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Our Reference: P1864
Your Reference:

Planit Consulting
PO Box 1623
KINGSCLIFFE NSW 2487

Attention: Luke Blandford
Sent via email: lukeb@planitconsulting.com.au

Dear Luke,

RE : TERRANORA ROAD TRAFFIC IMPACT AND ACCESS ASSESSMENT

1.0 INTRODUCTION

1.1. Background

Bitzios Consulting has been commissioned to prepare a Traffic Impact and Access Assessment for a proposed development of 9 residential lots at 255 Terranora Road, Terranora. The site location is shown in Figure 1.1 below.

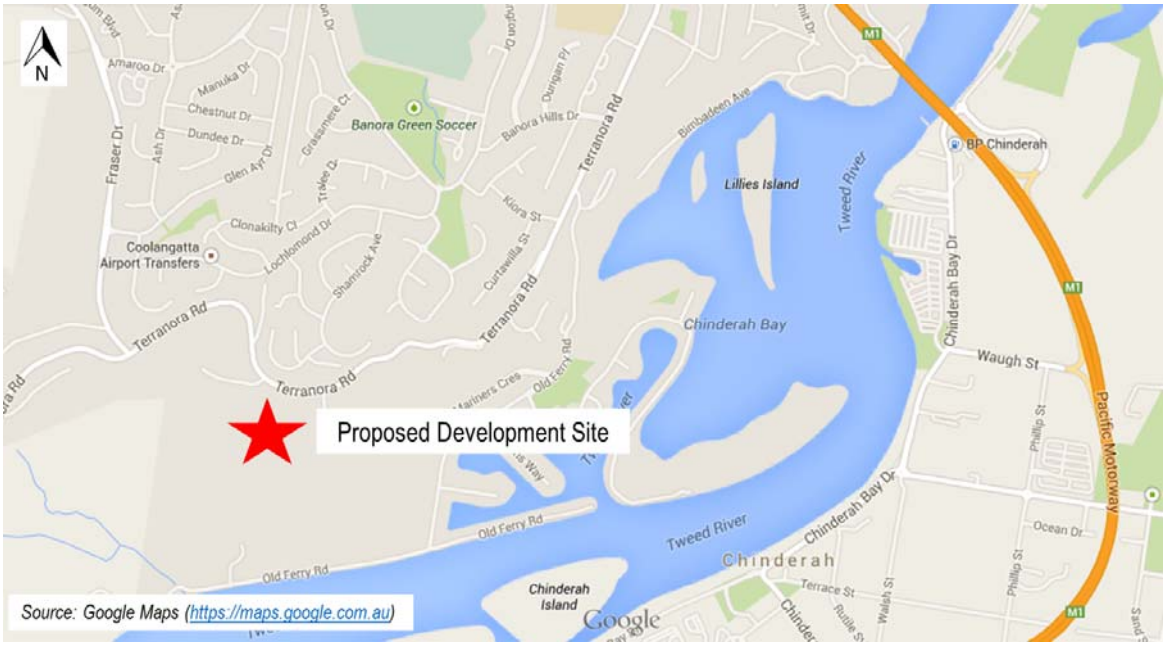


Figure 1.1: Site Location

1.2. Scope of Assessment

The scope of the traffic assessment included the following:

- calculating the development's traffic generation, distribution and impacts to the immediate road network;
- assessment of the site access and internal road layout against Council's *Section A2 Parking and Access Code*, and Australian Standards;
- undertake a turn warrants assessment and sight distance assessment for the proposed site access and provide recommendations for site access improvements;
- prepare a concept plan for the proposed site access configuration; and
- providing design guidelines and considerations for development of internal layout plans in accordance with council requirements.

1.3. Existing Site

The existing site is a vacant block, located on 225 Terranora Road, Terranora. Access is via a 10m wide access handle within Lot A DP863169.The existing site and access is shown below in Figures 1.2-1.4

Figure 1.2: Proposed Site and Location of Proposed Access Point

1.4. Proposed Development

The proposed development is for the subdivision of the subject site into 9 separate lots. It is proposed that a community title road will provide access onto Terranora Road. The proposed location for the access is consistent with the existing access as demonstrated in Figures 1.2-1.4. This assessment determines an appropriate access configuration for the lots with consideration of Councils relevant guidelines. The impact of traffic generated during peak periods will be investigated.

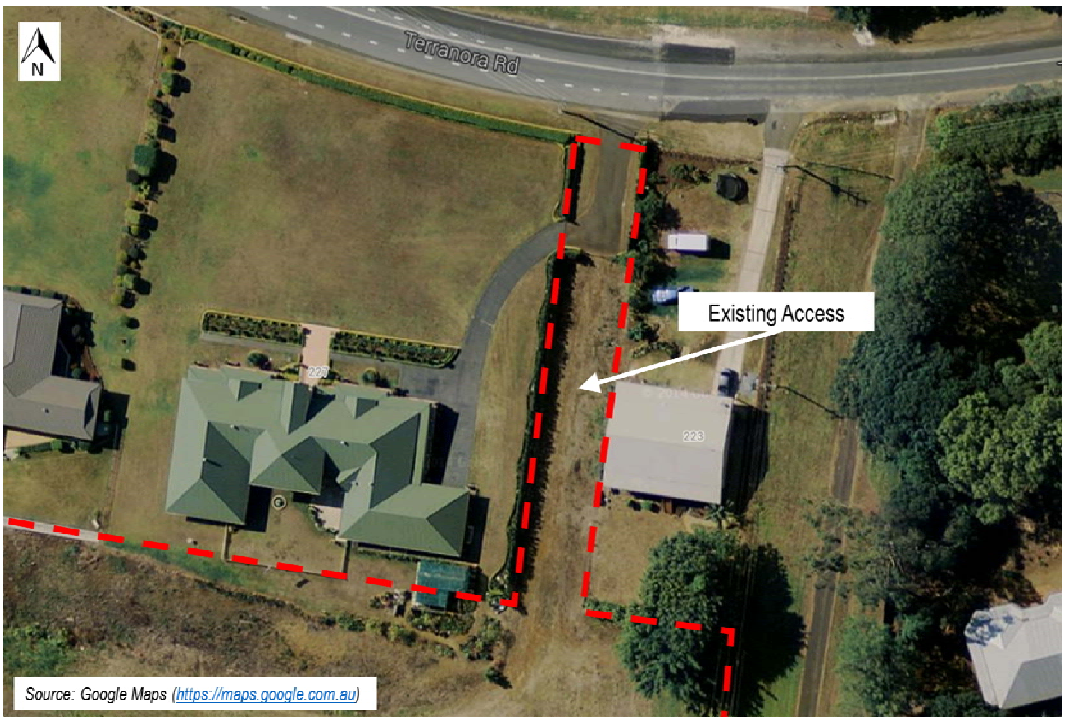


Figure 1.3: Site Access

Figure 1.4: Site Access from Terranora Road (westbound)

Figure 1.5: Site Access from Terranora Road (eastbound)

2.0 EXISTING CONDITIONS

2.1. Existing Active Transport

No designated cycle or footpaths are located directly at the front of the proposed site, however designated cycle ways and footpaths are available within close proximity to the site with the nearest paths shown in Figure 2.2. It is also noted that Terranora Road is a common route for sports cyclists particularly during mornings and on weekends.

Source: Tweed Shire Council – Cycleway Network

Figure 2.1: Surrounding Cycle and Foot Paths

2.2. Existing Public Transport

Existing public transport for the site is provided via Bus Route 605 which travels between Murwillumbah and Tweed Heads, operating at 1 hour frequencies during weekdays. The route travels along Terranora Road within close proximity to the development as shown in Figure: 2.2.

Source: Surfside (http://www.surfside.com.au/)

Figure 2.2: Location of Local Bus Routes

3.0 TRAFFIC ASSESSMENT

3.1. Road Network

A summary of the surrounding road network has been provided in Table 3.1 below.

Table 3.1: Surrounding Road Network Hierarchy

Road Name	Jurisdiction	No. of Lanes (two-way)	Hierarchy	Median Divided	Posted Speed	Details
Terranora Road	Tweed Shire Council	2	Rural Arterial	No	60 km/h	*East-west connection for the area. Provides access to Pacific Highway and local commercial areas.*

3.2. Existing Traffic Volumes

The Tweed Shire Council's traffic surveys identify the Average Annual Daily Traffic (AADT) for Terranora Road east of Fraser drive to be 3,293 vehicles in 2013. This assessment conservatively assumes 10% of AADT vehicles as the average peak hour traffic for the developments location. The traffic volumes calculated for the AM and PM peak periods assume the following traffic split percentages as shown in Table 3.2 applied.

Table 3.2: 10% AADT Background Traffic Splits (Peak Hour)

Component	Peak	Traffic Splits		Traffic Volumes (veh/hr)	
		East	West	East	West
Terranora Road Background Traffic using 10% of AADT (329 veh)	AM	70%	30%	230	99
	PM	30%	70%	99	230

Resultant background traffic volumes for 2013 in the AM and PM peak periods are shown below in Figure 3.1. This includes 1 vehicle to and from the east as a result of the existing dwelling located at Lot 18 DP863169.

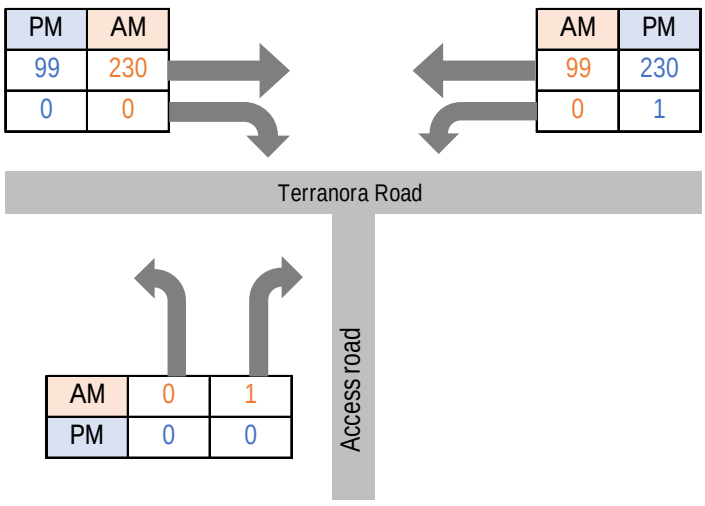


Figure 3.1: 2013 Peak Hour Traffic Volumes

A traffic growth rate of 3% per annum was adopted for the background traffic in calculating future year traffic volumes. This rate is considered appropriate given the previous historical traffic volumes exhibited on Terranora Road. Background traffic volumes calculated for the purpose of this traffic assessment for the 2014 and 2024 (10 year design horizon) assessment years traffic volumes are shown in Figure 3.2 and 3.3 overleaf.

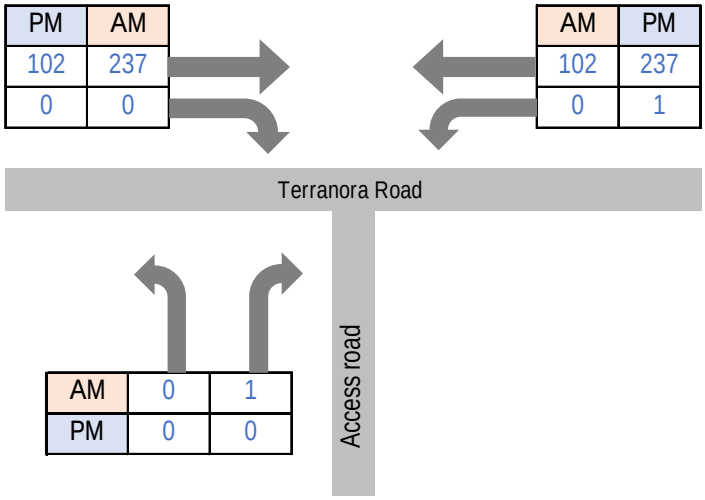


Figure 3.2: 2014 Background Traffic Volumes

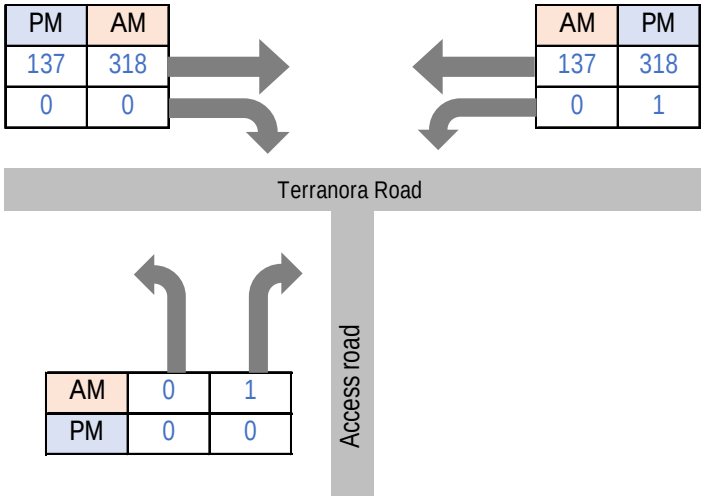


Figure 3.3: 2024 Background Traffic Volumes

3.3. Development Traffic and Distribution

3.4. Traffic Generation

Development Traffic has been calculated using a rate of 0.85 peak hour trips per dwelling as sourced from the *Roads and Maritime Service (RMS) - Guide to Traffic Generating Developments* (2002). Table 3.3 shows the proposed development trip generation summary. Whilst this traffic generation is considered low, for the purpose of confirming the need for any potential impacts or resultant widening of the carriageway at the access points a detailed analysis of traffic volumes has been conducted below.

Table 3.3: Development Trip Generation

Land Use	Trip Generation Rate	Quantity	Peak Hour Trips
Residential House	0.85 per dwelling	9	8
Total			8

Based on the above rate, the proposed development is forecasted to generate 10 vehicle trips / hour in the AM and PM peak periods.

3.5. Traffic Distribution

Table 3.4 outlines the calculated directional traffic splits for the development based on an understanding of likely travel patterns for the development and the location of nearby key trip generators.

Table 3.4: Development Traffic Splits

Component	Peak	Traffic Splits		Traffic Volumes (veh/hr)	
		In	Out	In	Out
Development (10 trips)	AM	30%	70%	2	6
	PM	70%	30%	6	2

The key trip generators in the surrounding area are connected via Terranora Road, with the Pacific Highway to the east and schools/shops to the west. The site's assumed traffic distributions as used in the traffic intersection analysis are shown in Figure 3.4.

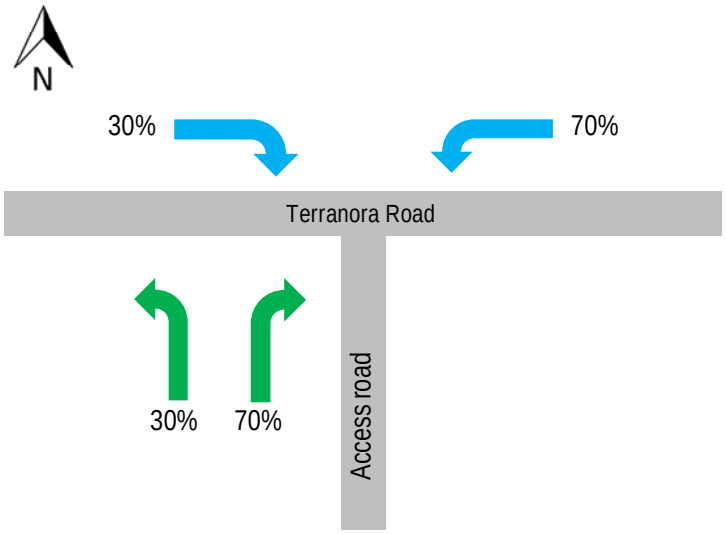


Figure 3.4: Development Traffic Distribution

The calculated peak hour development traffic volumes are shown in Figure 3.5 and are based on the previous directional traffic splits. All values have been rounded to the nearest whole number.

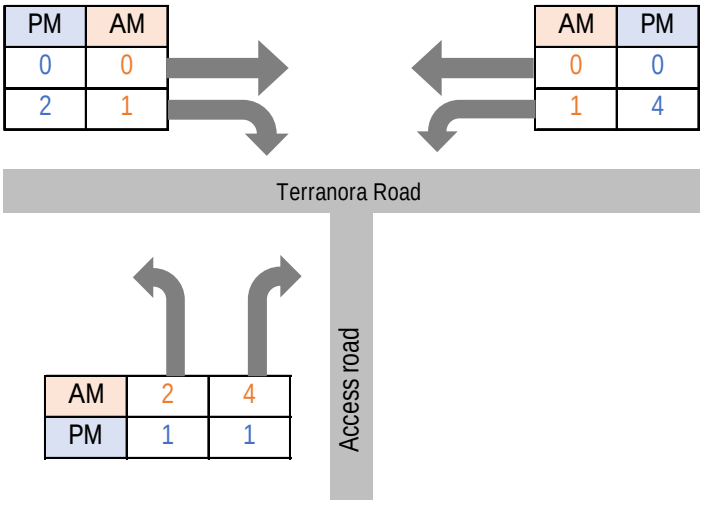


Figure 3.5: Development Traffic Volumes

The maximum turning movement will be the right-turn out of the access road during the AM peak and the left turn into the access road during the PM peak.

3.6. Development Traffic + Background Traffic

2014 and 2024 design traffic volumes (ie. Development generated traffic + background traffic) are shown in Figure 3.6 and 3.7.

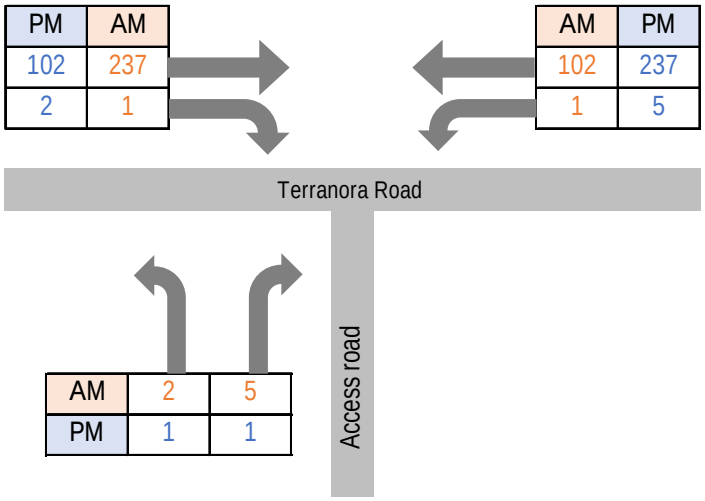


Figure 3.6: 2014 Development + Background Traffic Volumes

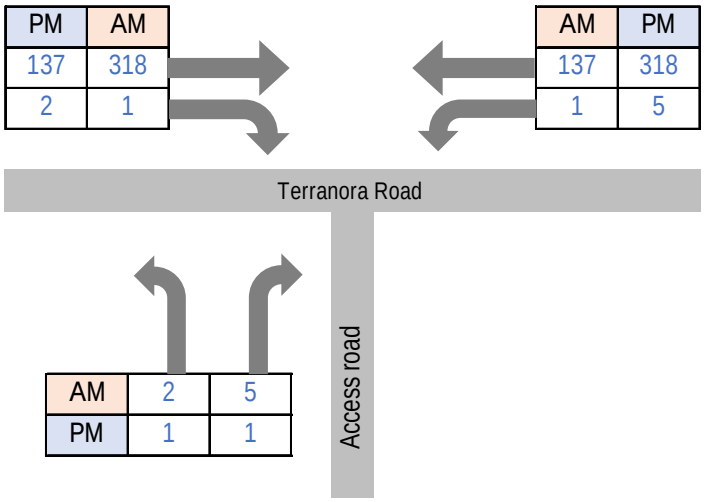


Figure 3.7: 2024 Development + Background Traffic Volumes

Due to the low development traffic volumes and the location of the site, no in-depth traffic analysis was deemed warranted and the existing priority controlled access to the site is sufficient.

4.0 SITE ACCESS

The proposed access point for the development is located at the northern side of the site, connecting to Terranora Road via a 10m wide access easement. Considering the easement width and relationship to adjoining properties, it is proposed that the access is to remain under community title (i.e. not a public asset road). The access road will service all 9 lots as well as Lot 18 DP863169, with a cul-de-sac arrangement at the southern end. The road will be required to be serviced by a refuse vehicle. Refer to Attachment 1 for further details regarding the internal layout.

4.1. Sight Distance

The proposed driveway access point has been assessed using sight distance requirements as specified by Tweed Shire Council. The posted speed is 60km/h and as such Council requires a minimum sight distance of 105m (urban) or 115m (rural). The location of the site falls under the urban classification; however 115m sight distance was still achieved. The achieved sight distance is demonstrated in Attachment 3.

4.2. Site Access Treatment Review

Austroads Guide to Traffic Management states that the turn warrants are not intended to be a direct application to accesses and driveways and should be used as a guide only. An assessment was undertaken for the site access to assess if a Basic Right Turn Treatment (BAR) is required. This treatment would require widening of the adjacent eastbound carriageway to 6.5 metres to allow vehicles to pass turning traffic. The largest expected traffic volume for the right turn movement into the development is two (2), during the PM peak period.

To establish any impact of the development traffic on Terranora Road, an analysis was completed using the estimated 2024 traffic volumes (as a “worst case” scenario). Average headway distance for eastbound and westbound traffic in the peak hour was calculated using the posted speed limit of 60km/h, with the results shown in Table 4.1.

Table 4.1: Peak Hour Average Headways for Terranora Road

Movement	Peak Traffic (Veh/Hour)	Average Headway (sec)	Average Headway (m)
Eastbound	137	26.3	438.3
Westbound	318	11.3	188.9

The estimated peak frequency of right-in traffic is two (2) vehicles per hour or one (1) vehicle per 30 minutes on average. Each vehicle will conservatively require a gap of 5 seconds between the headways of oncoming (westbound) traffic. The required headway distance between consecutive eastbound vehicles is shown in Table 4.2.

Table 4.2: Peak Hour Right-In Turn Required Headways

Movement	Peak Traffic (Veh/Hour)	Required Gap (sec)	Required Gap (m)
Right-In	2	5	83.3

Due to the average westbound headway being significantly larger than the required gap acceptance distance for vehicles turning (right-in) into the development, no impacts on westbound traffic are expected to occur. Furthermore, as the development will consist of low density residential and in turn will have low development traffic volumes entering and exiting the site, a BAR turn treatment is not considered required.

5.0 Layout Assessment

5.1. Background

The proposed layout includes a single access road connecting the proposed 9 subdivision lots to Terranora Road. Each dwellings driveway crossover will be internally connected to the access road and no additional driveway crossovers. Preliminary details of the site layout are demonstrated in Attachment 1. The following provides a series of considerations to be incorporated (where applicable) into the proposed developments internal layout.

5.2. Internal Service Road Requirements

Internal layout and grade requirements shall be in accordance with AS2890.2 Off-street commercial vehicle facilities, Council's Driveway Access to Property – Design Specification and Council's Development Design Specification – Road Design. The following requirements ensure compliance with the above documentation and allows for a service vehicle (including a refuse vehicle) to access the site:

- across pedestrian footpath area (as outlined by Tweed Shire Council) grade shall be a maximum of 2.5% (it is noted that no pedestrian footpath is present, or likely to be constructed, along this section of Terranora Road);
- maximum grade shall be 15.4% for the internal road, with the grade measured along the inside curve (Table 3.2 AS2890.2);
- maximum 'rate of change' grade shall be 6.25% over 7 metres of travel;
- the cul-de-sac shall have a minimum diameter of 18m to allow a turning movements. Properties fronting the cul-de-sac shall have a minimum frontage of 12.5m or 9.0m of kerb frontage (whichever is greater); and
- the internal service road width shall have a minimum width of 6 meters (for a target maximum street speed of 40 km/h).

5.3. Residential Driveways

Grade requirements for each residential driveway shall be in accordance with the Tweed Shire Council's Driveway Access to Property – Design Specification (2013), as outlined below:

- across pedestrian footpath area (as outlined by Tweed Shire Council) grade shall be a maximum of 2.5%; and
- maximum grade of driveway shall be 25%.

5.4. Site Servicing and Swept Path Checks

To ensure that a standard refuse vehicle can enter and exit the site, a turn path assessment for the access point was undertaken using AutoTURN software. The service vehicle is expected to enter and exit the development site at the proposed access point, as previously discussed. The results of the swept path analysis for a refuse vehicle are illustrated Attachment 4.

6.0 SUMMARY

The key findings from the Terranora Road Development Traffic Study and Access Assessment are:

- the site is forecasted to generate a total of 8 peak hour trips;
- access to the lots is proposed via an internal access road, connecting to Terranora Road;
- sight distance for the access driveways is considered acceptable in accordance with Councils Driveway Access Design Specifications;
- an assessment of a BAR treatment requirement using first principles found that no treatment is required for the site access;
- internal roadways shall be designed to comply with Australian Standards AS2890, Tweed Shire Council's Driveway Access to Property – Design Specification and Tweed Shire Council's Development Design Specifications;
- AutoTURN swept paths have been undertaken and demonstrate that a service vehicle can successfully enter and exit the site at the proposed access point; and
- the proposed development site has minimal access to pedestrian footpaths due to lack of an existing path network. Public transport facilities are also minimal. However, due to the location and expected use of the development lots as standalone dwellings the available amenities are deemed adequate.

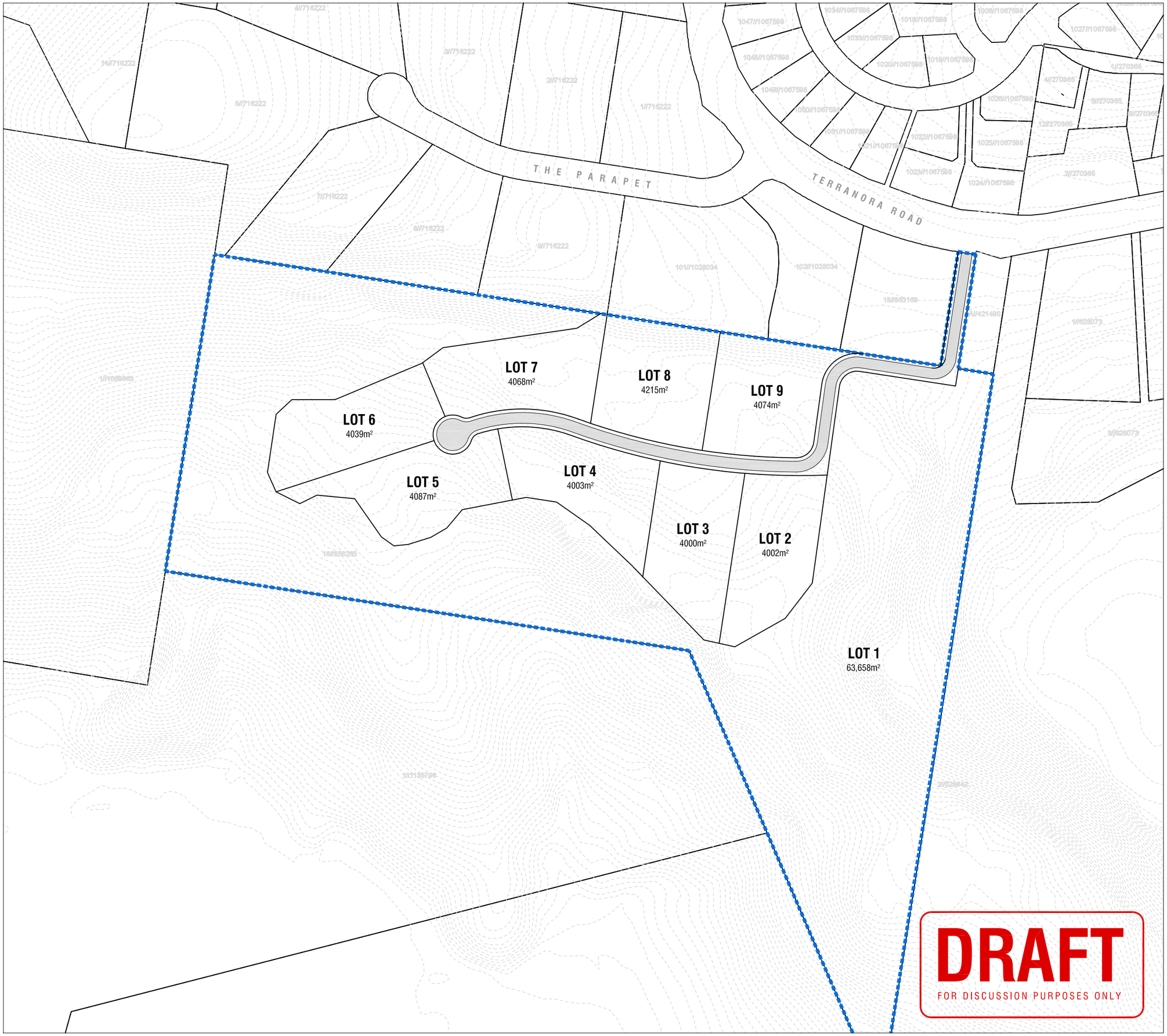
Based on the above assessment we conclude that the proposed concept poses no significant traffic or transport impacts to preclude its approval and relevant conditioning on transport planning grounds.

Yours faithfully

Andrew Eke
Manager – Gold Coast & Northern NSW
BITZIOS CONSULTING

ATTACHMENT 1

SITE LAYOUT



225 TERRANORA ROAD, TERRANORA

CONCEPT SUBDIVISION PLAN

PLANIT CONSULTING

PROJECT TITLE: 225 TERRANORA ROAD, TERRANORA

DRAWING TITLE: CONCEPT SUBDIVISION 01

BASE PROVIDED BY: N/A

CLIENT: N/A

NO	DATE	REVISION	BY
-	-	-	-

SCALE: 1/2000 @ A3

DESIGN: PLANIT CONSULTING

DRAWN: ZP

DATE: 01/2015

CHECKED: AS

DRAWING NO: 225TERRANORA_CONCEPT_01

NORTH POINT:

SHEET NO: 01 OF 01

Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218

Telephone: 07 5526 1500
Fax: 07 5526 1502
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ATTACHMENT 2

CONCEPT FOR PROPOSED ACCESS

NOTES:
1. ACCESS ROAD TO BE 6M IN ACCORDANCE WITH COUNCIL GUIDELINES
2. FRONTAGE TO TERRANORA ROAD TO BE 10M TO ALLOW ACCESS OF SERVICE VEHICLE
3. CONTINUITY LINE MARKING FROM BOUNDARY TO EXISTING LANE MARKERS (AS SHOWN) TO ALLOW VEHICLES TO SAFELY MANEOUVER IN AND OUT OF THE SITE.
4. THE WESTERN SIDE OF THE ACCESS ROAD WILL HAVE A 1M VERGE TO THE ADJOINING PROPERTY BOUNDARY WHILE THE EASTERN SIDE WILL HAVE A 3M VERGE

10m

EXISTING POWER POLE

CONTINUITY LINES

6m

1m

3m

No. 227 TERRANORA ROAD WILL ACCESS TERRANORA ROAD VIA THE PROPOSED ACCESS ROAD

Date: 05/12/14	Drawing Name: Preliminary Concept For Proposed Access	NOT FOR CONSTRUCTION	BITZIOS consulting
Project No: P1864	Project Name: Terranora TIA		Sheet 1 / Version A

ATTACHMENT 3

SIGHT LINE ANALYSIS

Date: 05/12/14	Drawing Name: Sight Lines For Proposed Access	NOT FOR CONSTRUCTION	BITZIOS consulting	
Project No: P1864	Project Name: Terranora TIA		Sheet 1	Version A

ATTACHMENT 4

SWEPT PATH ANALYSIS

Refuse Vehicle meters

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 34.9

Date: 05/12/14	Drawing Name: Swept Path Analysis For Proposed Access	NOT FOR CONSTRUCTION	BITZIOS consulting
Project No: P1864	Project Name: Terranora TIA		Sheet 1 / Version A