Better Transport Futures

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Transport Planning & Engineering

Proposed Sand Extraction Development, Coxs Lane, Fullerton Cove

Orogen Pty Ltd

Traffic Impact Statement

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1. Introduction

Mark Waugh Pty Ltd was commissioned by Orogen Pty Ltd to prepare a Traffic Impact Assessment for the proposed sand extraction site off Coxs Lane, Fullerton Cove, NSW.

This report presents the findings of the traffic investigations and assessment of the proposal. It is structured as follows:

- **Chapter 2** outlines the existing situation in the vicinity of the subject site, including discussion on the planned development growth within the vicinity and road network changes to support it.
- **Chapter 3** describes the traffic and parking features of the proposal.
- **Chapter 4** details the assessment of traffic operations related to the proposal.
- **Chapter 5** summarises the findings of this investigation, outlining conclusions and recommendations for the traffic operations of the site to support the rezoning application.

2. Existing Situation

2.1 Background and Site Location

The subject site is located off Coxs Lane in the general locality of Fullerton Cove. The subject site is currently vacant and has a gated access off the unformed length of road known as Zircon Lane.

The location of the site is shown below in **Figure 2.1**.

Figure 2.1 – Site Location

2.2 Local Road System

2.2.1 Road Characteristics

The site is located off Coxs Lane. Coxs Lane is a local road providing access to the existing residential dwellings within Fullerton Cove to the west of Nelson Bay Road. Coxs Lane provides a single lane of travel in each direction with an overall width in the order of 7 metres. For the majority of its length the road is sealed, with no footpaths or shoulders. There are street lights provided along its length reflecting the residential area and the associated 50 km/h posted speed. It provides a relatively straight alignment. Land use for the majority of its length is residential.

Photo 1 – View west along Coxs Lane showing typical section along unsealed section. Subject site to right of photo.

Coxs Lane connects with Nelson Bay Road at its eastern end via a partial grade separated intersection. Nelson Bay Road provides the main connection in the locality of the site, providing a valuable link between Newcastle City airport and Nelson Bay to the north and greater Newcastle to the south. It provides a mixture of 1 or 2 lanes in each direction. In the vicinity of the its intersection with Coxs Lane it provides two lane northbound and the on-ramp from Coxs Lane forms the second southbound lane to the south of the intersection.

Nelson Bay Road has a posted speed limit of 100 km/h in the vicinity of Coxs Lane. Street lighting is provided on Nelson Bay Road in the general vicinity of the intersection with Coxs Lane. Nelson Bay Road is classified as a Main Road (MR108) and any new works on or adjacent to this road require concurrence from the RTA with consent from Council (the road authority).

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Photo 2 – View south showing typical cross section for Nelson Bay Road

2.3 Traffic Volumes

2.3.1 Traffic Survey

Traffic data for the study was obtained from a traffic count completed during the morning and afternoon peak periods. The survey was completed at the ramp intersection of Nelson Bay Road and Coxs Lane. The survey obtained the two-way traffic flows along Nelson Bay Road as well as the flows on the two ramps to connect to Coxs Lane.

The traffic data shows that during the morning peak the two-way traffic flow on Nelson Bay Road was in the order of 1636 vehicles and in the afternoon peak was in the order of 1767 vehicles per hour. In the morning peak, there is a bias in flows towards Newcastle whilst in the afternoon the bias is reversed. However, the surveys show that the bias is not large, reflecting the demand for traffic heading towards the airport, the RAAF base and beyond to the Nelson Bay area.

The corresponding traffic flows on the two ramps were much lower. The one-way flow on these two ramps was in the order of 20 vehicles per hour or less. A large percentage of these flows were heavy vehicles, associated with the existing sand extraction quarry to the east of Nelson Bay Road in this locality.

Data from the RTA indicates that the Annual Average Daily Traffic flows (AADT) on Nelson Bay Road is in the order of 17,000 to 19,000 vehicles per day in 2004. Assuming a 2% background growth in traffic flows this would indicate that current daily flows are in the order of 21,000 along this length of Nelson Bay Road. From the peak hour surveys completed for this project, assuming the peak hour typically represents 8% to 12% of the daily flows, this would indicate that the daily flows are in the order of 20-22,000 vehicles per day.

The results of the traffic data are summarised in **Table 2.1** below.

Table 2.1 – Traffic Volumes

Road	Direction	Peak flow	Mid-Block Road Capacity[2]	Volume / Capacity
Nelson Bay Road (south of Coxs Lane)	Southbound	865 AM 854 PM	2800 (1)	0.309 AM 0.306 PM
Nelson Bay Road (south of Coxs Lane)	Northbound	771 AM 913 PM	2800 (1)	0.275 AM 0.326 PM

Notes: 1. Based on 1400 per direction, wide single lane with no parking

Table 2.1 demonstrates that Nelson Bay Road is currently operating well within capacity.

The traffic survey shows that the traffic flows along the two ramp connections to Coxs Lane are very low. A significant portion of these vehicles are associated with the existing vehicle movements in and out of the sand quarry to the east of Nelson Bay Road. Traffic flows along Coxs Lane to the west of Nelson Bay Road are considered to be lower still, and in the order of less than 20 vehicles per hour in each direction and accordingly well within acceptable limits.

2.4 Intersection Control and Operation

There are a number of driveways on Coxs Lane in the vicinity of the access via Zircon Lane to the subject site. These driveways provide access to individual residential lots. Coxs Lane connects with Fullerton Cove Road to the west via a simple give way controlled intersection.

The major intersection is the grade separated intersection connecting Coxs Lane with Nelson Bay Road. The layout of the intersection accommodates the major traffic movements, as the major origin / destinations are to the south towards the greater Newcastle area. It is noted that the line markings have been altered at this location, forcing traffic exiting the minor road to give way to the through movements on Nelson Bay Road.

2.5 Road Network Improvements

It is understood there are no major road network improvements planned in the vicinity of the subject site, apart from normal road maintenance performed by Council and the RTA. With the comparatively low traffic flows and pedestrian movements it can be seen that the existing road layout provides an adequate level of service for all users.

It is noted that there has been a historical demand to provide the northbound ramps to connect between Coxs Lane and Nelson Bay Road. This demand was created in the main by the truck movements from the sand quarry to the east of Nelson Bay Road. Since the construction of the roundabout to the south of this intersection on Nelson Bay Road, the demand for these northbound ramps has been removed. Trucks now avoid travelling along Coxs Lane, by travelling south along Nelson Bay Road and then completing a U-turn at the roundabout.

2.6 Public Transport, Pedestrians and Cyclists

There are limited regular bus services in the general vicinity of the subject site.

Cyclists are able to use the public roads in the vicinity of the site. It is noted that a considerable number of cyclists use Nelson Bay Road for commuting purposes, but that the overall width of the road carriageway together with sealed shoulders permits reasonably safe passage for cyclists.

There are no footpaths on any of the roads in the general vicinity of the road. Again, given the low overall traffic flows on Coxs Lane and road alignment it can be seen that pedestrians can use the edge of the roads if required.

3. Proposed Development

3.1 Development and Access Arrangements

The proposal for the subject site is for a sand extraction facility. The proposed development will be for an extractive industry over the following lots:

- Lot 991 DP627179;
- Lot 1910 DP 557701;
- Lot 1 DP 1006307;
- Lot 3 DP 11519;
- Lot 1 DP 794575; and
- Lot 201 DP 39968.

The proposal is to remove in the order of 577,550 m^3 of sand over a timeframe of between 3 and 7.5 years. Advise from the study team indicates that if the full area is approved for extraction, then there could be a maximum of 635,050 m^3 of sand could be extracted. The 3 year minimum timeframe has been chosen as a 'worst case scenario' for the traffic generation analyses. If the extraction takes longer than the 3 years then the daily traffic volumes will decrease. All material will be removed via road with a combination of trucks and truck with dog trailer.

3.2 Traffic Generation

The level of traffic generation from the development proposal will be dependent upon the future rate of extraction and removal from site. There will also be an element of traffic associated with workers based on the site. The workers will generally arrive at the site in the morning and depart in the afternoon at the end of the day. Given the nature of the proposal and the relative remote location of the site it is considered that there will be low numbers of vehicles entering and exiting the site during the day other than the trucks carrying the material.

It can be seen that the traffic movements associated with the removal of the sand from the site could vary considerably. For the assessment, the two extremes for the truck movements have been determined, based upon the best case and worse case scenarios.

The minimum timeframe for the proposal is to remove all of the material within a 3 year period. The following assumptions are made for the determination of truck movements accordingly:

- Trucks maximum load of 20 tonnes
- Truck trailer load of 10 tonnes
- Assume 50:50 split between trucks and trucks with trailer
- Sand weighs 1.5 tonnes per cubic metre

For the absolute maximum extraction of 635,050 m^3 of sand, this is equivalent to 952,575 tonnes of sand. With the average load extracted being some 25 tonnes, there would be a requirement for some 38,103 outbound truck movements over three years (less than 13,000 in a single year). Allowing for 5 days a week work and 45 working weeks, this would equate to some 56-57 trucks per day outbound.

There would also be a corresponding inbound truck movement, giving a two-way flow of some 114 trucks / trucks with trailers. Assuming a standard 8 hour day this would give 7-8 inbound and 7-8 outbound truck movements per hour.

The above provides a maximum scenario for the development using the same assumption that the sand will be extracted over a 3 year timeframe. But extracting the material over a 7.5 year timeframe, the volume of trucks per day would be much lower. The weekly outbound truck movements would be 113 per week and 23 per day. This would give a two-way daily flow of 46 trucks and an hourly flow of 2-3 inbound and 2-3 outbound.

These flow rates have been applied in the traffic analysis for these investigations, to ensure robustness of design. It can be seen that basing the assessment on the upper limit of 635,050 m^3 the highest flow rates have been assessed. If the full site is note extracted, the lower volume of 577,550 m^3 of sand will be removed, representing a decrease of some 9% over the above traffic volumes. The lower volume of material would there require less truck movements and hence less of a potential impact upon the adjacent road network.

3.3 Site Access

All vehicle access to the subject site will be via a new access off Coxs lane, approximately 170 metres east of Zircon Lane. All truck movements will be restricted to using the grade separated intersection with Nelson Bay Road and avoiding driving west along Coxs Lane towards Fullerton Cove Road. Access for all large vehicles associated with the establishment of the development will also be restricted to avoid travelling west along Coxs Lane towards Fullerton Cove Road. Employee vehicles, which are typically light vehicles, would be able to access the site via Fullerton Cove Road and Coxs Lane. However, it is considered the majority of the employees on the site would have an origin / destination to the south towards greater Newcastle and accordingly use the grade separated intersection on Nelson Bay Road.

3.4 Traffic Distribution

It can be seen that nearly all of the traffic associated with the proposed development will access the site via the grade separated intersection of Coxs Lane with Nelson Bay Road. All heavy vehicle movements will be restricted to this intersection and the majority of light vehicles would also use this intersection.

It is considered that the majority of the traffic would have an origin / destination towards the south towards greater Newcastle. The vehicles would continue along Nelson Bay Road via Stockton Bridge to Carrington beyond via Tourle Street to Industrial Drive.

For heavy vehicles wishing to head north from the site, the vehicles will head south along Nelson Bay Road and complete a U-turn at the roundabout controlled intersection of Nelson Bay Road and Fullerton Cove Road.

3.5 Pedestrian Access

Pedestrian access to the site would be via existing facilities along the local road network. Given the relatively remote location and the lack of pedestrian facilities on the adjacent road network, it is considered that there will be little if any external pedestrian movement between the development and other local amenities.

3.6 Public Transport Facility

Given the relatively remote location and the nature of the development it is considered that there will be no demand for public transport access to the site.

3.7 Site Operations and Access Arrangements

There are no detailed site plans for the proposed works currently. However, the development has a single vehicle access via the new access off Coxs Lane. This access will be unsealed and will require trimming of vegetation to provide appropriate visibility splays. As part of the development, a truck shakedown facility will be required within the site and the site access will be upgraded to suit the development, in accordance with Council's requirements.

The technical analysis for the development of the site is discussed further in **Section 4.**

3.8 Parking Requirements

It can be seen that the new development will require parking for the employees on site as well as for trucks waiting to be filled. Given the size of the site together with the low demands it is considered that all parking can be accommodated on site with no impact upon the external road network and that there is no further requirement to review parking for the development.

4. Assessment of Transport Operations

4.1 Site Access Operations

It is proposed to provide all vehicle access to the development via the site access on Coxs Lane.

4.2 Road Network Performance and Capacity

From **Table 2.1**, the current peak one-way hourly traffic flows along Nelson Bay Road are in the order of 865 vehicles per hour one-way in two lanes (southbound) in the general vicinity of the subject site. Table 4.5 of the RTA Guide to Traffic Generating Developments shows that for a single lane rural road this would give a level of service of C. Given that there are two lanes in this location the level of service would be better at B.

For the worst case scenario the traffic flows could increase by some 8 truck movements per hour. This represents an increase of less than 3% during the peak hours. Outside of the peak hours the traffic volumes are lower on Nelson Bay Road, meaning that whilst the impact as a percentage is greater, the overall traffic flows are lower and considerably lower than during the peak periods.

It is considered that the level of service would remain at B for all road users. Level of Service B is defined as "*This level is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is less than that of the level of Service A*". It is considered that the additional traffic generated by the development will have a minimal impact upon the existing operation of Nelson Bay Road and that the existing drivers along Nelson Bay Road will notice little if any change in the road conditions.

Whilst there is no traffic data available for flows along Coxs Lane between the subject site and the ramps to Nelson Bay Road, the traffic surveys indicate that the traffic flows on the ramps are very low, at less than 20 vehicles per hour. With a significant portion of these being associated with the sand quarry to the east of Nelson Bay Road it is considered that the flows along Coxs Lane are in the order of 10-20 vehicles per hour two-way and well within acceptable limits. It is considered that the additional traffic associated with the subject development will have a minimal impact upon the operation and level of service along Coxs Lane.

The key issue will therefore be the operation and safety of the intersection of the main site entry and Coxs Lane.

4.3 Intersection of site entry and Coxs Lane

It can be seen that the traffic flows in and out of the site will be relatively low and that there will not be any capacity issues with regard to the site access on Coxs Lane. With peak hour flows on Coxs Lane of less than 20 vehicles per hour and a maximum of 8 vehicle movements per hour associated with the development, there will be minimal delays for vehicles in this locality.

It is useful to consider the Austroads threshold levels for intersection capacity under uninterrupted flow conditions. **Table 4.1** below presents these thresholds. Where traffic flows fall within these limits intersection operation is essentially at no delay or interruption for approaching drivers other than to obey the requisite road rules.

Table 4.1 Intersection Capacity – Uninterrupted Flow Conditions

Road Type	Light Crossing or turning volumes Maximum Design Hour Volumes, Two-way (vph)		
Two Lane through Roadway	400	500	650
Cross Road	250	200	100
Four Lane through roadway	1000	1500	2000
Cross road	100	50	25

Source: Austroads Guide to Traffic Engineering Practice - Part 5, 1988

It can be seen that the current two-way peak hour on Coxs Lane are well below 400 vehicles per hour whilst the site flows would be in the order of 8 vehicles per hour maximum. Thus there will be little if any delay for road users.

The major issue for this intersection is the impact upon road safety. The majority of vehicles using this access will be trucks, with a large number towing trailers. These sizes of vehicles require large turning circles and are not fast moving vehicles.

The critical safety feature for this access will be sight visibility lines, for both trucks exiting the site as well as for vehicles travelling along Coxs Lane. For the posted speed limit of 50 km/h, the visibility requirements from the RTA Road Design Guide is 125 metres. This distance will satisfy the entering sight distance as well as approach site distance and safe intersection site distance. The visibility has been checked on site and exceeds 150 meters in both directions.

Photo 4 – View west (right) for vehicles exiting site access

Photo 5 – View east (left) for vehicles exiting site access

As can be seen from the above photos, the alignment of Coxs Lane is relatively straight in the vicinity of the site access and road safety will be acceptable with the truck movements in and out of the site.

4.4 Intersection of Coxs Lane and Nelson Bay Road

The majority of the additional traffic associated with the development will use this intersection. It can be seen that the intersection provides a high level of safety and that there will not be any capacity issues associated with this intersection. For vehicles exiting Nelson Bay Road, there is a left turn deceleration lane ensuring there is minimal conflict with the through traffic movements on Nelson Bay Road. For traffic heading south, the on-ramp needs to merge with the through traffic movements on Nelson Bay Road. It is noted that the RTA have altered the layout at this location, forcing traffic on the ramp to give way to the through traffic movements on Nelson Bay Road. The visibility at this location for traffic exiting the ramp exceeds the requirements due to the relatively straight alignment of Nelson Bay Road at this location.

Overall it is considered that the development will have a minimal impact upon the operation and safety of this intersection.

4.5 Intersection of Nelson Bay Road and Fullerton Cove Road

Better Transport Futures have previously completed a "Stage 6 – Existing Roads" road safety audit for the roundabout controlled intersection. The road safety audit was completed in accordance with the Austroads Checklist Number 6 for existing roads (Second Edition). Sean Morgan and Mark Waugh, who are both accredited road safety auditors, completed the audit.

The road safety audit was completed during both daylight hours as well as during the night, to ensure that the audit reviewed the layout of the roundabout under all conditions.

The audit of the roundabout did not highlight any issues with the design. The roundabout has been designed in accordance with the RTA Road Design Guide and has been designed to accommodate the movement of large vehicles, as per the designation of Nelson Bay Road. There is an eleven metre wide circulating lane, with two lane entries on all approaches. The design of the roundabout has taken into account all users, with an off-road footpath/cycle way ensuring the safety for vulnerable road users is high.

In addition, Better Transport Futures have previously completed traffic surveys of this roundabout to assess the performance of the roundabout. The surveys and analysis show that the roundabout has a good level of service with minimal delays for all road users. The additional traffic associated with the development of the subject site will have a minimal impact upon the operation of this intersection.

4.6 Pedestrian and Cyclist Facilities

It is considered that there will be no external pedestrian movements associated with the proposed development. Therefore no pedestrian facilities are proposed. Similarly, it is expected that cyclist movements will be minimal (if any) and that no dedicated facilities are required for the development.

4.7 Public Transport

It can be seen that the proposed development will have little if any impact in terms of public transport demand.

4.8 Internal Road Network

There will be a requirement for an internal haul road for the development to link with Coxs lane. This will be provided as part of the development.

5. Summary and Conclusions

5.1 Summary

From the study work for the proposed sand extraction site off Coxs Lane, Fullerton Cove, the following summary is provided:

1. The proposal is to provide a sand extraction site with access via a new access to connect with Coxs Lane. Advice from the study team indicates that the extraction could occur over a timeframe between 3 and 7.5 years. The sand will all be removed from site with trucks and trucks with trailers. For the purposes of this assessment, an absolute maximum volume of 635,050 m^3 of sand has been assumed, to assess the worst case scenario. The current application is for some 577,550 m^3 of sand, some 9% less than the theoretical maximum.
2. The site is located off Coxs Lane in the locality of Fullerton Cove. Coxs Lane is a local road with a posted speed limit of 50 km/h. Coxs Lane connects with Nelson Bay Road via a grade separated intersection allowing for connection to Nelson Bay Road to the south only. Nelson Bay Road is a classified main road and the posted speed limit is 100 km/h.
3. Traffic data collected as part of this study shows that the current traffic flows are well within acceptable limits. Existing levels of service for road users is good.
4. The traffic flows associated with the development have been determined based upon the future extraction rates that could vary considerably. If the sand is extracted over a 3 year period then there could be 8 inbound and outbound truck movements per hour, as a worst case scenario for 635,050 m^3 of sand. If the sand is extracted over a 7.5 year period or the current application for 577,550 m^3 of sand is approved the flows would be much lower at 4 truck movements inbound and outbound per hour.
5. All trucks will access the site via Coxs Lane and connect direct to Nelson Bay Road via the two ramps. There will be no trucks travelling west from the subject site to gain access to the wider road network. A review of the traffic numbers together with site observations indicates that the additional traffic will have a minimal impact upon the operation of the local roads in the vicinity of the site.
6. All trucks will approach and depart from the south, with the majority of origin/destinations being the greater Newcastle area. For trucks heading north, they will need to head south along Nelson Bay Road and then complete a U-turn at the roundabout controlled intersection of Nelson Bay Road and Fullerton Cove Road.
7. The roundabout controlled intersection of Nelson Bay Road and Fullerton Cove has been previously reviewed by Better Transport Futures. This review showed that the roundabout has adequate spare capacity to cater for the additional flows associated with this development. The safety audit completed on this roundabout showed that the roundabout provides a safe and appropriate layout in accordance with the RTA Road Design Guide.
8. The vehicle access to the site is proposed via new access road and haul road off Coxs Lane. As part of the development, a truck shakedown will be required within the site boundary. A review of the site access shows that visibility for drivers associated with the development together with traffic along Coxs Lane is good and exceeds the requirements of the RTA Road Design Guide for the posted speed limit. It is considered that a safe and appropriate control can be provided at this location. All vehicles will be able to enter and exit in a forward direction.
9. The development will create minimal pedestrian or cyclist movements and there are no additional facilities required for these users as part of this development.

5.2 Conclusion

From the study, it is concluded that the existing road system is able to cater for the traffic demands of the proposed development and it is recommended that the proposal be approved on traffic grounds.