Integrated Transport Assessment Mt Cooee Landfill Development

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1 Introduction

WSP have been commissioned to do an Integrated Transport Assessment of the proposed Landfill Development at Mt Cooee, for the Clutha District Council,

1.1 Proposal Description

Mt Cooee Landfill is located at 62 Kaitangata Highway, Stirling, and is approximately 1.2 km southeast of Balclutha. The application is for the renewal and expansion of the existing activity and the inclusion of a Resource Recovery Facility, with the following key objectives:

- Separation of operational and public access.
- Safe areas/facilities for the collection of Residual Waste and Garden Waste – currently deposited at the landfill face and on top of the capped landfill respectively.
- Enhanced management of hazardous materials, including provision of a hazardous substances collection point.
- Enhanced management and recovery of bulk recoverable materials and diversion from landfill of Construction and Demolition Waste.
- Management of product stewardship materials, e.g. Agricultural plastics and tyres.
- prioritisation of a 'free' recycling drop-off (and Resource Recovery Centre) prior to crossing the weighbridge.
- Development of a re-use shop where recovered materials can be made accessible to the community.
- Development of a dedicated education space to support environmental training and waste minimisation education activities

1.2 Purpose of this Report

The project will result in an increase of construction vehicle trips using the Kaitangata Highway to the site entrance. WSP have completed an assessment of the transport related impacts of the landfill. In doing so, this Integrated Transport Assessment (ITA) includes the construction impacts and the ongoing increase in vehicle movements once constructed along with consideration of the following matters;

- Details of the existing road network
- An overview of the transport related components of the proposal
- The level of additional vehicular traffic anticipated to be generated by the landfill and the associated effects on the performance and safety of the receiving road network
- The design of the intersection of Kaitangata Highway and site entrance to accommodate the increase in heavy vehicle movements.

This report considers the transportation effects of the Mt Cooee Landfill during both the construction and the operational phases, as well as giving due consideration to the long-term future scenario.

It is anticipated that the transportation effects of the Mt Cooee landfill can be suitably managed with less than minor adverse effect on the surrounding transport environment.

This report should be read alongside the Landfill Design Report (WSP, 2023) and the Design drawing – Resource Recovery Centre Plan C103.

1.2.1 Assumptions

The Council's waste reduction objectives and policies propose that the waste stream will diminish over the life span of the landfill. However, the population growth (0.8%) is likely to add to the waste stream over time. Therefore, the assumption has been made that the current average waste stream from the Council of up to 10,000 tonnes of incoming material (approximately 9000 tones landfill and 700 tonnes green waste) will be maintained for the life of the landfill.

2 Baseline Environment

2.1 Site location

The existing landfill is 16ha and is located adjacent to the Clutha (Mata-Au) River. The site is bounded by the Kaitangata Highway to the west and south and the Main South Railway Line crosses the Kaitangata Highway via an overbridge to the north. There is rural farmland to the east. The location of the site and its surrounds are shown in Figure 1.

Figure 1 Site location shown in red

Access to the site is off Kaitangata Highway, approximately 1.2 km south of Balclutha. The Kaitangata Highway is defined as a District Arterial Road in the Clutha District Plan, for the

"purposes of providing links between centres of population or to larger roads and is heavy traffic route".

The landfill site is Zoned Rural in the Clutha District Plan and is listed under Designations in the plan for "Refuse Disposal".

2.2 Road Network

2.2.1 Kaitangata Highway

Kaitangata Highway is a key Rural Connector (One Network Framework) road linking Balclutha with Stirling. The road is formed as a sealed two-lane carriageway (7.5 m width) with edge lines and a white dashed centre line. There is a rail overbridge located 160 m north of site entrance. The speed limit is 100 km/h and Megamaps has a mean operating speed of 85 km/h. The Average Daily Traffic (ADT) count for the road is 2400 and 18% heavy vehicles (Megamaps, estimate 31/03/2021).

There are no explicit provisions for walking or cycling on this road, however cyclists can use the roadside shoulder.

2.2.2 Crash Records

The Waka Kotahi Crash Analysis System (CAS) was interrogated for a five-year period from 2018 to 2022 on Kaitangata Highway. This shows that there has been one minor injury accident and six non-injury crashes. Most non-injury crashes were from vehicles hitting the overbridge. Only one crash may have concerned the access to the Landfill site, where a northbound vehicle lost control turning right.

2.2.3 Future Baseline Traffic Demand

Using the Mobile Roads data, the projected AADT (Annual Average Daily Traffic) has been calculated for future years and is presented in Table 1.

Table 1 Future Traffic growth (Abley Calculator)

Future Year	AADT (two-way) Forecasted
Current (2023)	2400
2030	2647
2040	2999
2050	3352

2.2.4 Kaitangata Highway Road Realignment

Clutha District Council engaged Stantec to complete a road realignment concept design that will either reduce or remove entirely a height restriction towards Balclutha under the rail bridge. The realignment would move the road towards the river, underneath the trussed section of the bridge. The proposal also allows for road widening at the Landfill Site access.

Figure 2 shows the existing height restriction while Figure 3 show the proposed realignment.

Figure 2 Railway overbridge Height Restriction

Figure 3 - Draft proposed realignment of Kaitangata Highway – Stantec

As the concept design has not been approved by the Clutha District Council, we have not used this concept in the Landfill upgrade.

3 Proposed Landfill Development

The project proposal is described in detail in the Landfill Design Report, with the transportation aspects of the project focusing on:

- Activities relating to construction of the expansion of the landfill
- Day-to-day operation of the landfill.

3.1 Operational Activity

The facility currently has –between two and six operational staff onsite at any one time. The proposed activity with the Resource Recovery centre and Re-use Shop will increase staff working at the site by approximately three people. The landfill and it is presumed that the new Re-use shop and education facility will be open for waste deliveries seven days per week with the following hours of operation:

- Monday – Friday 08:00am – 16:30pm
- Saturday – Sunday 10:00am – 16:30pm
- Christmas day, New Year's Day, Good Friday, Anzac morning: Closed to all vehicles.

Anticipated vehicle number to access the site include the following during operational phases:

- Commercial deliveries
- Delivery of waste
- Members of the public dropping off recycled materials
- Visitors to the reuse shop
- Visitors to the education facility
- During periods of construction, vehicle numbers will increase due to the transfer of clean fill and additional site workers.

3.2 Access and internal road layout

Vehicle access to the site will be provided by the existing site entrance located on Kaitangata Highway. This will be widened to allow room for through vehicles to avoid conflict with turning vehicles.

The new Resource Recovery Centre facilities include a resource recovery shop and education centre and associated carparking. The design allows for separate one-way circulation for public drop-off of recycling and other free to dispose of materials. These activities occur prior to the public weighbridge.

To accommodate the new Resource Recovery Centre the existing access road will be widened and recontoured, with a separate right turn lane for incoming vehicles wishing to access the Resource Recovery Centre.

The proposed widened access and internal layout is shown in Figure 4.

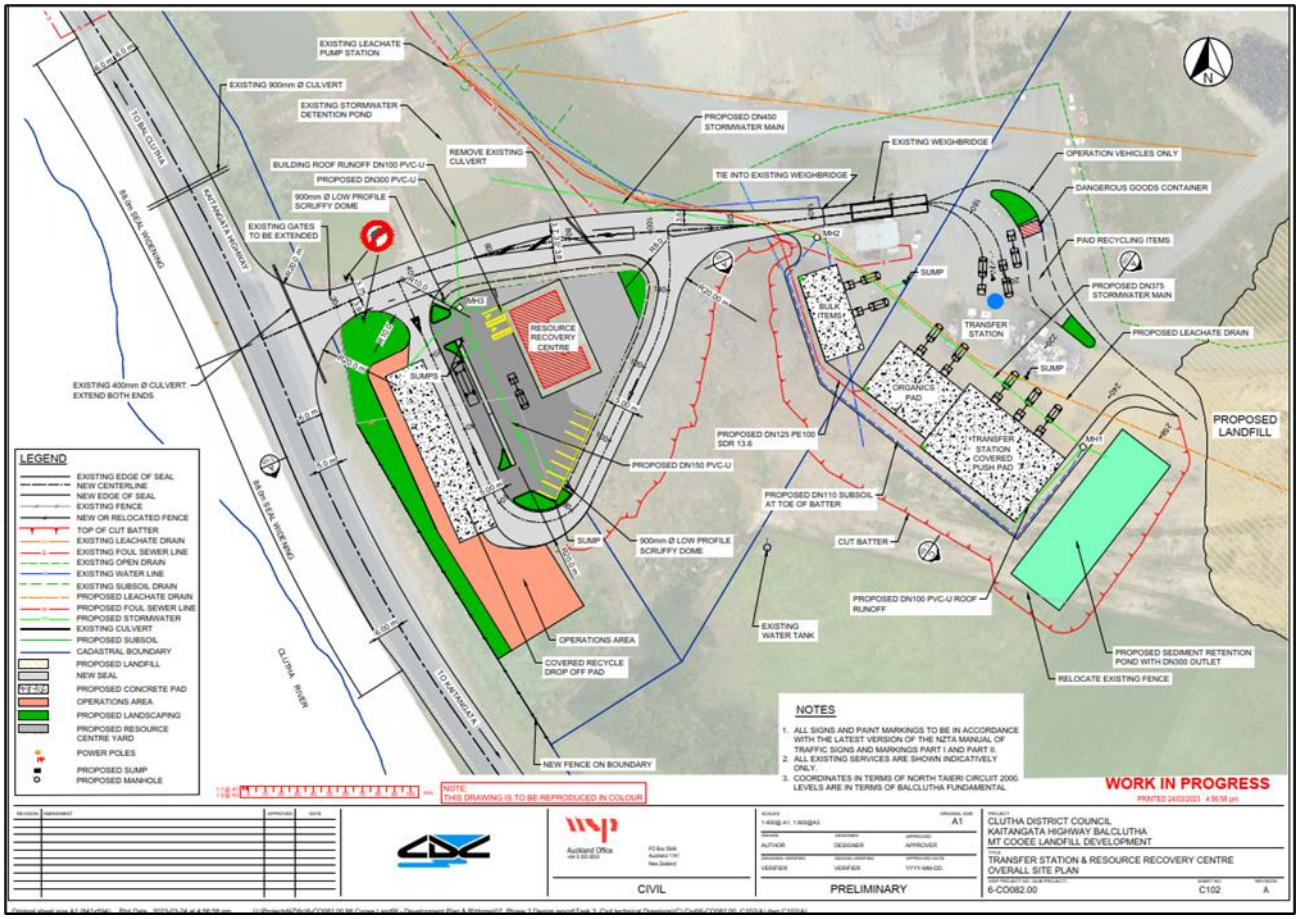

Figure 4 Resource Recovery Centre Plan C103 A

3.2.1 Resource Recovery Centre access

Access to the Resource Recovery Centre will be via a one-way traffic circulation with vehicles either entering from the access road (incoming traffic) or after crossing the weighbridge (outgoing traffic), vehicles will follow a clockwise circulation, with options to pull into a recycling drop off area (under cover), or continue through to the carpark entry of the re-use shop/education centre, or continue out to the main access road, where traffic will be controlled by a give way. Vehicles exiting the carpark will re-enter the Resource Recovery Centre circulation and exit via the main access road.

3.2.2 Drive-through recycling drop-off

A dedicated drop-off area will be provided for unloading of household recycling and reusable materials, the area will be covered by a roof to protect users from the weather and be orientated to the North. Materials will be deposited into nominated recycling containers, with the ability for Council to change material streams as required. Immediately behind the public drop-off area an operation's only area will provide storage for materials and loadout access.

3.2.3 Re-use shop and education centre

The re-use shop and education centre will be developed with a dedicated carparking area (approx. eight car parking bays plus two disability bays) which includes a bus parking bay.

3.2.4 Carparking and traffic circulation

All access and carparking prior to the weighbridge are intended to be sealed, with the added benefit of managing all surface water across the site and allowing clear road marking and site navigation.

3.2.5 Transfer Station

The site has been designed to separate public and operational traffic once vehicles exit the single (existing) weighbridge. Public traffic enters the Transfer Station area with options to unload hazardous materials prior to progressing to a dedicated refuse tipping floor. The tipping floor is an at-grade covered waste receival pad, which allows vehicles to reverse trailers to a vehicle stop and unload directly onto the tipping floor. Operational vehicles working beyond the physical barrier then consolidate materials for transfer to landfill or as recovered materials.

Once public users of the Transfer Station have deposited waste in the appropriate areas, vehicles will follow an exit loop to cross the weighbridge and exit the site via the direct access to Kaitangata Highway.

Operational traffic follows an external circulation that accesses the rear of public facilities, including a connection through to the existing and planned landfill area.

3.3 Site expansion and construction activity

The planned expansion will be undertaken in five stages. A summary of each stage, including the volume to be removed is summarised in Table 2 below.

Table 2 Summary of Landfill cut and fill by development stage

Landfill Cell (Stage)	Landfill Volume (m^3)	Excavated Area (Ha)	Cut Volume (m^3)	Fill Volume (m^3)
ST01	59,200	0.49	32,350	150
ST02	62,200	0.43	5,960	1,850
ST03	79,400	0.44	5,280	110
ST04	69,200	0.00	0	0
ST05	50,400	0.00	0	0
Total	320,400	1.36	43,590	2,110

The stages are proposed over a 35-year period and each stage will be implemented over approximately a one-year period.

In addition to heavy vehicles, there will be construction staff arriving in light vehicles to the site. Construction staff are likely to work typical work hours with most arriving during the morning peak and leaving during evening peak.

3.3.1 *Proposed mitigation measures for construction period*

It is recommended that a Construction Traffic Management Plan (CTMP) is prepared to the satisfaction of the Transport Agency and the Council. The CTMP is to be prepared prior to the commencement of site establishment and construction activities. This is a standard practice required for all land development and major earthworks undertaken, with the CTMP to include details of:

- Construction dates and times of work
- Nature and frequency of activities and traffic movements
- Truck route diagrams between the landfill and the external road network
- Specific measures to be followed when delivering special loads, such as the excavators, to avoid peak periods on the state highway
- Temporary traffic management measures to manage the interactions of construction traffic and other road users in a safe manner including public dropping off waste

It is considered that a CTMP approved by the Clutha District Council will allow the site establishment and construction activities to be appropriately managed so that any generated traffic effects are acceptable.

4 Trip Generation, Assignment and Distribution

4.1 Size and type of Vehicle

The commercial vehicles that are currently operational at the land fill site are shown in Table 3.

Table 3 Vehicle type

VEHICLE	PURPOSE	LENGTH	HEIGHT CLEARANCE
35m³ Collection Vehicle	Mingled recycling	12.5m	4.5m
22m³ Collection Vehicle	Garbage, Organics	9.8m	4m
Hook Lift Truck	Bulk containers (35m³ Skip Collection	10.7m	4m across vehicle path of travel 5m at point of bin lift / set-down
Skip Trucks	Construction and Demolition waste	9.8m	4m across vehicle path of travel 5m at point of skip lift / set-down
Hook-trucks HE vehicles (CWS)	Garbage to landfill	19m	4.6m across vehicle path of travel 5.6m at point of lift / set-down

4.2 Trip Generation

4.2.1 Existing trip generation

The existing daily trip generation from the site is shown in Table 4, data is sourced from the 2017 Solid Waste Analysis Protocols (SWAP) report.

Table 4 Daily vehicle type analysis – Mt Cooee

Vehicle type	# of loads surveyed	% of loads	% of total weight	Tonnes/week
Car	18	15%	0.4%	1 T/week
Compactors	16	13%	35%	59 T/week
Front-loader trucks	19	15%	36%	61 T/week
Gantry Trucks	8	6%	8%	14 T/week
Other trucks	3	2%	6%	11 T/week
Car + trailer	60	48%	14%	23 T/week
TOTAL	124	100%	100%	168 T/week

The SWAP report states, while 48% of waste loads were delivered to Mt Cooee landfill in trailer-sized loads, these loads account for only 14% of total weight of waste.

Front-loader trucks and compactors represented 15% and 13% of loads, respectively. As both types of vehicle carry larger average loads, each disposed of 35-36% of the total weight of waste.

Gantry trucks comprised 6% of loads in total and accounted for 8% of the total weight of waste. Car sized loads comprised 15% of loads but delivered less than 1% of the waste, by weight. Other trucks delivered 6% of all waste.

The vehicle movements are spread out evenly throughout the day. The average trip rate per hour equates to 16 vehicle trips.

4.2.2 Construction stage

The landfill is proposed to be expanded in stages. We have based this assessment on Stage One which is likely to represent the worst-case scenario in terms of traffic generation.

This stage has approximately 32,000m^3 of excavated material that will require off-site transport and approximately 1500m^3 (all via semi-trailer) of materials will need to be transported to the site. The construction period is estimated to be one year.

For the purposes of this assessment, we have assumed that haulage vehicles are:

- Semi-trailer – 22 tonnes capacity (40% of total deliveries)
- Truck & Trailer – 30 tonnes capacity (60% of total deliveries)

4.2.3 Proposed trip generation

The trip rate has been developed using a combination of the existing activity, Stage One construction as per the above parameters (Section 4.2.2), and while the exact details of the day to operations of the proposed new facilities are unknown, we have made assumptions based on similar activities elsewhere. For example, the Re-use shop and Education facility, was based on a similar activity in Timaru and then pro rata to the population.

The resulting trip generation is shown in Table 5.

Table 5 Proposed Trip Generation

Mt Cooee landfill – vehicles	Daily	Peak Hour - two-way movements
Recycling drop of area	28	12
Education facility	16	8
Re Use Shop	78	20
Resource recovery centre • Trailer sized load • Heavy vehicles (day to day operations)	 60 46	 20 12
Construction (Stage 1) • Semi-Trailer • Truck & trailer • Light Vehicle	 6 6 6	 3 3 3
TOTAL	246	81

The predicted numbers are high but as the design is still in its early stages a high number of vehicle movements has been used to show the potential impact of the development.

4.3 Intersection Performance

Figure 5 shows the estimated traffic flows at the intersection of Kaitangata Highway and Mt Cooee Landfill access during the 2030 PM peak period. It is assumed that the trip distribution would be a 70/30 split between Balclutha and Stirling.

It is noted of the two-way vehicle movements during peak shown in Table 5 above, peak period varies throughout the day for the different activities. The commercial activities are evenly distributed throughout the day, while the public related activities have a peak hour of 2 pm. In practice, the total number of heavy vehicles may fluctuate across any given day due to operational requirements.

The intersection has been modelled combining all the peak periods for the various activities into the one PM peak, representing a worst-case scenario.

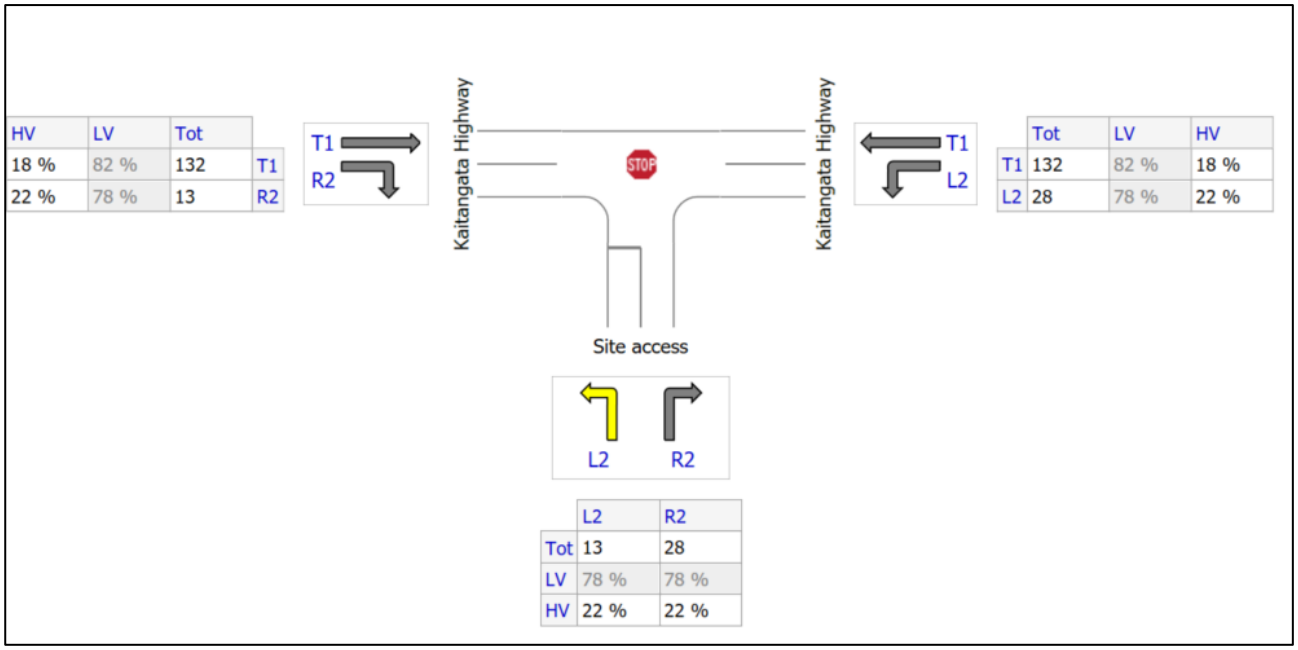

Figure 5 Peak hour movement summary (2030).

The traffic effects of the proposed development on the Kaitangata Highway have been modelled using SIDRA, an industry standard computer-based analysis tool for assessing the performance characteristic of an intersection. When modelled in SIDRA, all movements remain at a Level of Service (LOS) A except for the site access right turn out that drops to a LOS B. This is an index of the operational performance of traffic on a roadway, with LOS A representing the best operating conditions and LOS F the worst. This demonstrates that there will be no adverse effect on Kaitangata Highway because of the Land-Fill expansion.

5 District Plan Assessment

5.1 The relevant transport Polices, and Rules of the Clutha District Plan are presented in Table 6. The table indicates compliance of the development with the rule and provides comments describing any non-compliances.

Table 6 Planning Compliance Table

Rule	Compliance	Comment
Rule 1 Roading Activity Status		
I. Access and Legal Frontage for Developments	Yes	The road and access are existing however the access along with the Kaitangata Highway are proposed to be widened to improve road safety.
II. Internal access on private property in Rural Resource Areas	Yes	The internal access will be sealed with drainage system installed.
Rule 4 Access Standards from a public road		
I. Construction and maintenance	Yes	The internal access will be sealed with drainage system installed. Spacing between access shall not be less than 200 metres – there is only one access.
II. Sight Distance	No	Kaitangata Highway is defined as a District Arterial Road in the Clutha District Plan. Sight distance requires 250m for this road classification. The site access is staying in the existing location and has a an approximately 35 metre shortfall in sight distance to the south.
III. Access to rural state highways and regional arterials.	Not Applicable	
IV. Access to district arterial and collector roads	Mostly	Due to the large size vehicles and volume using the access it is deemed that Figure 11(b) is not appropriate, a higher specification in accordance with '*Guideline for visibility at*

		driveways RTS 6 ' is instead proposed.
Rule 5 loading and manoeuvring		
I. Servicing activities	Yes	Facilities are provided for unload and collection of material at the land fill site. Commercial vehicles will unload separate to the public. There will be no manoeuvres on any part of the road reserve.
II. Scheduled Roads	Yes	No reversing will be undertaken onto the road.
Rule 6 Parking		
I. Parking	Yes	The Resource Recovery Shop is classed as a Commercial Shop as such Table 12 of the Clutha District Plan, has a requirement for parking of one per 40m^2 floor area. The floor area is 400m^2, equates to 10 parking spaces. 10 parking spaces are proposed, including two disability spaces as is shown on drawing - Resource Recovery Centre Plan – plan no. C103 A
II. Construction of Parking Areas	Yes	The proposed parking area will be sealed and include drainage. The parking area meets all the requirements of (II).
Rule 7 Vegetation		
I. Road Reserve Vegetation	Yes	Landscape planting is proposed within the property boundary adjacent to the road reserve and it will be maintained to not overhang the legal roadside boundary.
II. Ice Thaw	Yes	No shelterbelts will be planted within 10 metres of the road reserve.
III. Visibility	Yes	No vegetation will be planted that will impede visibility at the intersection

5.2 Proposed Mitigation

Although the access to the Landfill site is staying in the same location, it has a shortfall of 35 metres sight distance to meet Rule 4 (II), (250 metres required). A view of the sight distance looking south from the site access is shown in Figure 6.

Figure 6 Sight distance southbound

In addition, the access to Kaitangata Highway (arterial road) will not meet Rule 4 – IV, this is due to the large number of heavy vehicles, a higher specification of access is warranted to meet standards.

The access is proposed to be upgraded to meet the requirements of *'Guideline for visibility at driveways (RTS 6), figure 4' – Seal widening on rural arterial roads for high volume driveways - Land Transport Safety Authority, (1993)* as is shown in Figure 7. Additional seal widening near the access will help to mitigate the shortfall in (II) above and provide a higher specification to (IV) by providing more room for manoeuvring and through vehicles to avoid conflicts. The additional seal widening will reduce the disruption to the through flow of traffic on Kaitangata Highway.

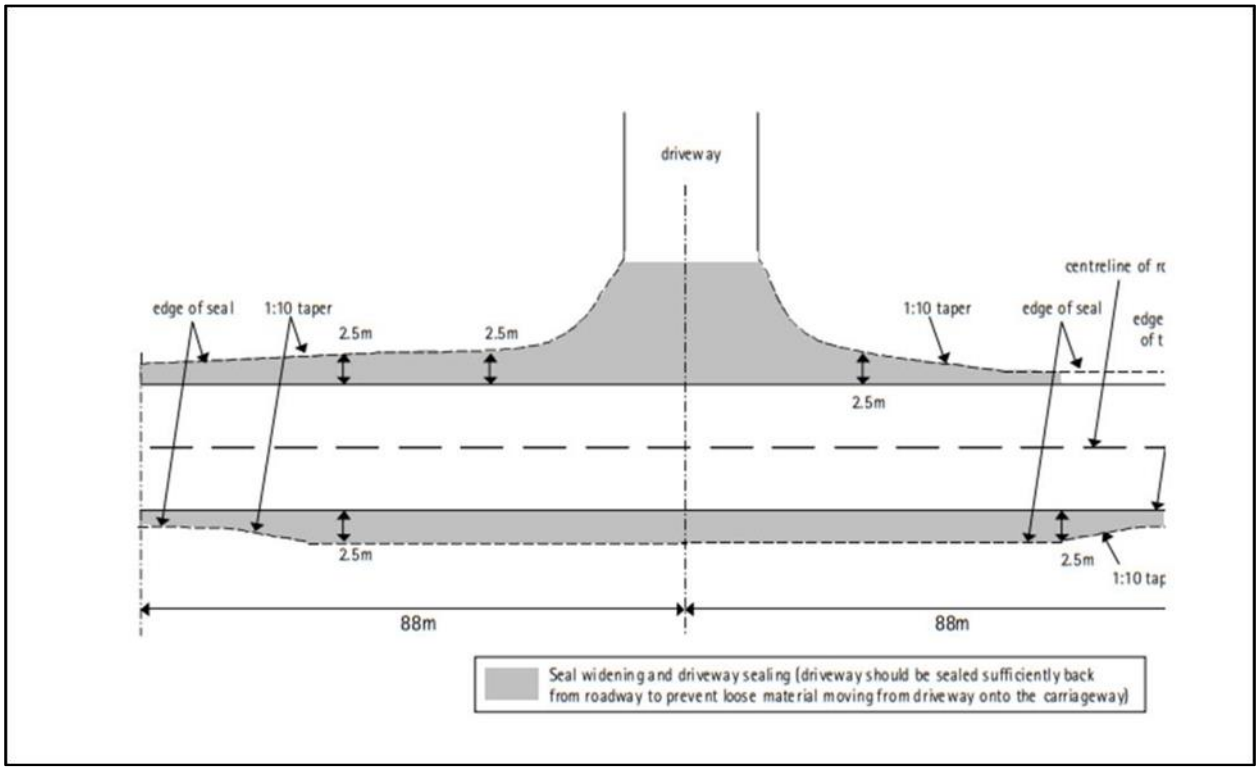

Figure 7 - RTS 6 (Figure 4): Seal widening on rural arterial roads for high volume driveways

6 Conclusion

Although there is a proposed 98% increase in traffic movements to the expanded landfill site over a daily period, the performance modelling of the surrounding road network - Kaitangata Highway demonstrates there will be no more than minor effect.

Overall, it is expected that the transportation effects of the Mt Cooee Landfill development can suitably be managed with the following improvements and mitigations, to address any adverse effects;

- Upgrade the intersection of the Kaitangata Highway with the existing site access to limit the conflict with turning movements, in line with a Safe System approach.

- Construction Traffic Management Plan to be submitted before the construction starts to ensure the construction activities are appropriately managed so that any generated traffic effects are acceptable.