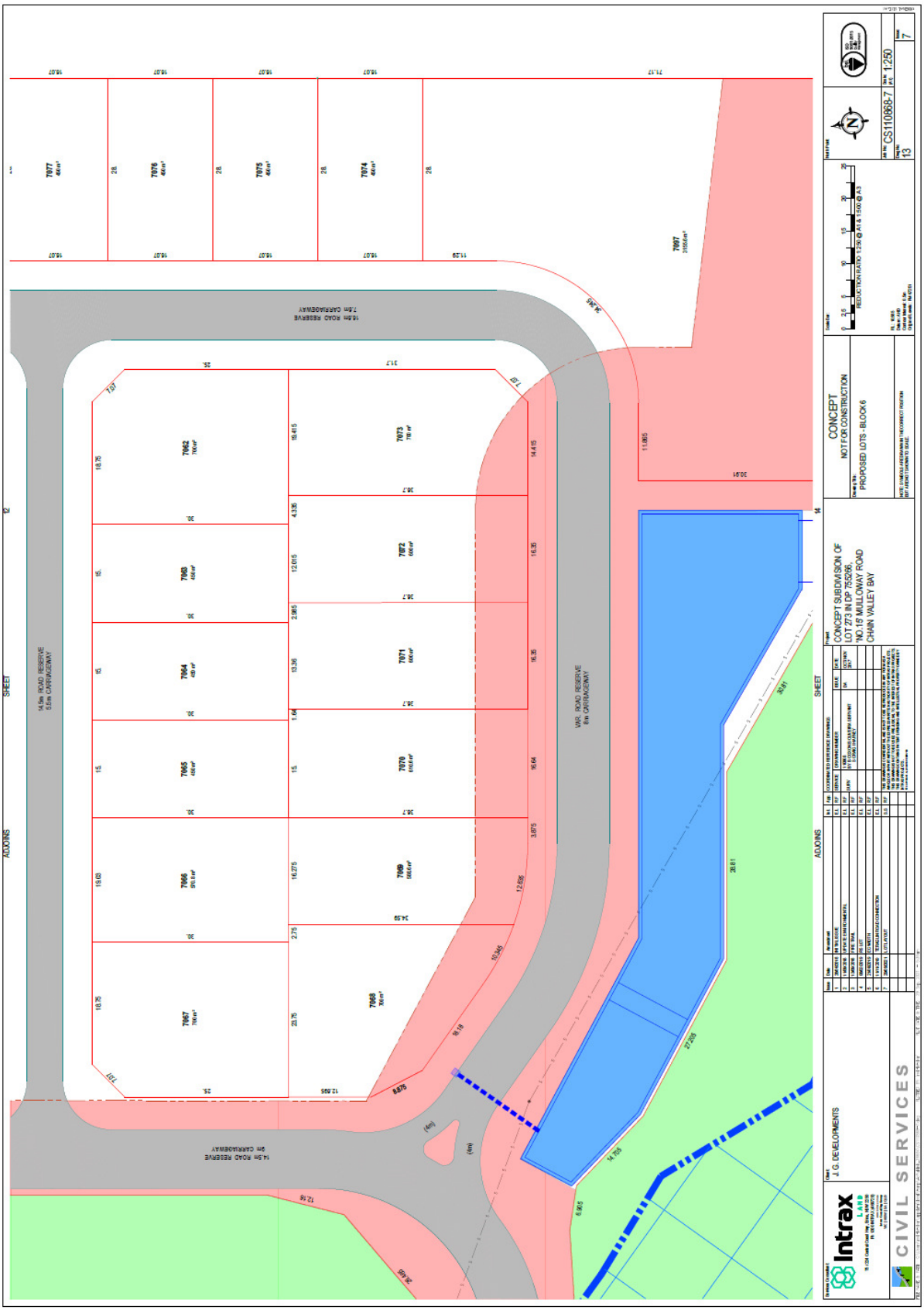
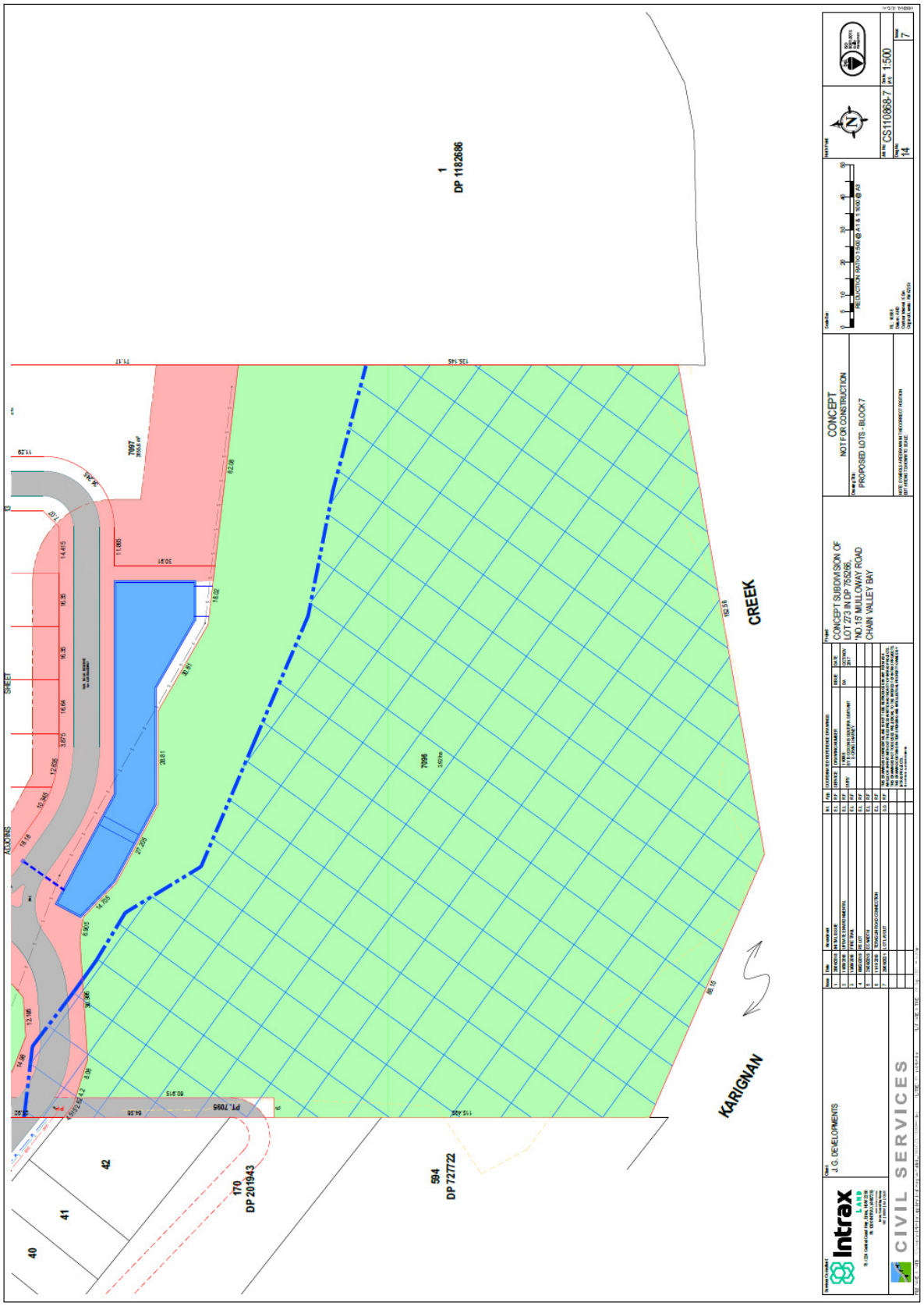

CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK 6
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266,
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
CIVIL SERVICES
CS110668-7
1:250
14.5m ROAD RESERVE
9m CARRIAGEWAY
16.0m ROAD RESERVE
7.0m CARRIAGEWAY
VAR. ROAD RESERVE
6m CARRIAGEWAY
14.5m ROAD RESERVE
5.5m CARRIAGEWAY
ADJOINS
SHEET


CREEK
KARIGNAN
ADJOINS
SHEET
1
DP 1182686
7097
7096
PT 7095
42
41
40
170
DP 201943
594
DP 727722
CONCEPT
NOT FOR CONSTRUCTION
PROPOSED LOTS - BLOCK7
CONCEPT SUBDIVISION OF
LOT 273 IN DP 755266,
NO.15 MULLOWAY ROAD
CHAIN VALLEY BAY
J.G. DEVELOPMENTS
Intrax
LAND
CIVIL SERVICES
CS110668-7
1:500
14
7


MULLOWAY ROAD
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
DP 755266
DP 1182686
E2
E3
R2
RE1
LEGEND:
ZONE R2
ZONE E2
ZONE E3
ZONE RE1
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266 "NO.15" MULLOWAY ROAD CHAIN VALLEY BAY
PROPOSED ZONING PLAN
J.G. DEVELOPMENTS
Intrax


MULLOWAY ROAD
TREVALLY AVENUE
TERAGALIN DRIVE
KARIGNAN CREEK
E2
E3
R1
R2
273 DP 755266
DP 1182586
CONCEPT SUBDIVISION OF LOT 273 IN DP 755266 "NO.15" MULLOWAY ROAD CHAIN VALLEY BAY
PROPOSED ZONING WITH AERIAL PHOTO
J.G. DEVELOPMENTS
Intrax LAND
ZN110868
1:1000
2
9

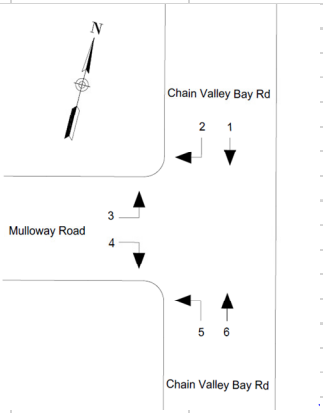
ATTACHMENT B

Traffic Count Data

Date	8th September 2016
Day	Thursday
Time	8:00am - 9:00am
Weather	Cloudy
Conducted by:	Peter

MOVEMENT	1	2	3	4	5	6
8:00 - 8:15	15	4	1	32	16	3
8:15 - 8:30	9	2	0	29	12	2
8:30 - 8:45	5	2	4	26	11	4
8:45 - 9:00	8	2	3	22	17	1
SUM	37	10	8	109	56	10
PEAK	37	10	8	109	56	10

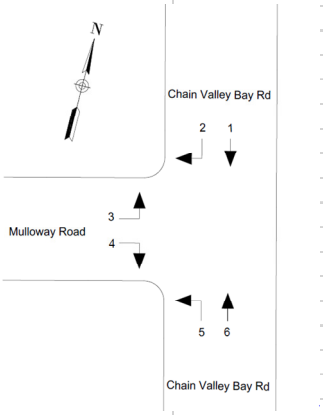
Leg	PHT (vph)
Chain Valley Bay Road North	65
Chain Valley Bay Road South	212
Mulloway Road	183

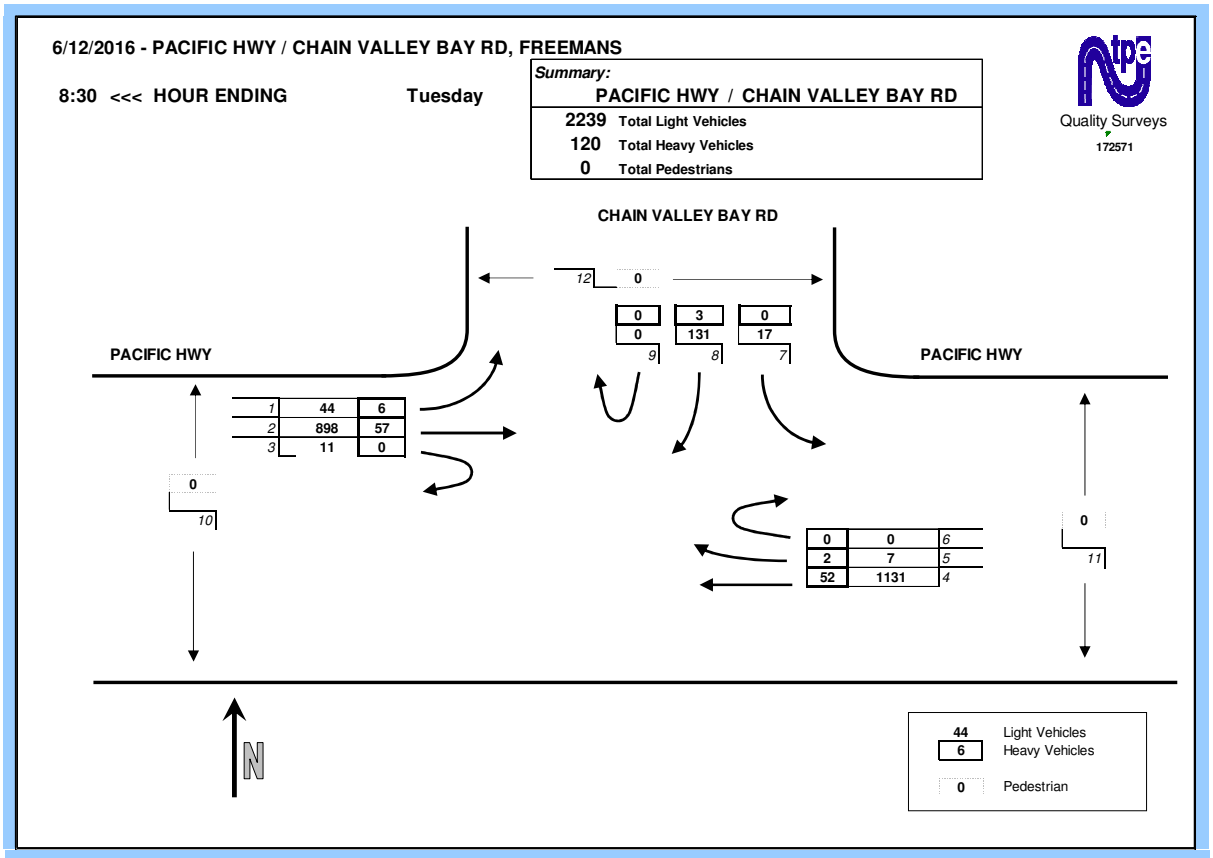


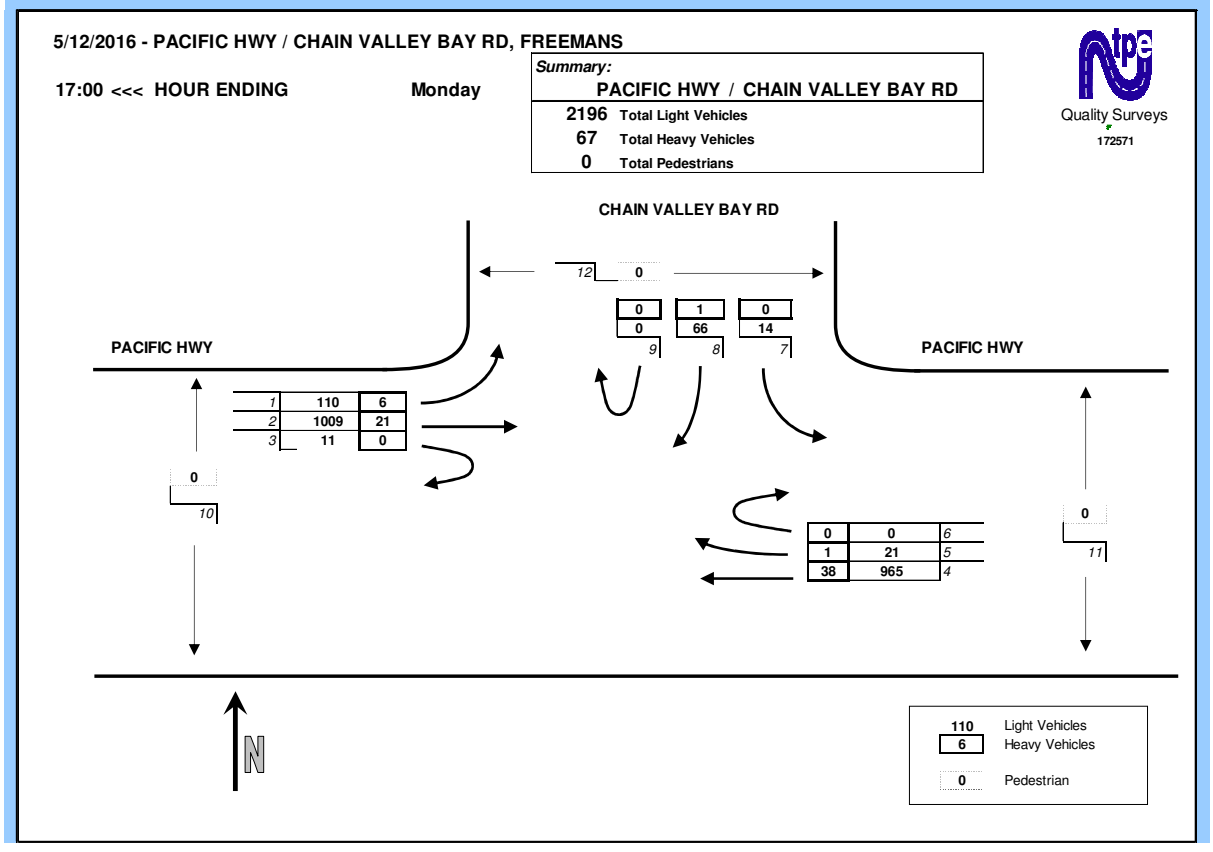
Date	8th September 2016
Day	Thursday
Time	4.30 pm - 5.30 pm
Weather	Fine
Conducted by:	Peter

MOVEMENT	1	2	3	4	5	6
4:30 - 4:45	1	1	2	15	31	8
4:45 - 5.00	5	4	2	21	23	9
5:00 - 5:15	3	3	2	21	23	8
5:15 - 5:30	7	2	1	11	24	8
SUM	16	10	7	68	101	33
PEAK	16	10	7	68	101	33

Leg	PHT (vph)
Chain Valley Bay Road North	66
Chain Valley Bay Road South	218
Mulloway Road	186

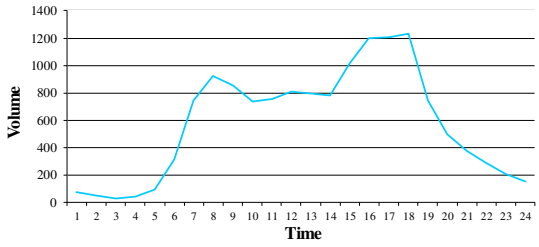



6/12/2016 - PACIFIC HWY / CHAIN VALLEY BAY RD, FREEMANS
8:30 <<< HOUR ENDING
Tuesday
Summary:
PACIFIC HWY / CHAIN VALLEY BAY RD
2239 Total Light Vehicles
120 Total Heavy Vehicles
0 Total Pedestrians
Quality Surveys
172571
CHAIN VALLEY BAY RD
PACIFIC HWY
PACIFIC HWY
44
6
898
57
11
0
0
3
131
0
17
0
0
0
2
7
52
1131
0
0
0
0
Light Vehicles
Heavy Vehicles
Pedestrian
N


5/12/2016 - PACIFIC HWY / CHAIN VALLEY BAY RD, FREEMANS
17:00 <<< HOUR ENDING
Monday
Summary:
PACIFIC HWY / CHAIN VALLEY BAY RD
2196 Total Light Vehicles
67 Total Heavy Vehicles
0 Total Pedestrians
Quality Surveys
172571
CHAIN VALLEY BAY RD
PACIFIC HWY
PACIFIC HWY
110
6
1009
21
11
0
0
1
66
0
14
0
0
0
1
21
38
965
0
0
0
0
Light Vehicles
Heavy Vehicles
Pedestrian
N

Site 4 Pacific Hwy - 300m N of Elizabeth Bay Dr **Northbound**

Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
Time	08/12/16	9/12/2016	10/12/2016	11/12/2016	12/12/2016	13/12/2016	14/12/2016	Ave.	Ave.	Ave
0:00	56	74	106	177	54	77	103	73	142	92
1:00	46	44	72	57	20	72	68	50	65	54
2:00	28	26	37	44	18	33	26	26	41	30
3:00	36	36	48	46	35	40	44	38	47	41
4:00	93	94	62	69	87	98	101	95	66	86
5:00	313	328	147	98	296	295	322	311	123	257
6:00	762	694	261	223	737	770	756	744	242	600
7:00	937	897	474	262	904	944	935	923	368	765
8:00	809	908	608	451	795	912	852	855	530	762
9:00	720	758	787	723	689	768	738	735	755	740
10:00	774	796	947	936	706	736	754	753	942	807
11:00	849	859	1048	1101	790	769	771	808	1075	884
12:00	811	845	1067	1031	767	791	764	796	1049	868
13:00	774	808	898	897	766	787	773	782	898	815
14:00	958	1149	943	873	977	962	1019	1013	908	983
15:00	1248	1244	904	864	1136	1171	1216	1203	884	1112
16:00	1163	1290	1021	877	1168	1256	1146	1205	949	1132
17:00	1205	1315	894	837	1246	1196	1198	1232	866	1127
18:00	815	874	694	620	664	677	698	746	657	720
19:00	480	598	451	433	449	487	481	499	442	483
20:00	390	451	346	346	317	352	384	379	346	369
21:00	330	360	297	206	220	289	233	286	252	276
22:00	225	292	351	164	183	162	184	209	258	223
23:00	151	213	222	103	130	123	134	150	163	154
Total	**13973**	**14953**	**12685**	**11438**	**13154**	**13767**	**13700**	**13909**	**12062**	**13381**

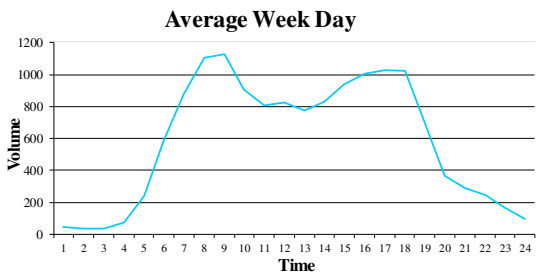


Summary

	from	to	
AM Peak	7:00 AM	8:00 AM	**944**
PM Peak	5:00 PM	6:00 PM	**1315**
		Week Day Average	**13909**
		Weekend Day Average	**12062**
		7 Day Average	**13381**

Site 4 Pacific Hwy - 300m N of Elizabeth Bay Dr **Southbound**

Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
Time	08/12/16	9/12/2016	10/12/2016	11/12/2016	12/12/2016	13/12/2016	14/12/2016	Ave.	Ave.	Ave
0:00	38	55	106	156	38	45	48	45	131	69
1:00	34	31	49	85	30	34	40	34	67	43
2:00	39	33	37	36	28	48	40	38	37	37
3:00	77	67	48	31	73	71	86	75	40	65
4:00	245	227	120	79	250	245	233	240	100	200
5:00	581	502	206	131	643	594	610	586	169	467
6:00	882	813	423	255	899	887	926	881	339	726
7:00	1098	1031	521	426	1117	1153	1123	1104	474	924
8:00	1135	1105	820	665	1107	1165	1137	1130	743	1019
9:00	896	927	934	876	893	907	926	910	905	908
10:00	781	900	1082	1027	783	769	795	806	1055	877
11:00	777	899	937	1071	823	776	835	822	1004	874
12:00	788	778	916	992	724	817	770	775	954	826
13:00	821	919	854	890	804	829	767	828	872	841
14:00	957	954	856	1013	876	941	962	938	935	937
15:00	954	1061	901	1100	1024	996	997	1006	1001	1005
16:00	1014	1096	900	919	1007	1013	1018	1030	910	995
17:00	1014	1048	738	851	960	1036	1046	1021	795	956
18:00	703	800	574	563	635	694	671	701	569	663
19:00	374	421	390	429	350	360	315	364	410	377
20:00	298	326	285	337	249	290	294	291	311	297
21:00	316	274	296	247	177	226	220	243	272	251
22:00	191	223	228	136	145	131	146	167	182	171
23:00	91	172	244	63	69	68	71	94	154	111
Total	**14104**	**14662**	**12465**	**12378**	**13704**	**14095**	**14076**	**14128**	**12422**	**13641**

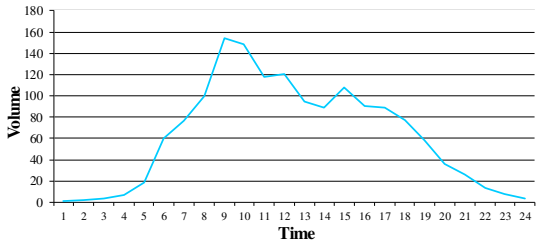


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**1165**
PM Peak	4:00 PM	5:00 PM	**1096**
		Week Day Average	**14128**
		Weekend Day Average	**12422**
		7 Day Average	**13641**

Site 5 Chain Valley Bay Rd - 200m W of Pacific Hwy **Eastbound**

Day	*Thu*	*Fri*	*Sat*	*Sun*	*Mon*	*Tue*	*Wed*	*W/Day*	*W/End*	*7 Day*
Time	08/12/16	9/12/2016	10/12/2016	11/12/2016	12/12/2016	13/12/2016	14/12/2016	*Ave.*	*Ave.*	*Ave*
0:00	0	0	4	7	1	2	4	1	6	3
1:00	0	2	3	6	2	1	5	2	5	3
2:00	2	2	3	5	2	6	5	3	4	4
3:00	6	9	2	2	5	8	5	7	2	5
4:00	22	15	11	7	17	19	19	18	9	16
5:00	56	49	17	12	62	71	61	60	15	47
6:00	89	73	38	27	74	73	75	77	33	64
7:00	86	95	54	54	103	108	108	100	54	87
8:00	164	145	115	78	143	171	149	154	97	138
9:00	131	154	134	130	133	151	172	148	132	144
10:00	123	131	156	123	105	128	103	118	140	124
11:00	109	121	102	126	130	108	132	120	114	118
12:00	97	105	99	75	89	83	99	95	87	92
13:00	76	94	89	80	100	88	86	89	85	88
14:00	122	92	76	80	103	113	111	108	78	100
15:00	85	89	75	65	95	91	92	90	70	85
16:00	88	96	70	64	88	76	95	89	67	82
17:00	71	90	76	66	67	78	80	77	71	75
18:00	65	56	71	58	52	62	58	59	65	60
19:00	44	39	33	30	34	33	30	36	32	35
20:00	15	22	26	35	26	35	30	26	31	27
21:00	12	25	18	7	10	14	5	13	13	13
22:00	12	13	15	7	3	5	7	8	11	9
23:00	3	10	18	3	3	1	2	4	11	6
Total	**1478**	**1527**	**1305**	**1147**	**1447**	**1525**	**1533**	**1502**	**1226**	**1423**

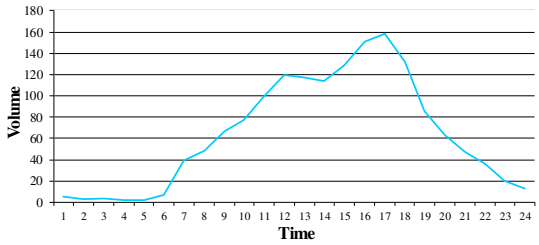


Summary

	from	to	
AM Peak	9:00 AM	10:00 AM	**172**
PM Peak	2:00 PM	3:00 PM	**122**
		Week Day Average	**1502**
		Weekend Day Average	**1226**
		7 Day Average	**1423**

Site 5 Chain Valley Bay Rd - 200m W of Pacific Hwy **Westbound**

Day	*Thu*	*Fri*	*Sat*	*Sun*	*Mon*	*Tue*	*Wed*	*W/Day*	*W/End*	*7 Day*
Time	08/12/16	9/12/2016	10/12/2016	11/12/2016	12/12/2016	13/12/2016	14/12/2016	*Ave.*	*Ave.*	*Ave*
0:00	3	6	13	15	5	6	5	5	14	8
1:00	5	2	8	4	1	3	5	3	6	4
2:00	2	3	5	6	4	6	3	4	6	4
3:00	2	3	3	9	0	1	2	2	6	3
4:00	2	1	5	3	1	3	1	2	4	2
5:00	6	14	4	4	9	2	4	7	4	6
6:00	41	40	13	13	37	35	45	40	13	32
7:00	44	47	28	26	52	54	43	48	27	42
8:00	59	73	49	39	64	69	68	67	44	60
9:00	71	85	83	75	65	88	79	78	79	78
10:00	116	79	113	93	101	107	94	99	103	100
11:00	124	112	119	107	111	128	121	119	113	117
12:00	112	132	113	87	101	112	128	117	100	112
13:00	117	112	107	92	123	112	105	114	100	110
14:00	120	133	112	97	140	122	129	129	105	122
15:00	136	152	111	110	155	165	149	151	111	140
16:00	153	167	96	102	156	151	164	158	99	141
17:00	123	128	87	91	142	130	136	132	89	120
18:00	87	86	78	74	72	92	91	86	76	83
19:00	61	71	54	67	57	69	57	63	61	62
20:00	48	44	37	43	42	43	62	48	40	46
21:00	38	36	35	23	28	41	35	36	29	34
22:00	19	31	39	13	16	18	18	20	26	22
23:00	14	18	23	5	13	11	8	13	14	13
Total	**1503**	**1575**	**1335**	**1198**	**1495**	**1568**	**1552**	**1539**	**1267**	**1461**



Summary

	from	to	
AM Peak	11:00 AM	12:00 PM	**128**
PM Peak	4:00 PM	5:00 PM	**167**
		Week Day Average	**1539**
		Weekend Day Average	**1267**
		7 Day Average	**1461**

ATTACHMENT C

Sidra Summary Tables

MOVEMENT SUMMARY

▽ Site: 101 [2019 AM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1301	4.2	0.344	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
6	R2	35	6.1	0.229	31.3	LOS C	0.7	5.2	0.88	0.97	0.95	44.6
Approach		1336	4.3	0.344	0.9	NA	0.7	5.2	0.02	0.03	0.02	78.2
North: Chain Valley Bay Road												
7	L2	92	0.0	0.124	10.0	LOS A	0.4	3.1	0.51	0.78	0.51	62.0
9	R2	443	0.7	4.896	3530.8	LOS F	235.2	1656.2	1.00	4.22	18.35	1.0
Approach		535	0.6	4.896	2927.8	LOS F	235.2	1656.2	0.92	3.63	15.29	1.2
West: Pacific Highway												
10	L2	201	3.1	0.111	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.3
11	T1	1051	5.7	0.279	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12u	U	12	0.0	0.116	42.9	LOS D	0.3	2.4	0.91	0.97	0.91	39.7
Approach		1263	5.3	0.279	1.5	NA	0.3	2.4	0.01	0.11	0.01	76.2
All Vehicles		3134	4.0	4.896	500.6	NA	235.2	1656.2	0.17	0.67	2.62	6.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:48:03 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

▽ Site: 101 [2019 AM + development only]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1301	4.2	0.343	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
6	R2	19	11.1	0.114	27.0	LOS B	0.3	2.6	0.85	0.94	0.85	46.2
Approach		1320	4.3	0.343	0.4	NA	0.3	2.6	0.01	0.01	0.01	79.0
North: Chain Valley Bay Road												
7	L2	31	0.0	0.041	9.7	LOS A	0.1	1.0	0.49	0.73	0.49	62.3
9	R2	223	1.4	2.179	1101.4	LOS F	83.0	588.0	1.00	3.48	14.20	3.1
Approach		254	1.2	2.179	970.1	LOS F	83.0	588.0	0.94	3.15	12.55	3.5
West: Pacific Highway												
10	L2	101	6.3	0.057	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	63.3
11	T1	1051	5.7	0.279	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12u	U	12	0.0	0.115	42.8	LOS D	0.3	2.4	0.91	0.97	0.91	39.7
Approach		1163	5.7	0.279	1.1	NA	0.3	2.4	0.01	0.06	0.01	77.3
All Vehicles		2737	4.6	2.179	90.6	NA	83.0	588.0	0.10	0.33	1.17	26.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:49:59 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101v [2019 AM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 79 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1301	4.2	0.903	39.0	LOS C	30.4	220.4	1.00	1.07	1.30	43.1
6	R2	35	6.1	0.257	46.8	LOS D	1.4	10.0	0.98	0.72	0.98	37.5
Approach		1336	4.3	0.903	39.2	LOS C	30.4	220.4	1.00	1.06	1.30	43.0
North: Chain Valley Bay Road												
7	L2	72	0.0	0.082	19.3	LOS B	1.5	10.6	0.58	0.72	0.58	53.5
9	R2	463	0.7	0.887	46.5	LOS D	20.6	145.3	0.97	0.98	1.31	38.4
Approach		535	0.6	0.887	42.9	LOS D	20.6	145.3	0.92	0.95	1.21	39.9
West: Pacific Highway												
10	L2	201	3.1	0.831	38.9	LOS C	7.3	52.4	0.74	0.90	1.14	41.2
11	T1	1051	5.7	0.881	35.4	LOS C	27.3	200.5	0.94	0.99	1.23	45.0
12u	U	12	0.0	0.109	47.4	LOS D	0.4	3.1	0.96	0.69	0.96	37.8
Approach		1263	5.3	0.881	36.1	LOS C	27.3	200.5	0.91	0.97	1.21	44.3
All Vehicles		3134	4.0	0.903	38.6	LOS C	30.4	220.4	0.95	1.01	1.25	42.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:51:14 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

▽ Site: 101 [2019PM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1169	3.4	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
6	R2	79	1.3	0.920	126.4	LOS F	4.8	33.8	0.99	1.26	2.47	20.8
Approach		1248	3.3	0.920	8.0	NA	4.8	33.8	0.06	0.08	0.16	67.7
North: Chain Valley Bay Road												
7	L2	52	0.0	0.077	10.4	LOS A	0.3	1.8	0.53	0.79	0.53	61.6
9	R2	269	0.4	5.874	4424.6	LOS F	155.7	1093.3	1.00	2.82	11.38	0.8
Approach		321	0.3	5.874	3715.4	LOS F	155.7	1093.3	0.92	2.49	9.63	1.0
West: Pacific Highway												
10	L2	425	1.5	0.231	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.8
11	T1	1201	1.8	0.312	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12u	U	14	0.0	0.097	32.7	LOS C	0.3	2.1	0.88	0.96	0.88	44.6
Approach		1640	1.7	0.312	2.1	NA	0.3	2.1	0.01	0.17	0.01	74.9
All Vehicles		3209	2.2	5.874	375.9	NA	155.7	1093.3	0.12	0.37	1.03	8.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:53:45 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101v [2019PM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1169	3.4	0.650	15.3	LOS B	15.3	110.6	0.82	0.73	0.82	59.9
6	R2	79	1.3	0.501	42.6	LOS D	2.8	19.8	1.00	0.76	1.00	39.8
Approach		1248	3.3	0.650	17.0	LOS B	15.3	110.6	0.83	0.73	0.83	58.0
North: Chain Valley Bay Road												
7	L2	52	0.0	0.078	23.0	LOS B	1.2	8.2	0.69	0.72	0.69	50.8
9	R2	271	0.4	0.874	46.7	LOS D	10.8	76.1	1.00	0.99	1.45	38.4
Approach		322	0.3	0.874	42.9	LOS D	10.8	76.1	0.95	0.95	1.33	39.9
West: Pacific Highway												
10	L2	425	1.5	0.903	42.6	LOS D	16.2	114.6	0.74	0.96	1.23	39.8
11	T1	1201	1.8	0.898	32.4	LOS C	32.9	233.6	0.89	0.98	1.24	46.8
12u	U	14	0.0	0.115	42.3	LOS C	0.5	3.3	0.95	0.69	0.95	39.9
Approach		1640	1.7	0.903	35.1	LOS C	32.9	233.6	0.85	0.97	1.24	44.7
All Vehicles		3211	2.2	0.903	28.9	LOS C	32.9	233.6	0.85	0.88	1.09	48.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:56:51 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101v [2029 AM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 108 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1488	3.7	0.907	44.6	LOS D	44.8	323.5	1.00	1.04	1.19	40.5
6	R2	39	5.4	0.392	64.1	LOS E	2.1	15.6	1.00	0.73	1.00	31.9
Approach		1527	3.7	0.907	45.1	LOS D	44.8	323.5	1.00	1.04	1.19	40.2
North: Chain Valley Bay Road												
7	L2	76	0.0	0.090	24.7	LOS B	2.2	15.6	0.60	0.73	0.60	49.6
9	R2	497	0.6	0.886	54.2	LOS D	28.3	199.1	0.96	0.95	1.19	35.5
Approach		573	0.6	0.886	50.3	LOS D	28.3	199.1	0.92	0.92	1.11	36.9
West: Pacific Highway												
10	L2	214	3.0	0.833	44.0	LOS D	9.6	69.0	0.68	0.86	0.98	39.0
11	T1	1201	5.0	0.870	37.6	LOS C	37.8	275.8	0.91	0.92	1.06	43.9
12u	U	14	0.0	0.177	64.6	LOS E	0.7	5.2	0.98	0.69	0.98	32.1
Approach		1428	4.6	0.870	38.8	LOS C	37.8	275.8	0.88	0.91	1.05	42.9
All Vehicles		3528	3.6	0.907	43.4	LOS D	44.8	323.5	0.93	0.96	1.12	40.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:52:18 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101v [2029PM + development]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 89 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1337	3.0	0.662	16.3	LOS B	21.0	150.6	0.78	0.70	0.78	58.9
6	R2	84	1.3	0.679	55.3	LOS D	3.9	27.9	1.00	0.81	1.16	35.0
Approach		1421	2.9	0.679	18.6	LOS B	21.0	150.6	0.80	0.71	0.80	56.6
North: Chain Valley Bay Road												
7	L2	55	0.0	0.087	28.5	LOS C	1.6	11.3	0.71	0.73	0.71	47.2
9	R2	287	0.4	0.868	53.6	LOS D	14.0	98.3	1.00	0.96	1.34	35.8
Approach		342	0.3	0.868	49.6	LOS D	14.0	98.3	0.95	0.92	1.24	37.2
West: Pacific Highway												
10	L2	455	1.4	0.906	46.0	LOS D	20.0	141.6	0.67	0.92	1.07	38.3
11	T1	1374	1.6	0.906	35.5	LOS C	44.6	316.8	0.86	0.95	1.13	45.0
12u	U	15	0.0	0.157	53.5	LOS D	0.7	4.6	0.97	0.70	0.97	35.6
Approach		1843	1.5	0.906	38.3	LOS C	44.6	316.8	0.82	0.94	1.11	43.0
All Vehicles		3606	2.0	0.906	31.6	LOS C	44.6	316.8	0.82	0.85	1.00	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 3:55:30 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101vv [2029 AM + development - Conversion]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1488	3.7	0.720	12.2	LOS A	10.1	72.7	0.97	0.94	1.21	62.1
6	R2	39	5.4	0.048	14.3	LOS A	0.3	2.1	0.65	0.70	0.65	59.5
Approach		1527	3.7	0.720	12.3	LOS A	10.1	72.7	0.96	0.93	1.19	62.0
North: Chain Valley Bay Road												
7	L2	76	0.0	0.198	18.5	LOS B	1.1	7.9	0.86	0.93	0.86	55.4
9	R2	497	0.6	0.865	56.7	LOS E	17.2	121.1	1.00	1.58	2.93	36.7
Approach		573	0.6	0.865	51.6	LOS D	17.2	121.1	0.98	1.49	2.66	38.4
West: Pacific Highway												
10	L2	214	3.0	0.162	6.0	LOS A	1.0	7.0	0.18	0.51	0.18	66.2
11	T1	1201	5.0	0.416	6.2	LOS A	3.5	25.3	0.21	0.45	0.21	67.7
12u	U	14	0.0	0.011	14.8	LOS B	0.1	0.4	0.16	0.67	0.16	62.2
Approach		1428	4.6	0.416	6.2	LOS A	3.5	25.3	0.20	0.46	0.20	67.5
All Vehicles		3528	3.6	0.865	16.2	LOS B	17.2	121.1	0.66	0.83	1.03	58.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 4:07:17 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

MOVEMENT SUMMARY

Site: 101vv [2029PM + development - Conversion]

Pacific Highway / Chain Valley Bay Road T-intersection, Lake Munmorah
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows 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	Aver. No. Cycles	Average Speed km/h
East: Pacific Highway												
5	T1	1337	3.0	0.530	7.6	LOS A	4.9	35.1	0.69	0.61	0.69	64.6
6	R2	84	1.3	0.085	13.2	LOS A	0.5	3.5	0.51	0.68	0.51	61.3
Approach		1421	2.9	0.530	8.0	LOS A	4.9	35.1	0.68	0.61	0.68	64.4
North: Chain Valley Bay Road												
7	L2	55	0.0	0.182	23.1	LOS B	1.1	7.7	0.92	0.96	0.92	51.8
9	R2	287	0.4	0.622	41.0	LOS C	7.1	50.2	1.00	1.21	1.72	43.2
Approach		342	0.3	0.622	38.1	LOS C	7.1	50.2	0.99	1.17	1.59	44.3
West: Pacific Highway												
10	L2	455	1.4	0.547	6.3	LOS A	2.3	16.2	0.30	0.53	0.30	66.0
11	T1	1374	1.6	0.535	6.4	LOS A	4.9	34.6	0.33	0.47	0.33	67.7
12u	U	15	0.0	0.012	15.0	LOS B	0.1	0.4	0.24	0.66	0.24	61.8
Approach		1843	1.5	0.547	6.4	LOS A	4.9	34.6	0.32	0.48	0.32	67.3
All Vehicles		3606	2.0	0.622	10.0	LOS A	7.1	50.2	0.53	0.60	0.58	63.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.

Organisation: INTERSECT TRAFFIC PTY LTD | Processed: Thursday, 7 February 2019 4:07:53 PM
Project: C:\Work Documents\Projects\2018\18.151 - Chain Valley Bay traffic update\PacHwy_ChainValleyBay.sip8

ATTACHMENT D

NSW RMS Correspondence

Transport Roads & Maritime Services

CR2017/002693
SF2013/015403
KAP / MJD

8 August 2018

General Manager
Central Coast Council
PO Box 20
WYONG NSW 2251

Attention: Jenny Mewing

PACIFIC HIGHWAY (HW10): PLANNING PROPOSAL (RZ/1/2017) TO AMEND WYONG LOCAL ENVIRONMENTAL PLAN 2013 ('LEP') TO REZONE LAND TO R2 LOW DENSITY RESIDENTIAL, LOT: 273 DP: 755266, 15 MULLOWAY ROAD, CHAIN VALLEY BAY

Reference is made to Council's email received 14 July 2017, regarding the abovementioned application which was referred to Roads and Maritime Services (Roads and Maritime) for comment.

Roads and Maritime understands that Council has received a Gateway Determination from the Department of Planning and Environment pursuant to Section 56(2)(d) of the *Environmental Planning and Assessment Act 1979* in respect of the subject planning proposal. The delegate of the Minister for Planning and Environment has directed Council to consult with Roads and Maritime in relation to the planning proposal.

Roads and Maritime understands the planning proposal seeks to rezone the subject 16.59Ha lot from Zone E3 *Environmental Management* to part R2 *Low Density* and part E2 *Environmental Conservation*. The proposed R2 *Low Density* area is expected to accommodate up to 102 residential lots within a future development application for subdivision. Three (3) future local road connections are illustrated within the strategic subdivision plan, connecting the residential zone to Mulloway Road to the north. All traffic is then directed to Chain Valley Road and the intersection of Pacific Highway.

Roads and Maritime Response

Transport for NSW and Roads and Maritime's primary interests are in the road network, traffic and broader transport issues. In particular, the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport.

TRAFFIC IMPACT STATEMENT

Roads and Maritime has reviewed the information provided, including the Preliminary Traffic Report (traffic report), prepared by Intersect Traffic, and dated October 2016. The traffic report concludes the following in regards to the intersection of the Pacific Highway and Chain Valley Bay Road:

- *Sidra modelling of the Pacific Highway / Chain Valley Bay Road intersection has shown that the right hand turn movement onto the Pacific Highway from Chain Valley Bay Road currently operates*

with unsatisfactory average delays, LoS and 95 % back of queue lengths which is only exacerbated by the proposed development. Therefore this intersection will be required to be upgraded to either a roundabout or signal controlled intersection before further development occurred.

- *As the Pacific Highway / Chain Valley Bay Road intersection is currently 'failing' the upgrading of the intersection would also provide benefit to existing road users and future developments in the area. It would therefore be unreasonable to expect the developer to fully fund the development and the upgrading of the intersection should be contained within a Section 94 developer contributions plan providing a mechanism for a fair and reasonable contribution to the intersection upgrade from all developers who would gain benefit from the intersection upgrade as well as the road authority for existing traffic. It is noted that the PTA concludes that the intersection at Pacific Highway / Chain Valley Road currently operates with unsatisfactory average delays, LoS and 95 % back of queue lengths resulting in a history of crashes, and accordingly, the intersection should be upgraded to improve safety for road users.*

- Roads and Maritime have no works planned to upgrade the Pacific Highway / Chain Valley Bay Road intersection.

- As the Pacific Highway / Chain Valley Bay Road intersection has been demonstrated to currently operate poorly, Roads and Maritime recommend that no lots be released within the area that requires access to Chain Valley Bay Road, prior to access being improved for vehicles accessing the Pacific Highway southbound.

- Roads and Maritime recommend that the developer submit an amended traffic report, exploring options in relation to upgrading the intersection. It is noted that the Darkinjung Local Aboriginal Land Council have a condition requiring the intersection of the Pacific Highway and Chain Valley Bay Road to be upgraded to TCS as part of the proposed 600 lot estate.

- An alternative and preferred option could be connecting the development to an adjacent catchment that connects to the Pacific Highway at a TCS intersection, for example via Carters Road or Kanangra Drive.

- Roads and Maritime recommend that the following be considered with the updated Traffic Impact Statement:

    - The traffic counts for the Pacific Highway and Chain Valley Bay Road intersection should be updated,

    - The development time period for commencement, completion and plus 10 years scenarios should be realistic given the known constraints,

    - The distribution of the trips generated by the proposed development shall be 100% towards the Highway from Mulloway Drive.

    - The peak hour traffic generation is to be taken at as the maximum and not the minimum, as used within the current traffic report. The minimum is not considered adequate for the residential trips as the site is isolated from schools, shops and employment, and it will be likely that residents will travel external to the site,

    - Various upgrade options being explored, not just TCS at the Chain Valley Bay Road intersection.

- Updated traffic analysis of the Pacific Highway and Chain Valley Bay Road using Sidra, including submission of files for review for various upgrade options.

Advice to Council

Roads and Maritime recommends that the following matters should be considered by Council in determining this development:

- It is noted that the Chain Valley Bay / Lake Munmorah area, which straddles the Pacific Highway (HW10), a classified (State) road, has been gradually rezoned to introduce low density residential development in recent years which are likely to generate significant traffic volumes. Council have also identified that the cumulative impact of the increased pedestrian and vehicular movements is suitably catered for and traffic generated by the urban release area does not adversely affect the safety and efficiency of the classified road network.
- Council should consider developing as part of its future Lake Munmorah Structure Plan connection to the separate villages by local roads to consolidate the number of TCS along the Highway, instead of the Highway being used as the local road connecting the sites.
- As Central Coast Council is the Roads Authority for all public roads in the subject area in accordance with Section 7 of the *Roads Act 1993*, Council should ensure that an appropriate funding mechanism is in place to obtain equitable monetary contribution from developers towards future road network upgrades and / or traffic management measures required to accommodate future development.
- Roads and Maritime has no proposal that requires any part of the property.
- The developer should take into account Section 117 (2) direction 3.4 (Integrating Land Use Development and Transport) under the *Environmental Planning and Assessment Act 1979*, in relation to the provision of adequate access to public transport, especially for the elderly, and opportunities for pedestrians and cyclists connections to the surrounding area.

On Council's determination of this matter, please forward a copy of the Notice of Determination to Roads and Maritime for record and / or action purposes. Should you require further information please contact Marc Desmond on 0475 825 820 or by emailing development.hunter@rms.nsw.gov.au

Yours sincerely

Peter Marler
Manager Land Use Assessment
Hunter Region