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Dear Pamela

TRAFFIC ASSESSMENT REPORT – KINGS QUARRY STAGE 2

Further to your instruction, we are pleased to provide this traffic assessment in respect to Stage 2 of Kings Quarry at Pebble Brook Road, Wainui (Proposal).

A consent has been granted for Stage 1 of the quarry site, immediately south of Stage 2.

1 INTRODUCTION

1.1 GENERAL

The Proposal intends to establish Stage 2 of the quarry and is approximately 30ha in size. The quarry will operate over a 45 year time period. For the first 10 years, approximately 300,000 tonnes of material will be excavated each year. For years 11-45, approximately 500,000 tonnes of material will be excavated each year.

Of note, the Proposal will be lodged under the Fast-track Approvals Act 2024.

The site is zoned Special Purpose – Quarry Zone in the Auckland Unitary Plan Operative in Part 15 November 2016 (Unitary Plan).

The quarry is located on the northern side of Pebble Brook Road, 1.5km northwest of the Waitoki Road / Pebble Brook Road intersection (Site). A consent has been granted for Stage 1 of the quarry Site, immediately south of Stage 2. The quarry and access location is shown in Figure 1 below. The two quarry stages are shown in Figure 2 below.

Figure 1: Quarry and Access Location

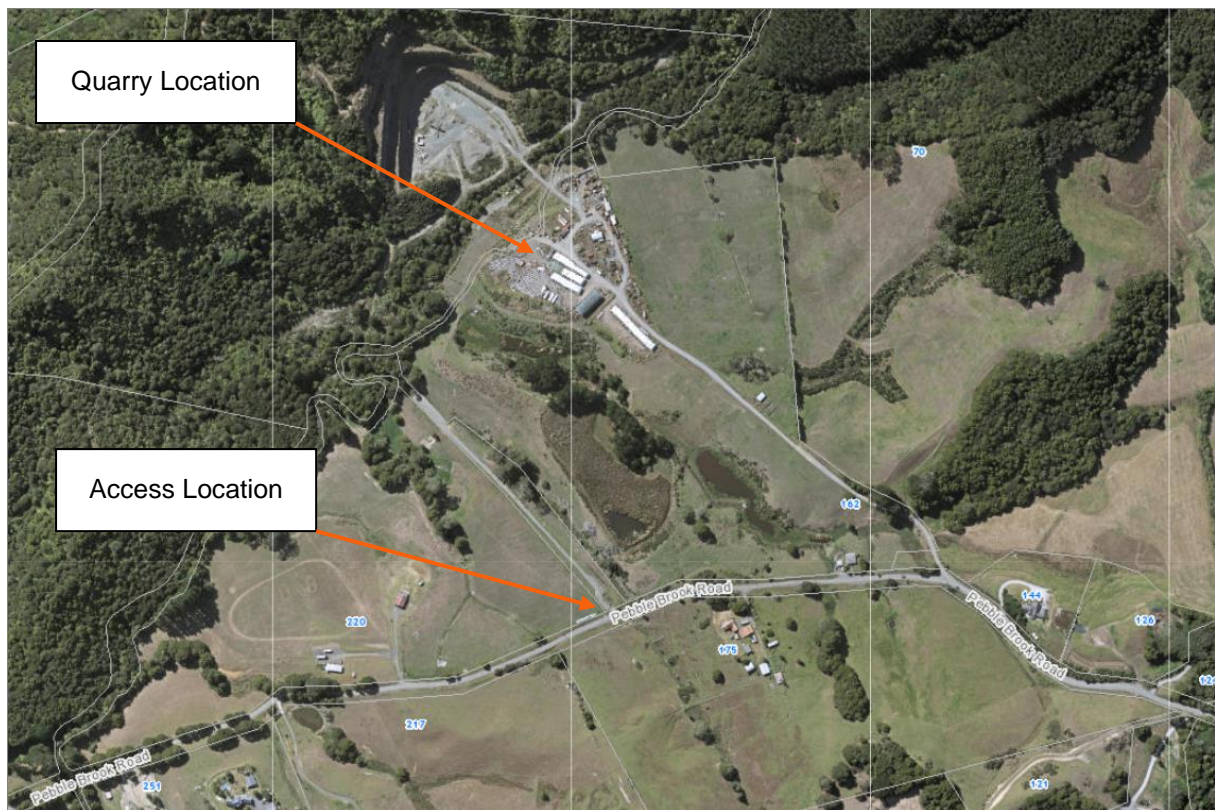
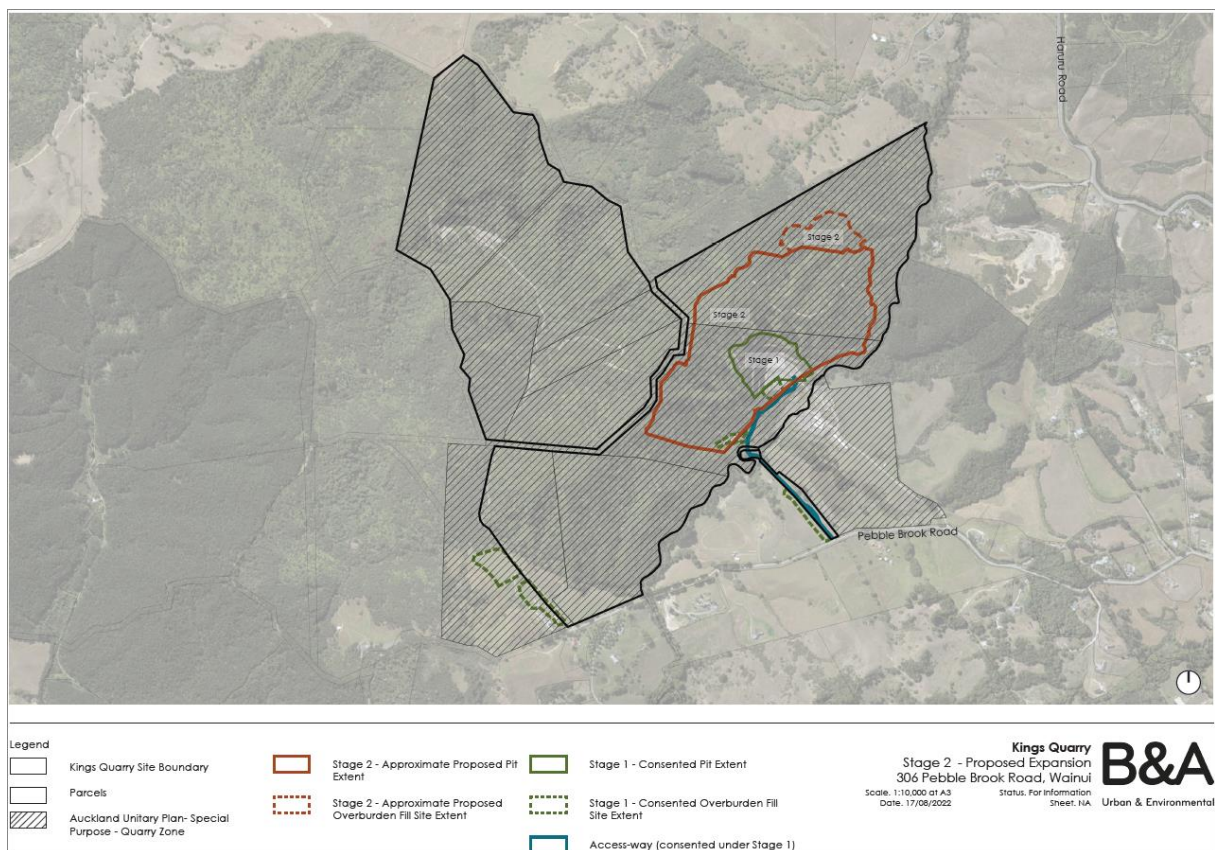


Figure 2: Stage 1 and Stage 2 Location Plan



1.2 STAGE 1

The Stage 1 quarry consent included a suite of upgrades to the Site and the local traffic network. These are detailed below:

- Establishment of new site access to Pebble Brook Road to allow two-way truck movement;
- Establishment of internal site accessways;
- Widening of Pebble Brook Road to allow two-way truck movement along its length; and
- Improvements to the Pebble Brook Road / Waitoki Road intersection, including:
 - Change from Give-Way to Stop controlled intersection;
 - Shifting of the posted speed limit signage 150m to the west. This reduces the speed limit from 100km/h to 80km/h for eastbound vehicles through the intersection;
 - Installation of high friction surfacing for 100m west of the intersection; and
 - Changes to paint markings and installation of truck turning signage.

It is noted that a detailed design Road Safety Audit has been undertaken for the Stage 1 upgrades and therefore additional minor changes may be implemented. The upgrades detailed above are considered suitable to accommodate Stage 1 quarry traffic. It is noted that Stage 2 of quarry operations cannot commence until these mitigation measures have been implemented.

This report assesses the ability of the traffic network to accommodate the additional Stage 2 quarry traffic.

2 EXISTING ENVIRONMENT

2.1 ROAD ENVIRONMENT

The Site is located on Pebble Brook Road, which is classified as non-arterial road within the Unitary Plan. Pebble Brook Road is a local rural access road which connects to Waitoki Road to the south and terminates to the northwest.

Adjacent to the Site, Pebble Brook Road comprises single unsealed traffic lanes and are typical of rural local roads in Wainui.

Waitoki Road is also classified as a non-arterial road within the Unitary Plan. Waitoki Road is a local rural connector road which connects to Kahikatea Flat Road to the south and Wainui Road to the north.

2.2 SPEED LIMITS

Pebble Brook Road currently has a posted speed limit of 100 km/h (since 30 June 2020), however it is considered that actual speeds are much lower given the unsealed and rural nature of the road. as detailed in the Stage 1 documents, the actual operating speed on Pebble Brook Road is approximately 30-40km/h. A reduction in the speed limit would be supported, however is a decision for the Road Controlling Authority. As detailed above, the actual lower speed limit is self-regulating.

Several changes and proposed modifications to the speed limits on Waitoki Road have occurred recently. These changes and proposed modifications are detailed below:

- a) **Prior to the lodgement of the Stage 1 Consent**, the speed limit signs were located east of the Pebble Brook Road intersection. The speed limit for eastbound vehicles was 80km/h and for westbound vehicles was 100km/h.
- b) **Subsequent to the lodgement of the Stage 1 Consent**, (however independent of the Stage 1 Consent), the speed limit signs were relocated slightly west of the Pebble Brook Road intersection. The speed limit for eastbound vehicles remained at 80km/h and for westbound vehicles remained at 100km/h.

The posted speed limit changes above (items a and b) are detailed in Figure 3 below.

Figure 3: Posted Speed Limit Changes (Prior and Subsequent to Stage 1 Lodgement)



- c) **Stage 1 consent recommendations:** As part of the safety improvements to the subject intersection, the Commute Traffic Assessment Report (TAR) recommended changes to the speed limits. The signs were recommended to be relocated 150m to the west of the intersection. The speed limit for eastbound vehicles would remain at 80km/h and for westbound vehicles would remain at 100km/h. This recommendation was incorporated into the Stage 1 consent conditions.
- d) **Current signs.** A site visit was undertaken on 20 October 2023. The speed limit signs have been relocated to the same position identified in (a) above. The speed limit for eastbound vehicles was reduced from 80km/h to 60km/h and for westbound vehicles remained at 100km/h.

The posted speed limit changes above (items c and d) are detailed in Figure 4 below.

Figure 4: Posted Speed Limit Changes (Stage 1 Recommendations and Current Signage)



It is recommended that the existing speed limits (d) should remain (i.e. reduction to 60km/h for eastbound vehicles), however they should be relocated to location (c) above. This would essentially be the previous Commute TAR recommendation, however, with the existing eastbound speed limit remaining at the recently reduced 60km/h.

Photograph 1 below shows the current speed limit change (i.e. (d) above).

Photograph 1: Current Speed Limit Signage



2.3 TRAFFIC VOLUMES

Auckland Transport traffic volume records do not include any recorded data on Pebble Brook Road.

A peak hour turning count survey was undertaken at the Pebble Brook Road / Waitoki Road intersection on Tuesday 17 October 2023 to understand the existing traffic movements on the local road network. The peak hour survey results are detailed in Table 1 below.

2.4 ONE LANE BRIDGE

A one-lane bridge exists on Pebble Brook Road. The one-lane bridge was assessed as part of the Stage 1 consent, and with respect to visibility and traffic volumes, it is considered suitable to accommodate additional traffic, including an increase in truck movements as detailed within this report. The bridge is considered to be appropriately signed and marked to provide adequate warning to road users. It is noted that the Stage 1 safety audit identified the lack of safety barrier. Auckland Transport as the safety engineer confirmed in the Stage 1 safety audit that no changes are required at the bridge given low speed and low volume operation. The crash search that was undertaken has not recorded any crashes involving the one-way bridge within the search period.

Table 1: Pebble Brook Road / Waitoki Road Peak Hour Survey

	AM				AM Total	PM				PM Total
	Cars	Trucks	Buses	Cyclists		Cars	Trucks	Buses	Cyclists	
Waitoki Road (Northeast)	126	17	3	0	146	131	18	2	0	151
Left into Whitehills Road (Southeast)	25	2	2	0	29	17	8	0	0	25
Thru into Waitoki Road (Southwest)	96	14	1	0	111	107	10	2	0	119
Right into Pebble Brook Road (Northwest)	5	1	0	0	6	7	0	0	0	7
U-Turn	0	0	0	0	0	0	0	0	0	0
Whitehills Road (Southeast)	23	5	1	0	29	29	5	0	0	34
U-Turn	0	0	0	0	0	0	0	0	0	0
Left into Waitoki Road (Southwest)	1	2	0	0	3	7	0	0	0	7
Thru into Pebble Brook Road (Northwest)	0	1	0	0	1	3	3	0	0	6
Right into Waitoki Road (Northeast)	22	2	1	0	25	19	2	0	0	21
Waitoki Road (Southwest)	108	10	2	0	120	64	7	0	0	71
U-Turn	2	0	0	0	2	0	0	0	0	0
Left into Pebble Brook Road (Northwest)	3	0	0	0	3	3	1	0	0	4
Thru into Waitoki Road (Northeast)	100	9	2	0	111	56	6	0	0	62
Right into Whitehills Road (Southeast)	3	1	0	0	4	5	0	0	0	5
Pebble Brook Road (Northwest)	23	6	0	0	29	19	0	0	0	19
U-Turn	0	0	0	0	0	0	0	0	0	0
Left into Waitoki Road (Northeast)	13	1	0	0	14	11	0	0	0	11
thru into Whitehills Road (Southeast)	4	2	0	0	6	4	0	0	0	4
Right into Waitoki Road (Southwest)	6	3	0	0	9	4	0	0	0	4
Grand Total	280	38	6	0	324	243	30	2	0	275

As detailed above, Pebble Brook Road features very low two-way traffic volumes in both peak hours (39 vehicles per hour and 36 vehicles per hour in the AM and PM peaks respectively). This indicates a daily volume of 300-400 vehicles per day.

Waitoki Road carries higher two-way traffic volumes in both peak hours (296 and 245 vehicles per hour in the AM and PM peaks respectively). This indicates a daily volume of 2,500-3,000 vehicles per day.

2.5 ROAD SAFETY ASSESSMENT

An assessment of the surrounding area's road safety record has been undertaken using the NZTA's CAS database. Crash records for the five year period 2020 - 2024 including all available records for 2025, have been assessed for the full length of Pebble Brook Road and the Pebble Brook Road / Waitoki Road intersection. A total of five crashes were recorded in the crash search and are detailed below:

- Two crashes occurred at the Waitoki Road / Pebble Brook Road intersection;
 - One crash resulted in serious injury and involved a driver attempting to turn right out of Whitehills Road. The vehicle was struck by a second driver on Waitoki Road;
 - One crash resulted in minor injury and involved a loss of traction when travelling from Pebble Brook Road to Whitehills Road.
- Three crashes occurred on Pebble Brook Road;
 - Two crashes resulted in minor injury and involved drivers losing control when turning;
 - One crash did not result in injury and involved a minor head on collision.

The crash at the Waitoki Road / Pebble Brook Road intersection is likely due in part to a lack of visibility at the intersection. This issue was identified in the Stage 1 Commute Report and therefore the improvements as detailed previously in Section 1.2 were recommended. These improvements were

required as conditions of consent for Stage 1 of the quarry. Subject to these improvements being implemented, it is considered that the proposal will not exacerbate the safety record in the vicinity of the site.

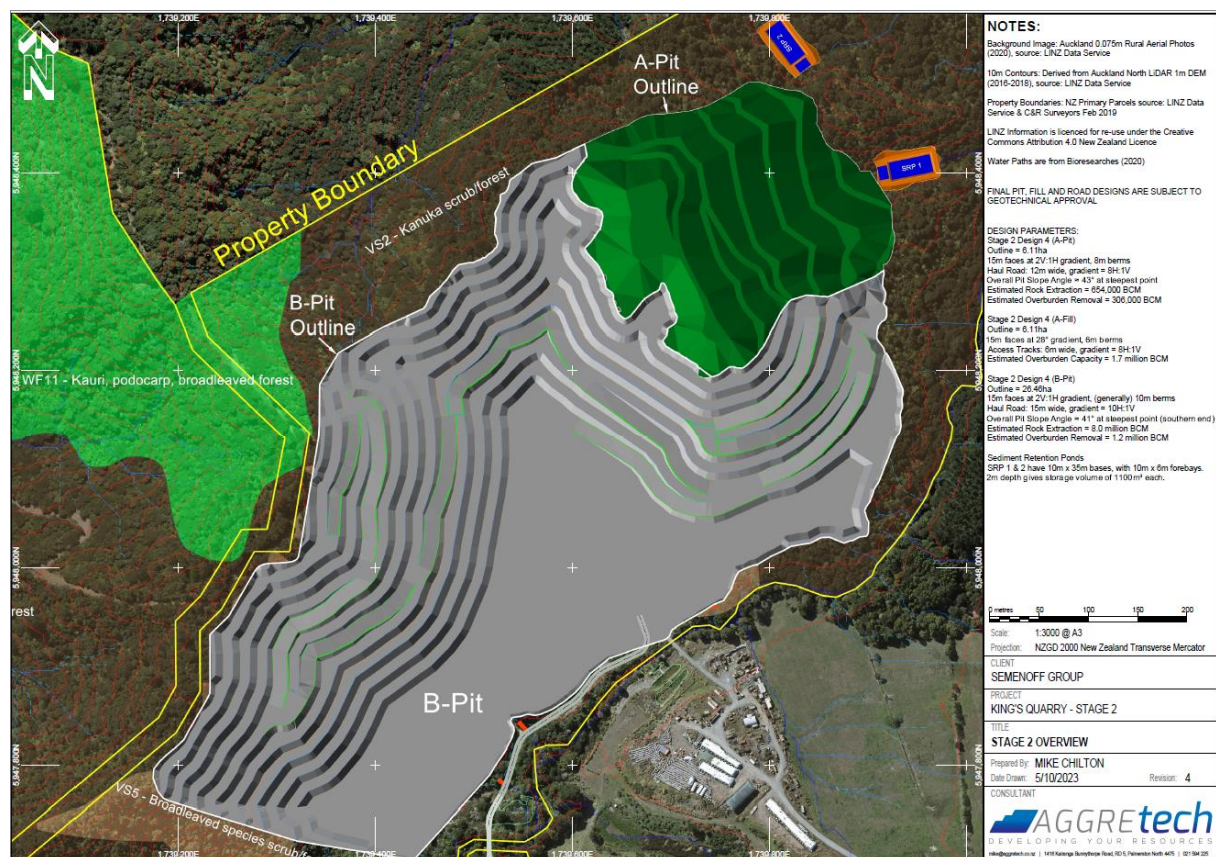
The crashes on Pebble Brook Road are considered to be suitably mitigated by the proposed upgrade works to the carriageway as part of the Stage 1 resource consent. The carriageway widening in particular will provide full two-way movement for vehicles, enabling safe encounters on its length. As such, the proposed quarry is not expected to have any adverse effect on the road safety in the surrounding area. The proposal is therefore not considered to exacerbate the safety record in the vicinity of the site.

3 PROPOSAL

The proposal intends to establish Stage 2 of the quarry and is approximately 30ha in size. The quarry will operate over a 45 year time period. For the first 10 years, approximately 300,00 tonnes of material will be excavated each year. For years 11-45, approximately 500,000 tonnes of material will be excavated each year.

The proposed Kings Quarry layout is detailed in Figure 5 below.

Figure 5: Proposed Kings Quarry Layout



4 TRAFFIC GENERATION

4.1 STAGE 1 CONSENT

The Stage 1 Commute Traffic Report detailed a maximum daily truck volume of 100 truck movements per day and maximum hourly truck volume of 10 truck movements per hour.

4.2 TRIP GENERATION AND EFFECTS

The following information has been provided by the quarry operator with regard to the Stage 2 anticipated trip generation of the Site:

- Extraction volume of approximately 22,500,000 tonnes over 45 years;
- Extraction volume of approximately 500,000 tonnes per year;
- Average truck and trailer load of 27 tonnes;
- Operation 6 days per week (approximately 300 days per year);
- Operating hours of 11 hours a day; and
- Peak day likely to be 40% higher than an average day

The above translates to a peak of approximately 90 trucks per day (180 truck movements per day) and approximately 8 trucks per hour (16 truck movements). This is an increase of up to 3 trucks (6 truck movements per hour) over the Stage 1 volumes.

Given that Pebble Brook Road will be upgraded as part of Stage 1 to provide simultaneous truck movement along its length (between its eastern termination and the site access), and the Pebble Brook Road / Waitoki Road intersection will be upgraded as detailed previously, no further upgrades to the existing local network or intersections are considered necessary. The minor increase in volumes is considered to be suitably accommodated by the local road network.

4.3 TRIP ORIGIN / DESTINATION

The exact destination of the trucks depends on the destination of the quarried materials; however it is noted that the majority of these trips will travel north or south on State Highway 1. Provision is made for all turning movements at the Pebble Brook Road / Waitoki Road intersection. The trucks will turn right into the Site and left out of the Site from Pebble Brook Road. The local turning movements of the trucks as a result of the origin / destinations are considered acceptable.

5 ACCESS

5.1 SIGHT DISTANCE

5.1.1 PROPOSED SITE ACCESS

The proposed site access was assessed and approved within the Stage 1 Commute Report. No changes to the access are proposed as part of the Stage 2 application. Given the minor increase in truck traffic detailed in Section 4.2 above, the access is considered acceptable to accommodate the Stage 2 traffic.

5.1.2 PEBBLE BROOK ROAD / WAITOKI ROAD INTERSECTION

The sight distance at the Pebble Brook Road / Waitoki Road intersection was assessed as part of the Stage 1 consent application. The available sight distance has not changed since the lodgement of the Stage 1 application. The Stage 1 assessment found that sight distance to the east satisfies relevant standards, however to the west was deficient. Given this deficiency, a suite of upgrades was recommended and incorporated into the approved Stage 1 consent conditions. These recommendations (for Stage 1) are detailed below:

- Change from Give-Way to a Stop controlled intersection;
- Shifting of the posted speed limit signage 150m to the west. This reduces the speed limit from 100km/h to 80km/h for eastbound vehicles through the intersection;
- Installation of high friction surfacing for 100m west of the intersection; and

- Changes to paint markings and installation of truck turning signage.

These upgrades will be included as part of the Stage 1 consent implementation. As detailed in Section 2.2 above, it is recommended that the existing 60km/h speed limit for eastbound vehicles should be retained when the speed limit signs are relocated (rather than the previous 80km/h).

It should be noted that as the posted speed limits exist currently, sight distance to the west is deficient. Given this proposed change to speed limits, the sight distance to the west has been reassessed. Austroads Safe Intersection Sight Distance (SISD) is considered the appropriate design standard for sight distance for a rural arterial intersection. The SISD requirement for a 70km/h design speed (considered appropriate with a 60km/h posted speed in this instance), 2.0s reaction time, and 3.0s observation time is 151m.

Photograph 2 below shows the sight distance to the west from the subject intersection.

Photograph 2: Sight Distance to the West



To the west, sight distance measures 138m when assessing driver height for a car and 182m when assessing driver height for a truck and therefore satisfies SISD requirements for trucks but not cars. Although the new speed limits will result in a compliant sight distance for the additional trucks, the Stage 1 consent upgrades (including high friction surfacing) are still recommended to be implemented.

5.2 TURNING MOVEMENTS

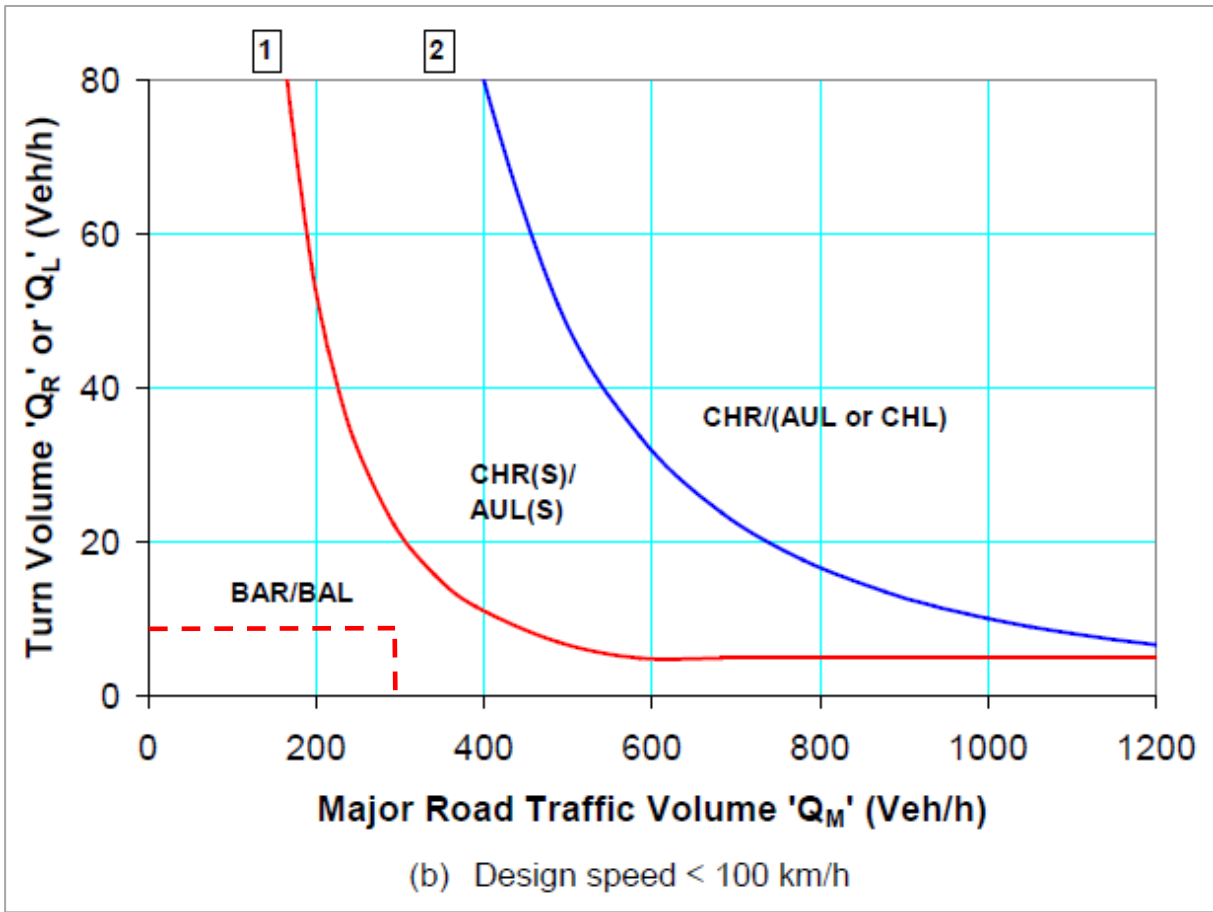
5.2.1 PEBBLE BROOK ROAD / WAITOKI ROAD INTERSECTION

The Austroads Guide to Road Design has been reviewed to inform the recommended treatment for turning vehicles. Through volumes are taken from the Pebble Brook Road turning count detailed in Section 2.3.

The peak hour flow on Waitoki Road in the vicinity of the Site measured 296vph (two-way movement) in the AM peak hour. Assuming a worst case scenario of 100% of truck movements turning right into

the Site, this results in 9 right turning movements into Pebble Brook Road in the peak hour. Figure 6 below details the turning warrants, sourced from the Austroads Guide, for the Proposal.

Figure 6: Recommended Turning Treatment



As detailed above, Austroads Section 4.8 recommends a basic right turn treatment (i.e. not a full right turn bay) to serve the Proposal. The existing intersection is considered to provide basic turning facilities, and therefore no additional mitigation measures (beyond those approved as part of Stage 1) are considered necessary.

5.3 PEBBLE BROOK ROAD

Pebble Brook Road is currently being widened to accommodate the movement of two large trucks as part of the Stage 1 consent, between the Pebble Brook Road / Waitoki Road intersection and the existing quarry access. Additional safety measures are also being included as part of the Stage 1 Engineering Plan Approval process. From on-site investigations and the calculations detailed in this report, the Stage 2 increase of traffic in the peak hour can be suitably accommodated by the upgraded road network.

As detailed above, the road carriageway is being widened and upgraded, and therefore it is considered all road users can continue to use Pebble Brook Road safely in both Stages of the quarry operation. These road upgrades are expected to be completed imminently, with the quarry being operational shortly thereafter. As such, the proposal is considered acceptable.

6 PARKING

Given the size of the quarry, the Site can readily satisfy the Unitary Plan rules with respect to provision of heavy vehicle, light vehicle and bicycle parking. The parking provided should also satisfy the dimensional and gradient requirements of the Unitary Plan. All parking spaces will be accommodated on-site.

7 WIDER EFFECTS

The Site gains direct access to Pebble Brook Road, and then to Waitoki Road / Wainui Road or Waitoki Road / Kahikatea Flat Road. In this regard, the wider road network provides roading links that cater predominantly for through traffic. These main roads help to facilitate the safe and efficient movement of people and goods between urban and rural centres. With suitable access provided to the arterial road network, the trucks are able to directly access a road which is specifically designed to accommodate large vehicles / goods.

Accordingly, the road network (with the upgrades for Stage 1) is considered suitable in terms of both design and capacity to accommodate the additional trucks. The Proposal has the following advantages:

- The managed quarry generally generates peak movements outside commuter peaks; and
- The access and local network will be upgraded as part of the Stage 1 consent.

As such, the proposed wider network is considered suitable to accommodate the additional development traffic.

8 CONCLUSION

With regards to the proposal to establish Stage 2 of the quarry at 162-306 Pebble Brook Road, the assessment can be summarised as follows:

- The quarry activity is not expected to exacerbate the safety record within the area (subject to the recommendations detailed below);
- The minor increase in traffic generation as a result of the Stage 2 quarry (over that considered for Stage 1) is considered to have a minimal effect on the surrounding road network;
- The proposed access point satisfies relevant sight distance requirements;
- The Waitoki Road / Pebble Brook Road intersection satisfies SISD requirements for trucks for a 70km/h speed limit; and
- The surrounding road network is designed to accommodate trucks and have sufficient capacity to accommodate the additional truck movements.

It is recommended that:

- The existing speed limits on Waitoki Road should remain, however the change to 60km/h should be relocated to 150m west of the Pebble Brook Road intersection (location as per previous Stage 1 TAR); and
- The Stage 1 consented road upgrades are implemented before Stage 2 commences. As noted above, these upgrades are expected to be completed imminently.

Accordingly, and subject to the above recommendations, it is concluded that there are no traffic engineering or transportation planning reasons that would preclude the development of the Site as proposed.

Yours sincerely

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