Appendix 8

ITA Peer Review by Bloxam Burnett & Olliver

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29 October 2020

Job No. 138630.171

Hayley Thomas
Project Planner
Waipa District Council

Dear Hayley,

ITA Peer Review: 928 Kaipaki Road Sand Quarry and Clean Fill Consent Application

As requested, Bloxam Burnett and Olliver Ltd (BBO) have carried out an independent peer review of the Integrated Transport Assessment (ITA) for the proposed Sand Quarry and Clean Fill at 928 Kaipaki Road.

Information provided for referral in this review is as follows:

- The AEE for the consent application by Mitchell Daysh, dated 26 April 2020
- The ITA report by Gray Matter; Appendix E of the AEE, dated 21 April 2020
- Email of concern by Helen and Warwick Hartstone to Hayley Thomas, 28 September 2020
- Submission in Opposition by Hamilton Fieldays Society Inc
- Submission in Opposition, K&A Walker
- Submission in Opposition, R&D Comez
- DE Internal Comments

1. Overview of the Proposal

The proposal is to consent a sand extraction and clean fill site at 928 Kaipaki Road.

The AEE states[1] that the site *"has the potential to supply over 900,000 cubic metres of sand over the next 7-10 years. The volume extracted may vary dependent on further detailed analysis."*

I note the ITA report refers to the 900,000 m^3 volume as a maximum although there is no proposed volume limit in the applicants offered draft conditions of consent. The AEE alludes to the fact that the total volume of sand extraction could be up to 2,200,000 m^3.

While the overall volume of sand extraction does not necessarily affect the traffic mitigation given the proposed daily traffic generation limits, it does impact on the total pavement impact contribution. (Refer Section 6 for further explanation).

[1] Assessment of Environmental Effects, Mitchell Daysh 26 April 2020; Section 3.1

2. Summary of Peer Review Findings

The ITA report primarily focuses on calculating the predicted trip generation, trip distribution on the network and potential effects and mitigation/upgrade measures needed at the proposed entrance and access way to the site from Kaipaki Road.

With exception to the recommended "Diagram E" access upgrade form, I generally agree with the ITA's suggested effects mitigation and recommended conditions of consent although I note the maximum and average daily heavy vehicle movement limits of 133 vpd and 106 vpd respectively, do not actually influence the peak hour flow rate or direction of travel of HCV trips which are the primary determinants for suitability of the proposed access form.

For example, if the peak hour demand volume for sand proves to be 12% of daily trip generation and 100% of demand is from Hamilton, or 15% of daily trips with 80% of demand from Hamilton then either situation would warrant the provision of a right turn bay according to Austroads[2], irrespective of other safety considerations warranting the same. The ITA assumes the peak hour demand will be ≤ 10% of daily total trips.

In addition to trip generation suitability is the question of the mitigation being suitably safe for all road users. To that end it is my opinion that the form of road widening at the site entrance be enhanced for safety, taking into account the influence of the following:

- Regular fog occurrence limiting forward sight distance and reducing clarity of the through-traffic travel path.
- The high speed rural environment
- Potential for greater than 8 HCV/hr from the north given the example above
- The presence of road cyclists
- Expected future commuter volumes on Kaipaki Road over the life of the quarry, particularly in the AM peak when traffic is predominantly northbound and fog is more likely in winter.
- An electronic warning signs to light up when a truck is detected exiting the site or turning into the site.

Accounting for these factors, it is my recommendation that a rural right turn bay is the more appropriate entrance form for this activity type at this particular location, to maximise safety for the travelling public. This should be implemented with a realigned access road to ensure a 90 degree intersection is created.

As a result of this peer review, if consent is granted I recommend the following amendments be adopted into the proposed conditions of consent:

- Underlined words to update the existing Condition 29 in italics below;

  The consent holder shall submit engineering plans detailing the vehicle crossing and proposed haul road to the Council's Manager Development Engineering for approval in a technical certification capacity in advance of any construction works being undertaken. The design should be in general accordance with NZTA Manual of Traffic Signs and Markings, "Rural Right Turn Bay" Figure 3.25 and *include:*
  (i) Heavy vehicle tracking for the design vehicle;
  (ii) Details for the location and size of the splitter island;
  (iii) Location of the proposed access gate and the extent of sealed access being no less than 100 m from the road reserve boundary

[2] Austroads Guide to Road Design Part 4 Intersections and Crossings General, Figure A 10; 7 veh/hr right turn in

(iv) Details of access to the residential dwelling;
(v) Details of the proposed sealed access road 6m wide or 3m wide with passing bays at maximum 100m spacings; and
(vi) Size and spacing of any passing bays on the proposed access road.

- That the site entrance upgrade includes an access road aligned to 90 degrees from Kaipaki Road to maximise efficiency of turning trucks and therefore safety for the travelling public.
- Provision of Traffic Control Devices Manual compliant electronic permanent warning signs on Kaipaki Road approaches to the quarry entrance that are triggered and lit / operational when trucks are crossing. The detection system shall be design to be fit for purpose to detect trucks entering the right turn bay, slowing to turn left into the site access, and exiting from the site access.
- A monitoring and trigger condition relating to the provision of a right turn bay at Kaipaki Road / Mellow Road intersection if the right turn into Mellow Road consistently (over at least one typical month of weekday AM peak hours) exceeds 8 vehicles per hour.
- That the security gate on the quarry access be set back a sufficient distance to allow for queuing of three HPMV truck and trailer units without extending into the road reserve.
- That all transportation of sand from the site shall be by covered truck and trailer units to avoid spillages on the road and creating safety and dust nuisances.
- No quarry related trucks shall use McEldownie Road and the south end of Mystery Creek Road.

In addition, the applicant should review the HVIF calculation taking into consideration the bullet point items identified in Section 6 of this peer review. The resulting revised HVIF should be included in the conditions of consent. Key components of the revised calculation include:

- Allowing for 276 days per year, not 250 as per the ITA spreadsheet
- 80% of sand demand and clean-fill to the north from Hamilton
- A total sand extraction volume of 2,200,000 m^3

3. Quarry Trip Generation and Distribution

The recommended access mitigation involving a "Diagram E" upgrade is reliant on a number of trip generation assumptions proving true at maximum consented production (200,000 m^3) and an assumed maximum weekly production of 5000 m^3, including:

- The peak trip generation flow rate being ≤ 10% of the maximum daily volume (133 HCVpd). Ie the trip generation profile is essentially flat over a 10.5 hour working day. This implies there is no particular AM inbound peak flow at the beginning of each day that could take the right turn flow rate over the Austroads warrant threshold (8 vph). However, it is not unrealistic to consider that five truck and trailer units and four staff arrive from Hamilton between 6:45am and 7:45 am.
- Sand demand is evenly spread across every hour each day, for each week over 12 months. (Unrealistic especially if the sand is suitable for roading and civils construction which concentrates in the construction season from October through end of April).
- The majority of demand for sand over the life of the quarry will be from the south (70%) rather than the north (30%). This works in favour for justifying the proposed Diagram E widening, but does not appear to recognise the future development of 6000 plus households in the Peacocke area approximately 15 km away, or the significant roading and other infrastructure projects in that area to establish the new suburb. Construction of NZTA's Southern Links roads might also commence within the life time of the quarry, in which case a significant volume of sand is likely to be required. Furthermore given the location of the Coombes Quarry closer to Cambridge, it would appear that the majority of future sand demand for this site will come from the north rather than the south.

- Future peak hour traffic volumes on Kaipaki Road over the life of the quarry do not increase significantly from existing volumes. Again this is unlikely given the ongoing growth in housing on the west side of the river in Cambridge, strengthening the commuter route on Kaipaki Road to Hamilton.

If the peak hour demand volume for sand proves to be 12% of daily trip generation and 100% of demand is from Hamilton, or peak hour is 15% of daily trips with 80% of demand from Hamilton then either situation would warrant the provision of a right turn bay according to Austroads[3], irrespective of other safety considerations warranting the same.

Even if the proposed Diagram E widening is theoretically sufficient (although borderline) to accommodate the potential worst case trip generation, in my view the ITA has not adequately considered the susceptibility of the location to fog (Hamilton (at Ruakura) experiences 38 fog days per year on average[4]) and the inherent crash risk this would create on such mornings during the commuter peak period. Sunrise during mid-winter months occurs after 7am so it is probable that first trucks of the day could arrive in dark foggy conditions.

A Diagram E upgrade provides a minimum 6m wide carriageway, made up of a 3.5 m wide lane and a 2.5m wide sealed shoulder. This is suitable for low turning volumes where visibility for through traffic to right turning traffic is not regularly restricted. However in fog, it is not unforeseeable that the driver of a vehicle travelling south toward Cambridge would be guided by the lane edge and centre-lines and not deviate into the widened shoulder around a stationary right turning vehicle in the through lane. Combined with the open road speed environment, colliding with the back of a stationary truck could very likely result in death or serious injury to the vehicle occupants. This safety concern is also raised in the submission of Helen and Warwick Hartstone.

4. Wider Network Effects

Having reviewed the ITA and trip generation calculations in context of the traffic volumes on Mystery Creek Road, Kaipaki Road and Airport Road, I consider that the effects on intersections in the wider network from the proposed traffic generation of the site will be minor at worse (with potential exception to the safety performance of Kaipaki Road / Mellow Road intersection) given the proposed limit of 133 HCV per day.

Even if 100% of HCV trips from the north this will concentrate at most, 20 additional movements per hour (10 in and 10 out for which the north and south split is likely to be even) at the intersection of SH21 / Mystery Creek Road. The intersection of Mystery Creek Road and Airport Road is a well formed rural right turn bay intersection with excellent sight distance in both directions, and even with the expected future traffic growth associated with Titanium Park and the airport, this intersection will continue to function at a safe and acceptable level of operation with this hourly quarry traffic volume added.

Regarding the Kaipaki Rd / Mellow Road intersection, the ITA identifies[5] the potential need to upgrade this to include a right turn bay for safety if the number of right-turning vehicles consistently exceeds 8 veh/hr. But there is no further discussion about monitoring traffic flows or the inclusion of a trigger in the proposed consent conditions that formalises when and how this upgrade should be done.

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[3] Austroads Guide to Road Design Part 4 Intersections and Crossings General, Figure A 10; 7 veh/hr right turn in

[4] https://niwa.co.nz/sites/niwa.co.nz/files/WaikatoClimate-ver2-web.pdf

[5] ITA section 3.8.3

I recommend that a monitoring and trigger condition be included in this consent if granted, for provision of a right turn bay at Kaipaki Road / Mellow Road intersection if the right turn into Mellow Road consistently (at least one month of weekday AM peak hours) exceeds 8 vehicles per hour.

5. Submissions in Opposition

I have reviewed the submissions in opposition where they relate to traffic concerns.

The NZ National Fieldays Society

The NZ National Fieldays Society (NZFS) considers that traffic efficiency and safety on the network will be significantly adversely impacted by the additional traffic movements associated with the proposed sand quarry, particularly during the annual Fieldays event at Mystery Creek Events Centre and in the before and after periods during set-up and pack-down.

I disagree with this opinion on the basis that the maximum additional hourly volume increase given the daily limit of 133 HCVpd would be 20 HCV (10 in each direction) on Mystery Creek Road. This assumes that the peak hour trip generation proves to be as high as 15% of the daily flow, not 10% as per the ITA, and 100% of quarry trips are to and from Hamilton via Mystery Creek Road (ie, none use Kaipaki Road to and from SH3).

The addition of 10 HCV movements per hour in each direction will make no tangible difference to the performance of the TMPs that the NZFS operate during Fieldays, which accommodate over 2000 vph in one direction during the peak arrival and departure periods of the event. Similarly, the additional truck movements will have no impact on the performance of the SH21 / Mystery Creek Road intersection safety. This is particularly so as that intersection is under full traffic management control during those peak event flows. Furthermore, other mitigating factors include that the sand quarry is unlikely to be operating consistently at full production during winter months, which is when the Fieldays event is run. However, even if it were at full production and maximum daily trips there is an alternative route to the site via Kaipaki Road / SH3. It is likely sand haulage operators would avoid the Fieldays traffic queues on Airport Road and Mystery Creek Road on the inbound trip by using this alternative route. The return trip loaded with sand would be in the opposite direction to the AM peak inflow to Fieldays, which would create negligible effect travelling via Mystery Creek Road.

Helen and Warwick Hartstone

The Hartstone's requested that Waipa District Council obtain a further review of the road safety issues due to concerns relating to the ITA report in their opinion not taking adequate account of:

- Peak commuter traffic flows on Kaipaki Road
- Peak "traffic densities" during Fieldays and other events
- Safety of the proposed Diagram E entrance
- The assumed predominant distribution of quarry trips to the south (70%) over demand from Hamilton.
- Safety on Kaipaki Road particularly due to fog and the lack of proposed speed reduction measures past the entrance
- Safety of cyclists

As part of this further safety review, I have addressed the issue of traffic effects during Fieldays and note that other events at Mystery Creek are much shorter duration and/or generate significantly less traffic. Therefore, even if the quarry is operating at the maximum daily trip generation of 133 HCV per day, it is very unlikely there will be any more than 20 movements per hour added to Mystery Creek Road. As

mentioned, the addition of 10 truck movements in each direction per hour will have negligible effect on traffic performance at the intersection or during events. There is also an alternative route for haulage operators to avoid Event traffic congestion, which I consider they would likely prefer at such times.

I have addressed the issue of peak commuter flows on Kaipaki Road. I agree this has not been adequately taken into consideration in the ITA in my opinion, and accordingly I recommend the entrance upgrade be to a higher standard than proposed, including a right-turn bay treatment with consideration in the design to cyclist safety and inclusion of electronic warning signs either side of the entrance which temporarily flashes yellow lights around a message board with LED words lit up "Caution Trucks Turning" when a truck is detected entering or exiting the site.

I agree that the predominant distribution of quarry trips will be to and from the north given the market demand in Hamilton in the near future. Although the ITA assumes the predominant trips will be south, I note it does actually address the scenario of all trips being to the north. Regardless, I consider that my recommendation for the entrance upgrade to include a right turn bay intersection will appropriately mitigate the safety effects associated with trips being predominantly to and from the north.

Amanda and Keith Walker

The Walker's live opposite the site and raise similar traffic concerns to the Hartstone's. They consider the mitigation should include:

- A right turn bay for traffic turning into the Site
- A reduced speed limit along that section of Kaipaki Road extending 500m to the east and 1200m to the west;
- Double yellow no overtaking lines along Kaipaki Road extending along the area of reduced speed as above.
- An acceleration and deceleration lane for heavy vehicles to the Site;
- A redesign of the entry to the Site to provide a safer access and reduce conflict with other traffic;
- The Site gates moved 100m further into the Site to ensure there is sufficient parking for trucks that arrive earlier than the opening time;
- No parking signs along Kaipaki Road for at least 500m in each direction.

I have recommended a right turn bay treatment at the access with consideration to including the electronic warning signs described above. I consider that the sign would be significantly more cost effective and potentially offer greater safety than an acceleration and deceleration lane, which are not typically favoured for entrance way treatments. Such auxiliary lanes can lead to other safety issues, particularly where large trucks are involved.

No passing lines are included where a right turn bay intersection is provided.

I agree with the Walker's that the gate should be inset into the site, maybe not 100m, but a sufficient distance to accommodate at least three truck and trailer units parked before opening time. No parking signs on Kaipaki Road can only be implemented and enforced by Waipa District Council. I expect Council would only do this if there was clear evidence such parking was occurring on Kaipaki Road causing safety issues and there was no other way to address it. However, a better alternative would be to increase the parking space within the site if there is an issue on Kaipaki Road, so I do not agree that no parking lines and signs should be implemented.

Rob and Debbie Comez

Rob and Debbie Comez raise similar concerns to the Walkers about traffic effects at the entrance, which I have addressed already above. They also raise dust and noise from HCVs accessing the site as significant concerns given their locality at 914 Kaipaki Road.

Noise is not my field of expertise so I offer no comment on that. Dust due to trucks entering and exiting the site is proposed to be mitigated by the following:

- Sealing of the entrance way and site access road along the site's eastern boundary for the first 100m
- A wheel wash facility to be used during winter months before exiting the site.

I recommend that a condition is also included that all transportation of sand shall be covered to avoid spillages on the road and creating dust.

6. Heavy Vehicle Pavement Impact Fee (HVIF)

I have reviewed the HVIF calculations in the ITA report. The calculation spreadsheet is in pdf form so I could not check and confirm the specific cell formulae, however I have considered the input values and run some independent calculation checks.

The spreadsheet formulae appear to be correct, however I note that the reported rate for Sand haulage only (excluding back-loads of clean fill or separate clean fill trips) is based on 250 days per year instead of 276 per year as identified earlier in the ITA. Correcting that raises the levy for sand haulage from $0.049/T to $0.055/T (pre NZTA subsidy).

The ITA calculation is also on the basis of 70% of trips to the south, and 30% north, which I have expressed concern with as an assumption in this review. Changing this to 80% north and 20% south in line with what I consider to be more realistic results in an increase of almost 100% to the levy per Tonne of sand. I calculate the impact levy to be $0.097 / Tonne compared to the ITA calculation of $0.049 / Tonne. My calculations are attached.

In addition, the overall pavement impact contribution calculated in the ITA for the sand haulage is $70,338. This is based on 900,000 m^3 of sand in total. However, this is not a proposed maximum limit.

Instead the ITA identifies that the total sand could be as much as 2.2 million m^3. On this basis the total pavement impact contribution would be $182,980 for sand haulage alone, based on the ITA's 30/70 north/south distribution, or $341,500 based on my suggested 80/20 split.

Given my calculations are not the complete picture (clean-fill haulage is excluded) I recommend the applicant reviews the HVIF calculation in the ITA taking into consideration:

- Predominant trip distribution being likely to the north by a significant margin over south (suggest 80/20 as more realistic), unless there is clear market research evidence to demonstrate that this expectation is incorrect.
- The number of proposed days of operation per year is 276.
- Updating the HVIF component for clean-fill import, taking account of both back-load and single load (no sand) trip scenarios.
- A total sand extraction volume of up to 2.2M m^3, and therefore clean-fill of similar.
- Confirmed existing HCV volumes on Kaipaki Road, Mellow Road and Mystery Creek Road through actual count data, rather than estimates from Mobile Road.

7. Conclusion

As a result of this peer review I consider that the effects of the proposed sand quarry and clean-fill operation can be managed to be no more than minor, provided the following recommended amendments to proposed mitigation measures are incorporated into the proposed conditions of consent:

- Underlined words to be included in proposed Condition 29;

  The consent holder shall submit engineering plans detailing the vehicle crossing and proposed haul road to the Council's Manager Development Engineering for approval in a technical certification capacity in advance of any construction works being undertaken. The design should be in general accordance with NZTA Manual of Traffic Signs and Markings, "Rural Right Turn Bay" Figure 3.25 and *include:*
  (i) Heavy vehicle tracking for the design vehicle;
  (ii) Details for the location and size of the splitter island;
  (iii) Location of the proposed access gate and the extent of sealed access being no less than 100 m from the road reserve boundary
  (iv) Details of access to the residential dwelling;
  (v) Details of the proposed sealed access road 6m wide or 3m wide with passing bays at maximum 100m spacings; and
  (vi) Size and spacing of any passing bays on the proposed access road.

- That the site entrance upgrade includes a realigned access road to 90 degrees from Kaipaki Road to maximise safety for the travelling public.

- Provision of Traffic Control Devices Manual compliant electronic permanent warning signs on Kaipaki Road approaches to the quarry entrance that are triggered and lit / operational when trucks are crossing. The detection system shall be design to be fit for purpose to detect trucks entering the right turn bay, slowing to turn left into the site access, and exiting from the site access.

- A monitoring and trigger condition relating to the provision of a right turn bay at Kaipaki Road / Mellow Road intersection if the right turn into Mellow Road consistently (over at least one typical month of weekday AM peak hours) exceeds 8 vehicles per hour.

- That the security gate on the quarry access be set back a sufficient distance to allow for queuing of three HPMV truck and trailer units without extending into the road reserve.

- That all transportation of sand from the site shall be by covered truck and trailers to avoid spillages on the road and creating safety and dust nuisances.

- No quarry related trucks shall use McEldownie Road and the south end of Mystery Creek Road.

In addition, I recommend that the applicant reviews the HVIF calculation taking into consideration the bullet point items identified in Section 6 of this review, and the resulting revised HVIF is included as a condition of consent.

Yours sincerely,
Bloxam Burnett & Olliver

Cameron Inder
Transportation Engineering Manager
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2,200,000 m3 with 70% South to Cambridge

Total Extracted Volume	2,200,000	m3		
average cu.m per load	15	m3		
duration	11	years		
Volume per year	200000	m3	less than 200,001?	YES
Days/year	276			
Average # HCV per day	**97**			

		Section length	Existing DESA	Proportion	Additional tyraffic	direction factor	HVs / lane	ESA/HVAG	NHVAG	ESA/Veh	DESA	Renewal cost per km	Financial Contr
		km			hcv/day							**$ 350,000**	
1	Kaipaki Rd west to McEldownie	2.3	3431117	0.3	29.0	0.5	4000	0.6	3	1.8	79200	$ 805,000	$ 18,581.70
2	Kaipaki Rd, McEldownie to Mellow	1.3	2052994	0.3	29.0	0.5	4000	0.6	3	1.8	79200	$ 455,000	$ 17,552.90
3	Kaipaki Rd, Mellow to Tarr	1.8	2052994	0.1	9.7	0.5	1333	0.6	3	1.8	26400	$ 630,000	$ 8,101.34
4	Kaipaki Rd, Tarr to SH3	3.8	1857470	0.1	9.7	0.5	1333	0.6	3	1.8	26400	$ 1,330,000	$ 18,903.13
5	Mellow Rd	0.75	820987	0.2	19.3	0.5	2667	0.6	3	1.8	52800	$ 262,500	$ 16,882.12
6	Mystery Creek Rd, Mellow to SH21	3.6	1686756	0.2	19.3	0.5	2667	0.6	3	1.8	52800	$ 1,260,000	$ 39,441.39
7	Kaipaki Rd east to Cambridge Road	3.9	3431117	0.7	67.6	0.5	9333	0.6	3	1.8	184800	$ 1,365,000	$ 73,518.92
											501600		

	Total cost	$/T
	$ 192,981.50	**$ 0.055**
Quantity	2,200,000	
CF	1.6	
Tonnes	3,520,000	

2,200,000 m3 with 80% North to Hamilton

Total Extracted Volume	2,200,000	m3		
average cu.m per load	15	m3		
duration	11	years		
Volume per year	200000	m3	less than 200,001?	YES
Days/year	276			
Average # HCV per day	**97**			

		Section length	Existing DESA	Proportion	Additional tyraffic	direction factor	HVs / lane	ESA/HVAG	NHVAG	ESA/Veh	DESA	Renewal cost per km	Financial Contr
		km			hcv/day							$ 350,000	
1	Kaipaki Rd west to McEldownie	2.3	3431117	0.8	77.3	0.5	10667	0.6	3	1.8	211200	$ 805,000	$ 49,551.21
2	Kaipaki Rd, McEldownie to Mellow	1.3	2052994	0.8	77.3	0.5	10667	0.6	3	1.8	211200	$ 455,000	$ 46,807.74
3	Kaipaki Rd, Mellow to Tarr	1.8	2052994	0.1	9.7	0.5	1333	0.6	3	1.8	26400	$ 630,000	$ 8,101.34
4	Kaipaki Rd, Tarr to SH3	3.8	1857470	0.1	9.7	0.5	1333	0.6	3	1.8	26400	$ 1,330,000	$ 18,903.13
5	Mellow Rd	0.75	820987	0.7	67.6	0.5	9333	0.6	3	1.8	184800	$ 262,500	$ 59,087.42
6	Mystery Creek Rd, Mellow to SH21	3.6	1686756	0.7	67.6	0.5	9333	0.6	3	1.8	184800	$ 1,260,000	$ 138,044.86
7	Kaipaki Rd east to Cambridge Road	3.9	3431117	0.2	19.3	0.5	2667	0.6	3	1.8	52800	$ 1,365,000	$ 21,005.40
											897600		

	Total cost	$/T
	$ 341,501.10	**$ 0.097**
Quantity	2,200,000	
CF	1.6	
Tonnes	3,520,000	

900,000 m3 with 70% South to Cambridge

Total Extracted Volume	900,000	m3			
average cu.m per load	15	m3			
duration	7	years			
Volume per year	128571	m3	less than 200,001?	YES	
Days/year	276				
Average # HCV per day	**62**				

		Section length	Existing DESA	Proportion	Additional tyraffic	direction factor	HVs / lane	ESA/HVAG	NHVAG	ESA/Veh	DESA	Renewal cost per km	Financial Contr
		km			hcv/day							$ 350,000	
1	Kaipaki Rd west to McEldownie	2.3	3431117	0.3	18.63354037	0.5	2571	0.6	3	1.8	32400	$ 805,000	$ 7,601.61
2	Kaipaki Rd, McEldownie to Mellow	1.3	2052994	0.3	18.63354037	0.5	2571	0.6	3	1.8	32400	$ 455,000	$ 7,180.73
3	Kaipaki Rd, Mellow to Tarr	1.8	2052994	0.1	6.211180124	0.5	857	0.6	3	1.8	10800	$ 630,000	$ 3,314.18
4	Kaipaki Rd, Tarr to SH3	3.8	1857470	0.1	6.211180124	0.5	857	0.6	3	1.8	10800	$ 1,330,000	$ 7,733.10
5	Mellow Rd	0.75	820987	0.2	12.42236025	0.5	1714	0.6	3	1.8	21600	$ 262,500	$ 6,906.32
6	Mystery Creek Rd, Mellow to SH21	3.6	1686756	0.2	12.42236025	0.5	1714	0.6	3	1.8	21600	$ 1,260,000	$ 16,135.11
7	Kaipaki Rd east to Cambridge Road	3.9	3431117	0.7	43.47826087	0.5	6000	0.6	3	1.8	75600	$ 1,365,000	$ 30,075.92
											205200		

	Total cost	$/T
	$ 78,946.98	**$ 0.055**
Quantity	900,000	
CF	1.6	
Tonnes	1,440,000	

900,000 m3 with 80% North to Hamilton

Total Extracted Volume	900,000	m3		
average cu.m per load	15	m3		
duration	7	years		
Volume per year	128571	m3	less than 200,001?	YES
Days/year	276			
Average # HCV per day	**62**			

		Section length	Existing DESA	Proportion	Additional tyraffic	direction factor	HVs / lane	ESA/HVAG	NHVAG	ESA/Veh	DESA	Renewal cost per km	Financial Contr
		km			hcv/day							$ 350,000	
1	Kaipaki Rd west to McEldownie	2.3	3431117	0.8	49.68944099	0.5	6857	0.6	3	1.8	86400	$ 805,000	$ 20,270.95
2	Kaipaki Rd, McEldownie to Mellow	1.3	2052994	0.8	49.68944099	0.5	6857	0.6	3	1.8	86400	$ 455,000	$ 19,148.62
3	Kaipaki Rd, Mellow to Tarr	1.8	2052994	0.1	6.211180124	0.5	857	0.6	3	1.8	10800	$ 630,000	$ 3,314.18
4	Kaipaki Rd, Tarr to SH3	3.8	1857470	0.1	6.211180124	0.5	857	0.6	3	1.8	10800	$ 1,330,000	$ 7,733.10
5	Mellow Rd	0.75	820987	0.7	43.47826087	0.5	6000	0.6	3	1.8	75600	$ 262,500	$ 24,172.12
6	Mystery Creek Rd, Mellow to SH21	3.6	1686756	0.7	43.47826087	0.5	6000	0.6	3	1.8	75600	$ 1,260,000	$ 56,472.90
7	Kaipaki Rd east to Cambridge Road	3.9	3431117	0.2	12.42236025	0.5	1714	0.6	3	1.8	21600	$ 1,365,000	$ 8,593.12
											367200		

	Total cost	$/T
	$ 139,704.99	**$ 0.097**
Quantity	900,000	
CF	1.6	
Tonnes	1,440,000	