

APPENDIX H – Traffic Engineer Report



Proposed Extension to Use of Field Days Site

Assessment of Transportation Effects



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1. Introduction

- 1.1. Eastern Southland YFC Southern Field Days Incorporated presently operates the biennial Southern Agricultural Field Days event at their site at 575 Waimumu Road, Gore. This is a permitted activity under Rule 4.3.1(1)(d) of the Gore District Plan (**District Plan**). However it is now desired to maximise the opportunities which have arisen to use the site for other temporary activities, which are not covered by Rule 4.3.1(1)(d). Accordingly, consent is now being sought for such activities.
- 1.2. This assessment of transportation effects sets out a detailed analysis of the transportation issues associated with the proposed activities including changes in travel patterns that are likely to arise. Where potential adverse effects are identified, ways in which these can be addressed are set out.
- 1.3. This report is cognisant of the guidance specified in the New Zealand Transport Agency's 'Integrated Transport Assessment Guidelines' and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered as appropriate.





2. Site Overview

2.1. Location

2.1.1. The site is situated approximately 9.4km west of Gore. The location of the site in the context of the local area is shown in Figure 1 and in more detail in Figure 2.

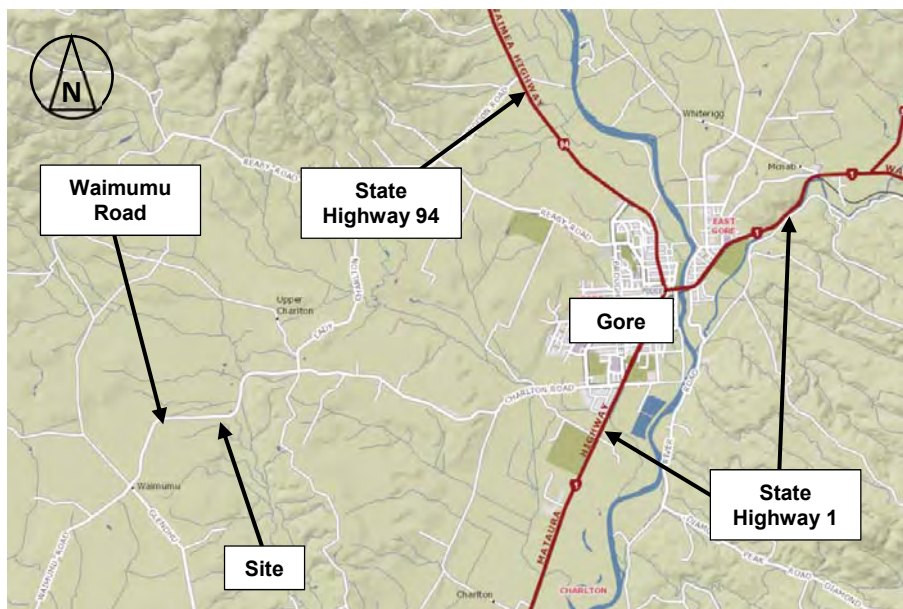


Figure 1: General Location of Development Site



Figure 2: Aerial Photograph of Development Site and Environs



2.2. Road Hierarchy

2.2.1. There is only one road in the immediate vicinity of the site, which is Waimumu Road. The District Plan classifies this as an Arterial Road, indicating a role in accommodating higher traffic volumes and with a high proportion of through traffic.



3. Current Transportation Networks

3.1. Road Network

3.1.1. The general entrance configuration of the site is shown below.

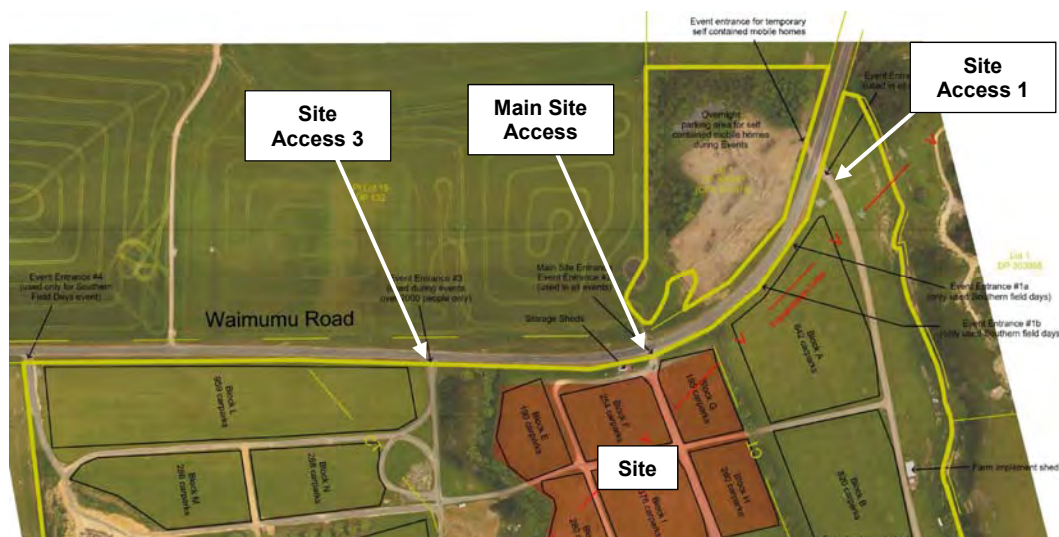


Figure 3: Existing Configuration of Site

3.1.2. As can be seen, the site has access only onto Waimumu Road, on the northern side of the site. In this location Waimumu Road has a carriageway width of 6.3m width, providing one traffic lane in each direction with a 0.8m sealed shoulder and 1m metalled berm. The carriageway has a centreline and edgeline markings. There is a swale on the northern side of the road.



Photograph 1: Waimumu Road Looking West

3.1.3. Towards the west, the road has a flat and straight alignment and rises (as can be seen in Photograph 1). Towards the east, the road curves northwards, with an advisory 75km/h speed limit and PW-17 ('Curve 15° to 90°') signs on the immediate approaches. There are no chevron boards at the curve however.



Photograph 2: Waimumu Road Looking Towards Site and Curve in Road

- 3.1.4. The site access itself is located at the apex of the curve, on the outside. It is formed with two traffic lanes but is unsealed over its whole length, including up to the seal of the carriageway of Waimumu Road. There is a widened shoulder to the immediate east of the access which is 2.8m wide and 55m long, and there is a culvert across the Waimumu Stream around 60m east of the access.



Photograph 3: Main Site Access onto Waimumu Road

- 3.1.5. Because of the curve in the road, sightlines are excellent in this location, being more than 300m towards the west (to the left of an exiting driver) and 200m towards the east (to the right of an exiting driver).



Photographs 4 and 5: Sight Distances to the Left and Right at the Site Access Along Waimumu Road

- 3.1.6. Also of relevance to the current application is a second site access (**Site Access 3**) that is located 200m west of the main site access. This is formed with two traffic lanes but is again unsealed. Sightlines are excellent in this location, being more than 300m towards the west (to the left of an exiting driver) and 240m towards the east (to the right of an exiting driver).



Photograph 6: Site Access 3 onto Waimumu Road



Photographs 7 and 8: Sight Distances to the Left and Right at Site Access 3 Along Waimumu Road

3.1.7. Finally, of relevance, **Site Access 1** is located 235m northeast of the main site access.



Photograph 9: Site Access 1 onto Waimumu Road

3.1.8. This is formed with two traffic lanes but is again unsealed. Sightlines are good in this location, being 200m towards the southwest (to the left of an exiting driver) and more than 300m towards the northeast (to the right of an exiting driver).



Photographs 10 and 11: Sight Distances to the Left and Right at Site Access 1 Along Waimumu Road

3.2. Non-car Modes of Transport

3.2.1. None of the roads in the area have footpaths and there is also no cycling infrastructure. There are no bus stops in the immediate vicinity.

3.3. Future Changes

3.3.1. There are no known changes to the roading infrastructure in the immediate area.



4. Current Transportation Patterns

4.1. Traffic Flows

- 4.1.1. The NZTA Crash Analysis System (**CAS**) includes details of traffic volumes sourced from Council RAMM database. This shows that Waimumu Road presently carries in the order of 650 vehicles per day (two-way).
- 4.1.2. The peak hour volume on a road is typically around 10% to 15% of the daily flow. This therefore indicates a peak hour volume of 65 to 100 vehicles (two-way).
- 4.1.3. The Austroads Guide to Traffic Management Part 3 ('Traffic Studies and Analysis') sets out a method by which the level of service provided by a road can be calculated. Using this method, Waimumu Road presently provides Level of Service A, which is described by the guide "a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream" and where "the general level of comfort and convenience provided is excellent".

4.2. Non-Car Modes of Travel

- 4.2.1. The volumes of pedestrians and cyclists using Waimumu Road can be expected to be very low due to the lack of potential destinations within a viable walking/cycling distance.
- 4.2.2. There are no bus routes which use Waimumu Road.

4.3. Road Safety

- 4.3.1. The NZTA Crash Analysis System has been used to establish the location and nature of the recorded traffic crashes in the vicinity of the site. All reported crashes on Waimumu Road between 2008 and 2017 (plus the partial record for 2018) were identified over a distance of 500m on either side of the site. This showed that there was one reported crash in the area, as set out below.

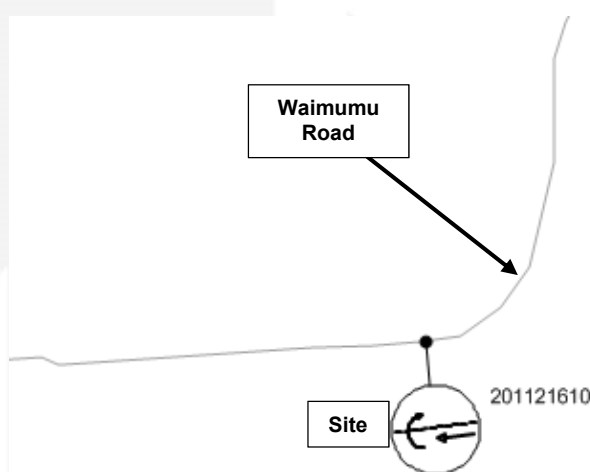


Figure 4: Location of Reported Traffic Crashes



- 4.3.2. The crash occurred when a westbound vehicle stopped and suddenly u-turned in front of a eastbound truck. This did not result in any injuries.
- 4.3.3. The crash record does not indicate any inherent deficiencies in the roading network.
- 4.3.4. As noted above, the sightlines at the main site access are more than 300m towards the west and 200m towards the east. Under the Council's Subdivision and Development Bylaw, these are appropriate for an operating speed of 110km/h and 90km/h respectively. Given that the curve has an advisory speed limit of 75km/h, the sightlines will be appropriate for the prevailing speeds.
- 4.3.5. Sightlines at Site Access 3 are more than 300m towards the west and 240m towards the east, and these are appropriate for operating speeds of 110km/h and 100km/h respectively. This access is some distance from the curve with the advisory speed limit but having slowed to negotiate the curve, vehicles start to travel uphill and hence are constrained in their acceleration. Although the alignment for westbound vehicles is straight, the gradient will limit the speeds and thus a 100km/h operating speed is not unreasonable in this location.
- 4.3.6. Sightlines at Site Access 1 are 200m towards the southeast and more than 300m towards the northeast, and these are appropriate for operating speeds of 90km/h and 110km/h respectively. As with the main site access, since the curve in Waimumu Road has an advisory speed limit of 75km/h, the sightlines will be appropriate for the prevailing speeds.
- 4.3.7. On this basis, it is considered that the sight distances at these three accesses are appropriate for the operating speeds of vehicles on the adjacent road network.





5. Proposal

- 5.1. The proposal is to enable the existing site to be used for a range of events that are unrelated to agricultural activities. It is understood that consent will be sought for a range of activities, and the information provided is as follows:

Type of Event	Length of Event	Number of People per Day	Maximum Number of Events per Year
Festival	1 to 5 days	1,500 to 2,000	1
Sporting Event	1 day	0 to 500	5
		501 to 2,500	6
		2,501 to 10,000	1
Community Events	1 to 10 days	0 to 500	10
		501 to 2,500	5
		1,501 to 2,000	2
Trade Exhibition / Demonstration Events	1 to 5 days	0 to 500	2
		501 to 2,000	1
Corporate Events	1 to 5 days	0 to 500	5
		501 to 5,000	1
Private Functions	1 day	0 to 500	5
		501 to 1,000	1

Table 1: Proposed Activities at the Site

- 5.2. The accesses to the site would remain in their present location, although the proposed activities would result in them being used more frequently. The main entrance would be used for all events, with Site Access 1 only being used for certain types of event. Site Access 3 would only be used for events of more than 2,500 people.



6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. In terms of the traffic generation, the nature of the activity is less relevant because there will be no controls placed on the ways in which people are able to travel to the site, or the times at which they travel. Consequently, for the purposes of assessing the traffic generation, the application is for the following:

Length of Event	Number of People per Day	Maximum Number of Events per Year	Maximum Number of People	Maximum Number of Days
1 to 5 days	1,500 to 2,000	1	2,000	5
1 day	0 to 500	5	500	5
	501 to 2,500	6	2,500	6
	2,501 to 10,000	1	10,000	1
1 to 10 days	0 to 500	10	500	100
	501 to 2,500	5	2,500	50
	1,500 to 2,000	2	2,000	20
1 to 5 days	0 to 500	2	500	10
	501 to 2,000	1	2,000	5
1 to 5 days	0 to 500	5	500	25
	501 to 5,000	1	5,000	5
1 day	0 to 500	5	500	5
	501 to 1,000	1	1,000	1

Table 2: Proposed Activities at the Site for the Purposes of Traffic Generation

6.1.2. This equates to a total of up to 238 days per year where the site may generate additional traffic flows:

- 1 day with up to 10,000 people;
- 5 days with up to 5,000 people;
- 56 days with up to 2,500 people;
- 30 days with up to 2,000 people;
- 1 day with up to 1,000 people; and
- 145 days with up to 500 people.

6.1.3. The traffic generation associated with any large-scale event is difficult to forecast with certainty. However surveys of large sporting-type events indicate an average vehicle occupancy of 3.5 people per vehicle. This compares to travel to social functions where occupancies of 2.5 to 3.0 people per vehicle are typically observed. This shows that as a function becomes larger, the potential for sharing a vehicle also increases and hence occupancy increases also.

6.1.4. In terms of the times at which people could be present, it is known that as an event becomes larger, there is a greater propensity for people to travel at different times in order to avoid the perceived busier periods. Thus for example, at a small event most people will arrive shortly before it starts whereas at a larger event some people will arrive well before it starts, most will arrive in the hour before it starts, and others may arrive shortly after it starts.



6.1.5. On this basis we have calculated the expected traffic generation, allowing for the range of factors and taking a conservative approach to the extent of travel in the peak hours:

Maximum Number of People	Expected Vehicle Occupancy	Total Vehicles Entering Site	Percentage Entering in Busiest Hour	Vehicles Entering Site in Busiest Hour
10,000	3.5	2,860	65%	1,860
5,000	3.5	1,430	80%	1,140
2,500	3.0	835	90%	750
2,000	2.5	800	100%	800
1,000	2.5	400	100%	400
500	2.5	200	100%	200

Table 3: Total Traffic Volumes Generation by Proposed Activities at the Site

6.1.6. With regard to vehicles exiting, typically there are very low numbers as most attendees stay within the site. However there can be a number of drop-offs, either through taxi use, ride-share or coach travel (where the coach subsequently departs). A robust allowance has been made for 10% of vehicles that enter the site to exit again in the peak hours.

6.2. Trip Distribution

6.2.1. In this instance, the distribution of trips will also depend on the nature of the activity. Since the major settlement of Gore lies towards the east, it can be expected that there will be a strong bias in this direction for events which are attractive to the general population. Conversely, events that have a more specialist attraction could have a greater number of people travelling from the west.

6.2.2. For the purposed of this assessment, between 90% and 70% of all travel has been assumed to take place to/from the east.

6.2.3. This results in the following traffic generation to the east and west of the site:

Maximum Number of People Attending	Days per Year	Increase in Vehicle Movements on Waimumu Road in Busiest Hour	
		East	West
10,000	1	1,430-1,840	205-615
5,000	5	880-1,130	125-375
2,500	56	580-745	85-250
2,000	30	615-790	90-265
1,000	1	310-400	45-130
500	145	155-200	20-65

Table 4: Directional Traffic Volumes Generation by Proposed Activities at the Site



7. Effects on the Transportation Networks

7.1. Roading Network Capacity

7.1.1. The Austroads Guide to Traffic Management Part 3 (*Traffic Studies and Analysis*) has again been used to find the level of service for Waimumu Road under each of the scenarios set out above, assuming that the traffic generated by the site coincided with the highest existing volumes on Waimumu Road:

Maximum Number of People Attending	Days per Year	Traffic Volume on Waimumu Road in Busiest Hour		Level of Service	
		East	West	East	West
10,000	1	1,530-1,940	305-715	E	C/D
5,000	5	980-1,230	225-475	D	C/D
2,500	56	680-845	185-350	D	C
2,000	30	715-890	190-365	D	C
1,000	1	410-500	145-230	C	B/C
500	145	255-300	120-165	C	B/C

Table 5: Traffic Volumes and Levels of Service on Waimumu Road

7.1.2. It can be seen that in most cases, although the road becomes much busier than at present, Levels of Service B, C and D are generally achieved. Under the Austroads definitions, these are all within the zone of stable flow although convenience and the ability for a driver to select their own speeds is significantly reduced.

7.1.3. The exception to this is for the very largest event, when Level of Service E may arise. This is a point where the road is very close to capacity and there is likely to be queuing on Waimumu Road. If this occurred, it would be broadly comparable to the Field Days event. However, this would only occur for one hour each year, and in practice may not arise at all if drivers spread their travel over a greater period of time. Furthermore, an event of this nature would require the provision of temporary traffic management on Waimumu Road which would proactively manage and control the traffic flows.

7.1.4. As such, this scenario will be rare and more heavily managed than other events. It is therefore considered that the effects are acceptable.

7.2. Layout and Performance of the Site Accesses

7.2.1. As noted above, it is anticipated that the main site access would be used for all events, with Site Access 1 also being used for some of these events (but not all). Site Access 3 would only be used for events of more than 2,500 people.

7.2.2. The Austroads Guide to Traffic Management Part 6 (*Intersections, Interchanges and Crossings*) sets out warrants for the traffic flow conditions at which auxiliary turning lanes are required to be provided. Given the speed limit on Waimumu Road prevailing flow, a right-turn lane is required when 80 or more vehicles turn into the site from a particular direction.

7.2.3. The warrants do not contemplate activities which occur infrequently and so it is not unreasonable to anticipate that when a particular combination of traffic flows occurs very



infrequently or there is temporary traffic management controlling the traffic, the need for an auxiliary turning lane should be carefully assessed.

7.2.4. Based on the traffic flows above and the proposed operation of the site accesses, for events of up to 2,500 attendees:

- If only the main site access is used, then it will be used by vehicles approaching from both the east and the west. There could be up to 232 of these events each year and in ease case, the combination of traffic flows means that auxiliary turning lanes are warranted. Therefore an auxiliary right-turn lane and an auxiliary left-turn lane should be provided at the main site access; and
- If the main site access is used with Site Access 1, then the main site access would be used by vehicles approaching from the west with vehicles approaching from the east using Site Access 1. Again, there could be up to 232 of these events each year and in ease case, the combination of traffic flows means that auxiliary turning lanes are warranted. Therefore an auxiliary right-turn lane should be provided at the main site access with an auxiliary left-turn lane being provide at Site Access 1.

7.2.5. On this basis, it is understood that a right-turn auxiliary lane will be provided at the main site access, with left-turn auxiliary lanes being provided at the main site access and Site Access 1. One advantage of improving the main site access in this manner is that it creates a focus for vehicle movements and also enables efficient advance signage to be provided to approaching drivers at times when other site accesses are not used.

7.2.6. For clarity, events where Site Access 1 is used might also result in right-turn movements taking place into this access. The extent to which this occurs and the number of vehicles both depend on the specific details of the event, which will vary. Accordingly, since the main site access will have a right-turn auxiliary lane provided, it is considered that right-turn movements into Site Access 1 should not take place unless controlled through temporary traffic management.

7.2.7. Events with more than 2,500 attendees will occur on at most six days each year. As such, it is not considered that permanent improvements to infrastructure are justified but rather, a more appropriate outcome will be to proactively control vehicles using more extensive temporary traffic management. Consequently it is not proposed to undertake any improvements to Site Access 3 – rather, when this is open, it will operate under temporary traffic management measures.

7.2.8. Anticipating that the auxiliary lanes are formed, the main site access has been modelled using the computer software package Sidra Intersection and the results are summarised below¹. Two options have been considered which represent the ‘worst case’ scenario:

- Up to 2,000 people attending (with only the main site access being used); and
- Up to 2,500 people attending (with only the main site access being used).

¹ The modelling assumes that patrons can travel directly into the site and will not need to stop for, say, purchase of a ticket or similar



Approach	90% Travelling From East			70% Travelling From East		
	Queue Length (veh)	Average Delay (s)	Level of Service	Queue Length (veh)	Average Delay (s)	Level of Service
Site Access	0	7.4	A	0	8.4	A
Waimumu Road (east)	5	9.3	A	6	12.4	B
Waimumu Road (west)	0	7.9	A	1	8.0	A

Table 6: Assessment of Waimumu Road / Main Site Access, Event with 2,000 People, Only Main Access Used

Approach	90% Travelling From East			70% Travelling From East		
	Queue Length (veh)	Average Delay (s)	Level of Service	Queue Length (veh)	Average Delay (s)	Level of Service
Site Access	0	7.4	A	0	8.0	A
Waimumu Road (east)	5	9.3	A	5	11.6	B
Waimumu Road (west)	0	7.9	A	1	8.0	A

Table 7: Assessment of Waimumu Road / Main Site Access, Event with 2,500 People, Only Main Access Used

- 7.2.9. The model runs show that the queues and delays at the main access are anticipated to be minimal. This is primarily due to the very low prevailing traffic flows on Waimumu Road
- 7.2.10. The model results show that even when there is an event with 2,500 people, and with 90% of people choosing to travel in the hour prior to the event starting, queues and delays remain low. Consequently this confirm that under this scenario, there is no requirement for extensive temporary traffic management² at the upgraded main site access.
- 7.2.11. The scenario with events of more than 2,500 people has not been reported but initial model runs with 5,000 people attending showed that queues and delays would be extremely large. This shows that under such a situation, extensive temporary traffic management measures will always be needed.
- 7.2.12. A summary of the potential operation of the accesses is set out below, allowing for the right-turn auxiliary lane at the main site access, plus a left-turn auxiliary lanes at both the main site access and Site Access 1.

² For clarity, some level of temporary traffic management will still be required for smaller events, but this can potentially be limited to PW-2 sign with an 'event' supplementary plate, directional signage and potentially a temporary reduction in the speed limit on Waimumu Road



Maximum Number of People Attending	Days per Year	Scenario	Main Site Access	Site Access 1	Site Access 3
More than 2,500	6	All	Open and operating under temporary traffic management		
2,500 or less	232	Main access only open	No further measures required ³	Closed	Closed
		Main access open, plus left-turn <u>only</u> at Site Access 1		No further measures required ⁴	
		Main access open, plus left-turn <u>and</u> right-turn at Site Access 1		More extensive temporary traffic management required	

Table 8: Operation of the Site Accesses

7.3. *Non-Car Modes of Travel*

7.3.1. It is not envisaged that the use of the site for a greater number of events will result in increased levels of walking or cycling on Waimumu Road, and it is not considered that any improvements are required to the existing infrastructure in this regard.

7.4. *Road Safety*

7.4.1. The crash history in the vicinity of the site does not indicate that there are any particular features or factors that would affect, or be affected by, the proposed development.

7.4.2. As noted above, the sightlines at the three site accesses assessed are appropriate for the prevailing speed environment. On this basis, there is no reason to anticipate that increased use of these accesses will give rise to any road safety concerns (subject to the improvement measures noted above).

7.4.3. On this basis, it is considered that the sight distances at the accesses are appropriate for the operating speeds of vehicles on the adjacent road network.

³ Other than minor temporary traffic management measures for some events, as discussed above

⁴ As above



8. District Plan Matters

8.1. Introduction

8.1.1. The District Plan sets out a number of transportation-related rules with which any development is expected to comply. An assessment of the proposed development against these rules has been undertaken and the results are summarised below.

8.2. Rule 5.9.1: Access

8.2.1. The relevant matters related to access to the site are addressed in detail above. In particular, the need for auxiliary turning lanes, and the sight distances available in each location have been identified and considered.

8.2.2. Vehicles will always enter and exit the site in a forwards direction.

8.3. Rule 5.9.2: Off-Street Car Parking

8.3.1. The site is extremely large, and it is not considered that there will be any difficulties in providing ample car parking. It is unlikely that the spaces will be marked due to the parking area being unsealed.

8.3.2. It is considered that the main site access should be sealed over a distance of at least 10m into the site in order to prevent debris being deposited on Waimumu Road due to higher numbers of vehicles exiting the site (part (e)(ii) of this Rule). If Site Access 1 is to be used for all events, then it too should be sealed over the first 10m into the site.

8.4. Rule 5.9.3: Vehicle Loading

8.4.1. The site is extremely large, and it is not considered that there will be any difficulties in providing suitable loading. Trucks will be able to enter and exit the site in a forwards direction.



9. Conclusions

- 9.1. This report has identified, evaluated and assessed the various transport and access elements of a proposed increase in use of the Southern Field Days site. There are a range of potential activities which could take place, and it is considered that the traffic generation of all but the largest ones (that is, those with more than 2,500 people attending) can be accommodated on the adjacent roading network without capacity or efficiency issues arising. This however is subject to auxiliary turning lanes being provided at the main site access (right-turn and left-turn lanes) and Site Access 1 (left-turn lane only).
- 9.2. Under this scenario, the improvement measures mean that the layouts are suitable for higher traffic flows without the need for extensive temporary traffic management. For those few (six) days each year where events with more than 2,500 people may take place, each site access would need to operate under more significant temporary traffic management measures.
- 9.3. The crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal and the existing sight distances available for vehicles turning out of the site at the main access and Site Accesses 1 and 3 are appropriate for the prevailing vehicle speeds.
 - 9.3.1. It is considered that the main site access should be sealed over a distance of at least 10m into the site in order to prevent debris being deposited on Waimumu Road due to higher numbers of vehicles exiting the site. If Site Access 1 was to be used on a regular basis then this too should be similarly sealed.
- 9.4. Overall, and subject to the preceding comments, the proposed development can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why consent could not be granted.

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