18 September 2020

Dunedin City Council
[BY EMAIL]
Connor.marner@dcc.govt.nz

Attention: Connor Marner

Response to request for information – 20 Bay Road, Warrington (Council Ref: LUC-2020-293)

Dear Connor

The New Zealand Motor and Caravan Association (the applicant) has applied to Dunedin City Council (DCC) for resource consents to develop a new site for camping by NZMCA members at 20 Bay Road, Warrington. This letter is in response to your request for further information (RFI) under s92 of the Resource Management Act 1991 (RMA) which we received on 18 August 2020.

The information provided below partly addresses the points raised in the RFI. Items 2, 3, and 4 are still in progress for reasons explained below. The following attachments are provided as part of this response:

- Attachment One – Additional Traffic Assessment
- Attachment Two – Rules Assessment
- Attachment Three – Pavement Options Memo and Plan
- Attachment Four – Noise Emissions Memo

Item 1 – Further traffic assessment to address transport issues
Additional traffic assessment has been prepared by Stantec's Transport Engineer and is outlined in a letter responding to this part of the request relating to transport issues. The additional traffic assessment is provided as Attachment One. I have made further comment below with regard to some of these matters.

Item 1.3: Road construction and pavement integrity
It is unclear why the question regarding payment of a contribution is directed to the applicant or to you as the reporting officer. Nonetheless we understand that under DCC Development Contributions Policy the DCC will assess whether development contributions are payable when a resource consent is granted. We also understand that DCC has decided to establish its Development Contributions Policy within the requirements of the Local Government Act 2002. For these reasons we consider that information in this regard is not relevant for the purpose of s92 under the RMA as being needed to better understand any potential adverse effects on the environment from the activity.

Item 1.4: Internal access, parking and manoeuvring

- We have noted in the application (please refer page 1 of the AEE) that the gate in the accessway is proposed to be recessed 12-15m from the road edge to ensure vehicles are on site / off the road when opening and closing the gate. A condition of consent would be acceptable.

- With regard to vehicle crossing and driveway formation, a condition has been proposed (Appendix K of the application) as follows:

  Proposed condition (6) – The vehicle access to the motor caravan park shall be formed to a width of 6m, hard surfaced from the edge of the carriageway of Bay Road to a distance not less than 5m inside the property boundary, and be adequately drained for its duration.

The above condition, or something similar recommended by Council if particular mention to any standards are required, would be acceptable.

- With regard to surfacing, the length of the seal from the property boundary is proposed to be sealed for the first 5m to ensure that no loose material tracks onto the road carriageway. The detailed design for the entrance from Bay Road has not been completed at the current time and a condition of consent, similar to condition (8) of the land use consent for the education facility (Ref LUC-2018-555), is considered appropriate.

  Condition (8) of Land Use consent LUC-2018-555 states:

  > *That the right of way be maintained to a minimum width of 3.5m and have a minimum depth of compacted aggregate of 250mm.The right of way shall be maintained to facilitate surface water run-off and be drained and collected in an approved manner onsite. The intersection point of the right of way with Bay Road shall maintain edge integrity and water table drainage flow in Bay Road, to the satisfaction of the Manager of the Transportation Planning Department.*

Item 2 – Further details of earthwork activities

A comprehensive assessment of the earthwork rules is provided in Appendix J of the application and is included as Attachment Two of this letter for ease of reference.

The assessment against the performance standards under Rule 8A.3.2.1 of the Proposed Second Generation Dunedin City District Plan (2GP) that apply to all land use activities is provided. Rule 8A.5.2 requires that all earthworks on an archaeological site must comply with Rule 13.3.3 in which an Archaeological Authority is required for the proposed earthworks. This requirement is discussed further in response to Item 4 below. As outlined in the rule's assessment, we confirm all other performance standards under Rule 8A.3.2.1 are either not applicable or complied with.

The proposed earthworks do not meet the criteria to be defined as 'earthworks-small scale' as the clearance of indigenous vegetation and earthworks that will exceed a spatial area of 200m² are proposed to occur within a Natural Coastal Character (NCC) overlay. Therefore, the proposed earthworks must be assessed as 'earthworks-large scale' and consent is required as a restricted discretionary activity. Consent has been sought under Rule 8A.3.2.3. No other earthwork rules for determining compliance have been identified. Therefore, it is our understanding that no further information is necessary to determine compliance nor specified in matters to which council's discretion is restricted to assessing earthworks – large scale activities.

Item 3 – Confirm details of Stage 2 (earthworks)

To better clarify the proposal, the reason why this is proposed in stages is that subsequent to consent approval the applicant will take the necessary steps to give effect to the relevant Stage 1 conditions, we anticipate to include forming the driveway and making good the manoeuvring areas and landscaping, in order for members to use the site utilising the Stage 1 parking areas as soon as possible. The "paving[1]" treatment proposed for Stage 2 will require further detailed design and, we expect, will be subject to review and sign off by DCC before commencing installation, therefore will not be given effect to straight away.

The Pavement Options memo (Appendix F of the application) made recommendations regarding different types of paving treatment. To provide protection in the Stage 2 area it is proposed to complete an "overlay" pavement design in line with the recommendations in Section 4.2.2 of the Pavement Options Memo. The option involves limited to no excavations being completed, by placing additional imported material above the existing surface level. It is proposed to provide this treatment to the extent of the area of archaeological significance. The memo and a plan showing this proposed area is provided as Attachment Three.

[1] Note while the word "pavement" or "paving" is used, the nature of the proposed development is not for a standard road pavement to be constructed, rather a reinforced or unreinforced soil pavement.

In this area the construction of this pavement would take the following steps:

- spray existing grass with a suitable herbicide,
- mow the dead grass close to the existing surface level, and remove clippings to waste,
- place geofabric and geogrid layer,
- place 100mm coarse sand drainage blanket,
- place 200mm minimum imported topsoil across the area,
- level site to ensure positive drainage is achieved,
- sowing grass or laying turf (aka Readylawn)
- roll area once grass strike has been achieved, to ensure a suitably compact surface.
- monitor site and retrofit soil reinforcement matt if required.

We trust the information above clarifies the details of the proposed earthworks for the preparation of the parking area in Stage 2.

We understand that the written approval of Heritage New Zealand Pouhere Taonga (HNZPT) is required for earthwork activities occurring over a scheduled heritage site and we have begun the process to apply for an Archaeological Authority. The Archaeological Assessment is part of this process and will be submitted as part of the application for the authority. However, the outcome of consultation with takata whenua is also required as part of this process. The applicant is also mindful that takata whenua should be consulted with to ensure that all areas of cultural sensitivity are appropriately protected.

Arrangements for a hui on site with representatives from Kāti Huirapa Runaka ki Puketeraki were being made early in the year which were postponed due to Covid-19. At the time of lodging the application we had anticipated that we would meet with the Runaka shortly after, though again we have experienced delays in both contacting the Runaka and due to Covid-19 constraints. However, we have recently set a date for Saturday the 26th of September. Shortly after this meeting, we will be able to provide an update regarding written approval from both Kāti Huirapa Runaka ki Puketeraki and HNZPT.

Item 4 – Written approval / Cultural Impact Assessment

The RFI states that *'As the application does not currently include the written approval from Manawhenua, and Heritage New Zealand, the effects on cultural heritage from the proposal are largely uncertain. A Cultural Impact Assessment is therefore requested to identify any adverse impact on the cultural significance of the site and to determine, in particular, the effects on Manawhenua and identified wahi tupuna mapped areas'.*

Our understanding is that where written approval from Manawhenua and HNZPT is provided, a Cultural Impact Assessment may not be required and therefore we would like to continue to pursue our efforts to meet with the representative from Kāti Huirapa Runaka ki Puketeraki and obtain the relevant approvals.

Item 5 – Noise requirements

Further noise assessment has been requested specific to the application site and surrounding noise environment, and the impact of noise generated from the gravel access leg.

It is agreed that the predominant noise generated from the site would be that from vehicle movements along the accessway which at this stage is still proposed to be formed in compacted gravel aggregate. A short memo was prepared by WSP in 2019 for use by NZMCA to inform future noise assessments of NZMCA parks. The noise emissions memo was provided as Appendix H of the application and is included as Attachment Four of this letter for ease of reference.

The noise emissions memo provides a conservative value for vehicle drive-by noise as 75dB L_{Amax} at 7 metres from the nearside wheel path and represents the typical vehicle drive-by sound level on gravel. The actual noise generated along the accessway cannot be measured in its current state (prior to gravel) and hence the conclusion from the noise emissions memo has been used (as it has been in relation to other sites) to inform the anticipated noise generated from the proposal. An assessment of the surrounding noise environment is also not considered to change the predicted volume of noise generated from the gravel access leg.

Therefore, given the inability to reliably confirm compliance of the noise limit set by the 2GP during night-time hours (10pm to 7am) of 70 dB LAFmax, we request that a dispensation is included as part of the application.

When firstly considering the effects of this breach it is important to emphasise that most vehicle movements occur between 9:00am and 4:00pm. Furthermore, any adverse effects on the surrounding residential environment arising from occasional vehicle movements during night time hours will be no more than minor, when compared traffic-related disturbance that might occur in association with a permitted activity. The following condition of consent are proposed for activities to be accountable to and enable monitoring and actions to be taken where necessary. Condition A is consistent with the accepted approach at the NZMCA site at Woodhaugh (Condition 13 of LUC-2013-49). The most conservative noise limits have been used (i.e. noise limits for recreation zoned land).

Condition (A) The maximum noise limits generated by any activity on the site shall not exceed the following limits:

- 50 dB LAeq (15 min) during the daytime (7.00am to 7.00pm),
- 45 dB LAeq (15 min) during the shoulder period (from 7.00pm to 10.00pm); and
- 40 dB LAeq (15 min) at night-time (10.00pm to 7.00am the following day) and all day on Sundays and statutory holidays, measured at or within the notional boundary of any dwelling not on the same site.

(Between 10.00 pm on any night and 7.00 am the following day no noise shall exceed 70 dB LAFmax measured at or within the boundary of any other residential site).

Summary

As noted from the outset, the information provided in this letter partly addresses the points raised in the RFI. Items 2, 3, and 4 are still in progress for reasons explained above.

Please contact me via email (kelly.bombay@stantec.com) or phone 03 341 4719 should you wish to discuss any of the responses provided to date or the proposed way forward regarding the outstanding matters.

Yours sincerely

Kelly Bombay
Senior Planner

Stantec New Zealand

ATTACHMENT 1 – Additional Transport Assessment

11 September 2020

Dunedin City Council
[BY EMAIL]
Connor.marner@dcc.govt.nz

Attention: **Connor Marner**

Response to request for information (Transport) – 20 Bay Road, Warrington (Council Ref: LUC-2020-293)

Dear Connor

The New Zealand Motor Caravan Association (NZMCA) has lodged an application for resource consent to establish a camping ground for its association members at 20 Bay Road, Warrington. The Dunedin City Council (DCC) has requested further information regarding the application. This letter provides a response to those parts of the request that relate to transport.

1. HILL ROAD / BAY ROAD INTERSECTION

Figure 1-1 shows an aerial view of the Hill Road / Bay Road intersection.

Figure 1-1: Hill Road / Bay Road Intersection (Source: DCC GIS Maps)

Stantec New Zealand
Hazeldean Business Park
6 Hazeldean Road
Addington, Christchurch 8024
PO Box 13-052
Armagh
Christchurch 8141
TEL +64 3 366 7449
FAX +64 3 366 7780

Although Hill Road forms a side road approach at the intersection with Bay Road, the road has been marked to provide continuous movement from Hill Road to Bay Road east of the intersection. Give-way signs and markings have been installed on the western approach. The non-standard road markings at the intersection reflect the fact that the dominant vehicle flows are between Hill Road and Bay Road east which provides access to the Esplanade and Warrington Reserve.

The carriageways of Hill Road north of the intersection and Bay Road west of the intersection have been formed within 16 m wide road reserves. East of the intersection, the Bay Road road reserve reduces to 12 m wide. Figure 1-1 also shows that the driveway to the dwelling at 37 Bay Road, and the hedge on the western side of Hill Road are located within the road reserve. Photograph 1-1 shows that the driveway has not been constructed in a position that would comply with the current District Plan rules for separation of crossings from an intersection.

Photograph 1-1: Driveway and hedge adjacent to Bay Rd / Hill Rd intersection

Within Warrington, intersections and bends have been constructed with inside corner radii ranging from 5 m to 10 m. The inside radius for the left turn from Bay Road into Hill Road is at the lower end of this range but is of a similar standard to other intersections in the area. The small radius corner requires vehicles to turn at low speed, and larger vehicles such as waste collection trucks to cross the centre line as they turn left into Hill Road. These effects could be mitigated by increasing the inside radius to 10 m in line with the inside radius on the opposite side of the road. This will require DCC approval to remove the hedge, and will affect the existing vehicle access to 37 Bay Road.

The hedge on the western side of Hill Road is located within the road reserve and constrains the sightlines on the Bay Road approach. In practice, the shortfall in sight distance does not represent a significant safety concern in this location because of the low vehicle speeds on the road network in this area. Approach speeds of less than 35 km/h are expected because of the small radius corner connecting Hill Road with Bay Road and also connecting Bay Road with Esplanade. Although no crashes have been reported at the intersection, it is acknowledged that increasing the sight distance would provide safety benefits. As outlined

earlier, this will require DCC approval to remove the hedge and will affect the existing vehicle access to 37 Bay Road.

Vehicle tracking analysis has been undertaken with and without the widening of the intersection. This analysis demonstrates that large vehicles are able to safely negotiate the intersection in its current form without improvements being made, but that widening the intersection would ensure that two-way movement of large vehicles would be possible. In practice, the anticipated low volume of movements generated by the proposed NZMCA camping ground and the generally tidal nature of the traffic flows means that the potential for conflict will be very low.

2. SIGNPOSTING

There are existing signposts to the Warrington Reserve camping area at the Coast Road / Park Road, Park Road / Hill Road and Hill Road / Bay Road intersections that clearly indicate routes for campervans. NZMCA members would be unlikely to choose to follow other routes to access the site at 20 Bay Road. However, any Council concerns with the potential use of Bank Road could be addressed with additional signage at the Park Road / Bank Road intersection to reinforce the route for campervans.

Bay Road has been constructed with a 4.8 m wide seal and has a gravelled footpath along its southern edge. The seal width is sufficient to allow slow speed, two-way movement of a 2.5 m wide vehicle and a 99th percentile design vehicle with 300 mm separation. The seal width is not sufficient to allow two-way movement of two large vehicles without one vehicle traversing the footpath. Given that the peak hour volumes generated by the proposed campground even with the Stage 2 development are expected to be less than five movements and that movements will be tidal in nature, the likelihood of two large vehicles meeting on Bay Road is very low. Since the volume of pedestrian movements in the area is also low, the rare use of the gravelled area to allow the vehicles to pass each other is considered acceptable.

The road carriageways on the signposted route between Coast Road and Warrington Reserve are all over 6 m wide which is sufficient to allow safe two-way movement of large vehicles. Additional widening of these roads is not considered to be necessary.

3. ROAD CONSTRUCTION

From a traffic assessment perspective, the analysis of traffic generation for the camping ground indicates that it is likely to generate an average of about five additional vehicle movements per day on the road network during off-peak periods and about 15 movements per day on average during the summer peak period. This represents the typical traffic generation of about two households measured over a year-long period.

4. SITE ACCESS

4.1 ACCESS DESIGN

The detailed design for the entrance from Bay Road has not been completed at the current time but there are no reasons why the Council's comments in relation to the gate location and sealing would not be taken into account. These represent matters for Engineering Approval.

4.2 ON-SITE MANOEUVRING

The camping ground has been set out to provide individual sites that are 6 m wide and 13 m deep which is sufficient to accommodate all vehicle types anticipated while still providing separation from adjacent vehicles.

The central access aisle is 20 m wide which is adequate to accommodate all anticipated manoeuvres associated with parking vehicles.

We trust that this report addresses the request for further information in relation to transport matters but would be happy to discuss any matter raised as necessary.

Regards,

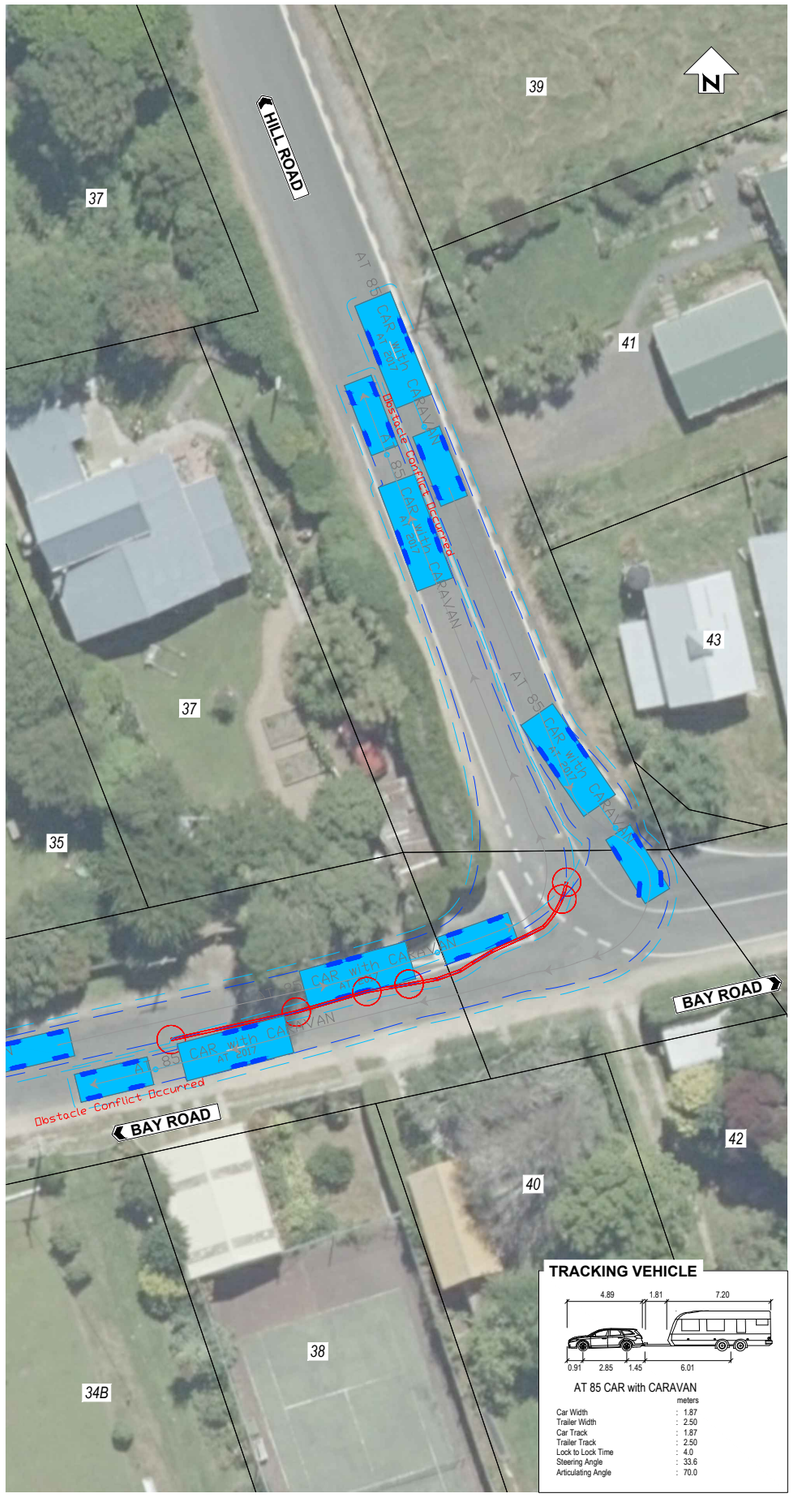
Stantec New Zealand

Chris Rossiter BSc (Hons), BA (Hons) CPEngNZ
Principal Transportation Engineer
Phone: 03 926 2206
chris.rossiter@stantec.com

Attachment: Vehicle tracking figures

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE **A1**



TRACKING VEHICLE

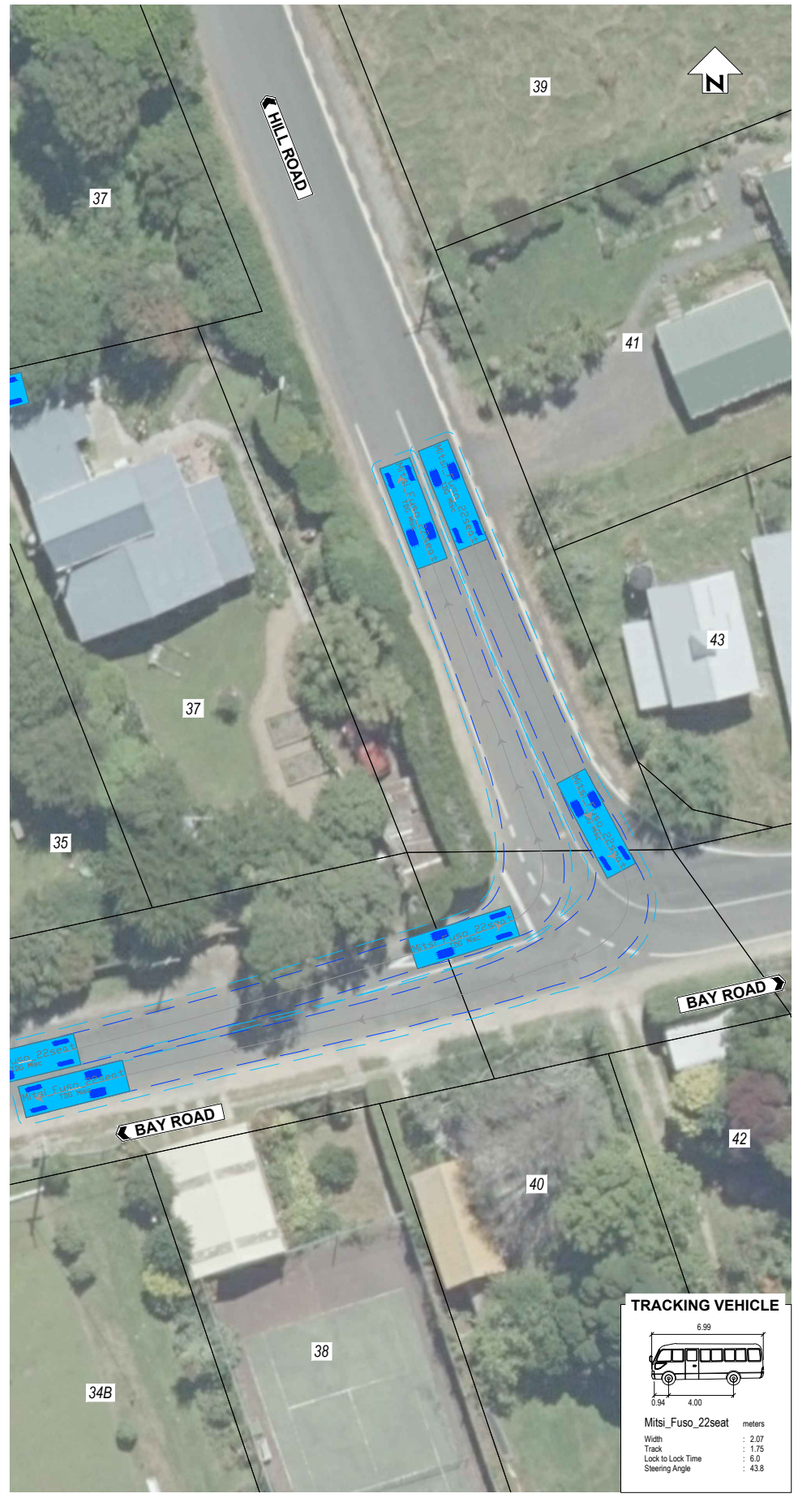
AT 85 CAR with CARAVAN

	meters
Car Width	1.87
Trailer Width	2.50
Car Track	1.87
Trailer Track	2.50
Lock to Lock Time	4.0
Steering Angle	33.6
Articulating Angle	70.0

TRACKING VEHICLE

VW_Maui Plat_B4_Berth

	meters
Width	2.20
Track	2.20
Lock to Lock Time	6.0
Steering Angle	43.8



TRACKING VEHICLE

Mitsi_Fuso_22seat

	meters
Width	2.07
Track	1.75
Lock to Lock Time	6.0
Steering Angle	43.8

5 0 5 10m

SCALE 1:200

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
A	FOR REVIEW	SP	CR		02.09.20

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DESIGNED		
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CAD REVIEW		
APPROVED		
PROF REGISTRATION:		

Stantec

Client:

20 BAY ROAD, WARRINGTON
BAY ROAD/HILL ROAD INTERSECTION

VEHICLE TRACKING
SHEET 1 OF 3

Status Stamp: **FOR REVIEW**

Date Stamp: **02.09.20**

Scales: AS SHOWN

Drawing No.: 310003165-01-001-SK001-1

Rev.: A

20/11/2018 4:43 p.m.

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DO NOT SCALE - IF IN DOUBT, ASK

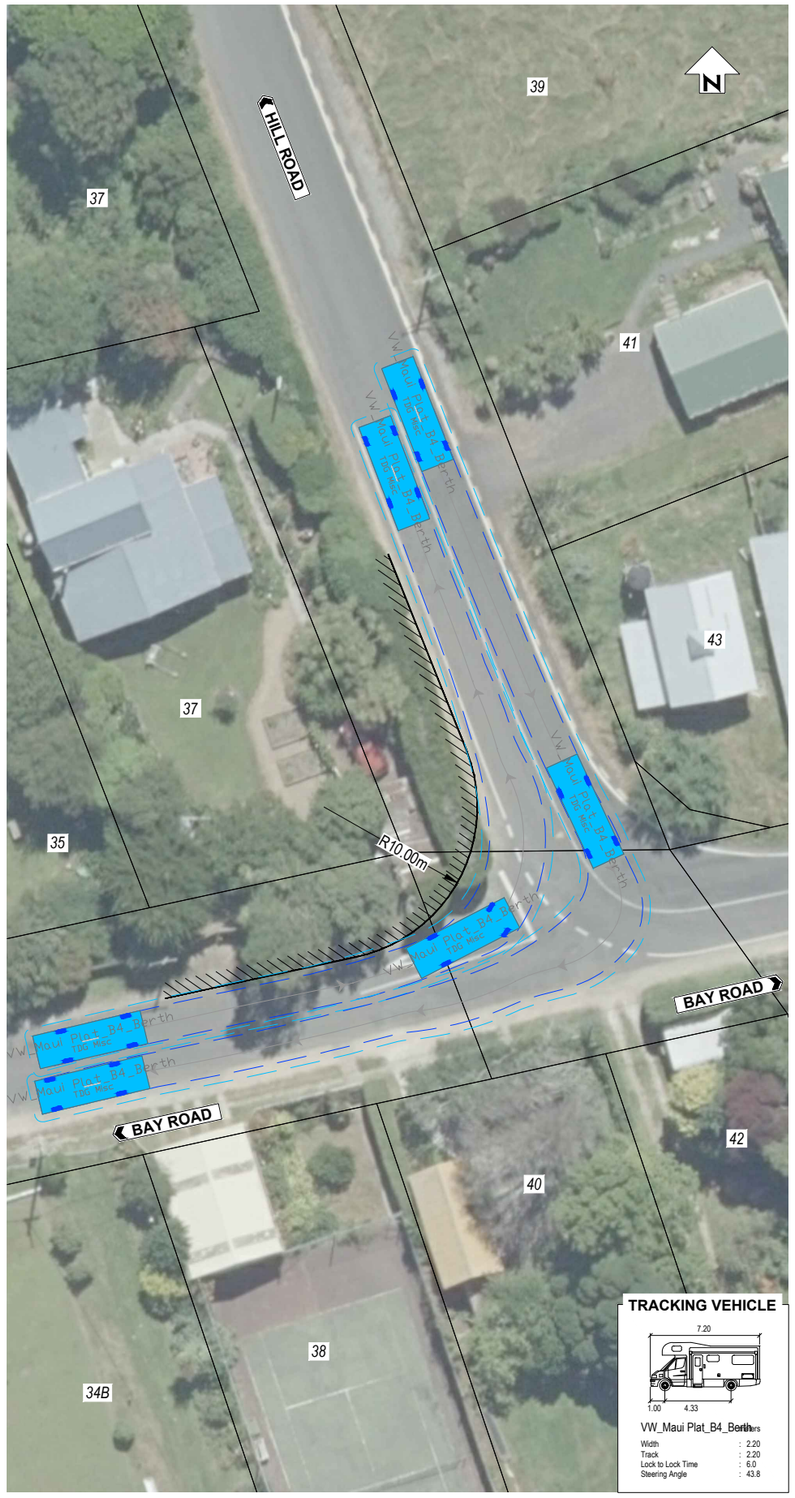
200 mm 150 100

ORIGINAL SIZE A1

TRACKING VEHICLE

AT 85 CAR with CARAVAN

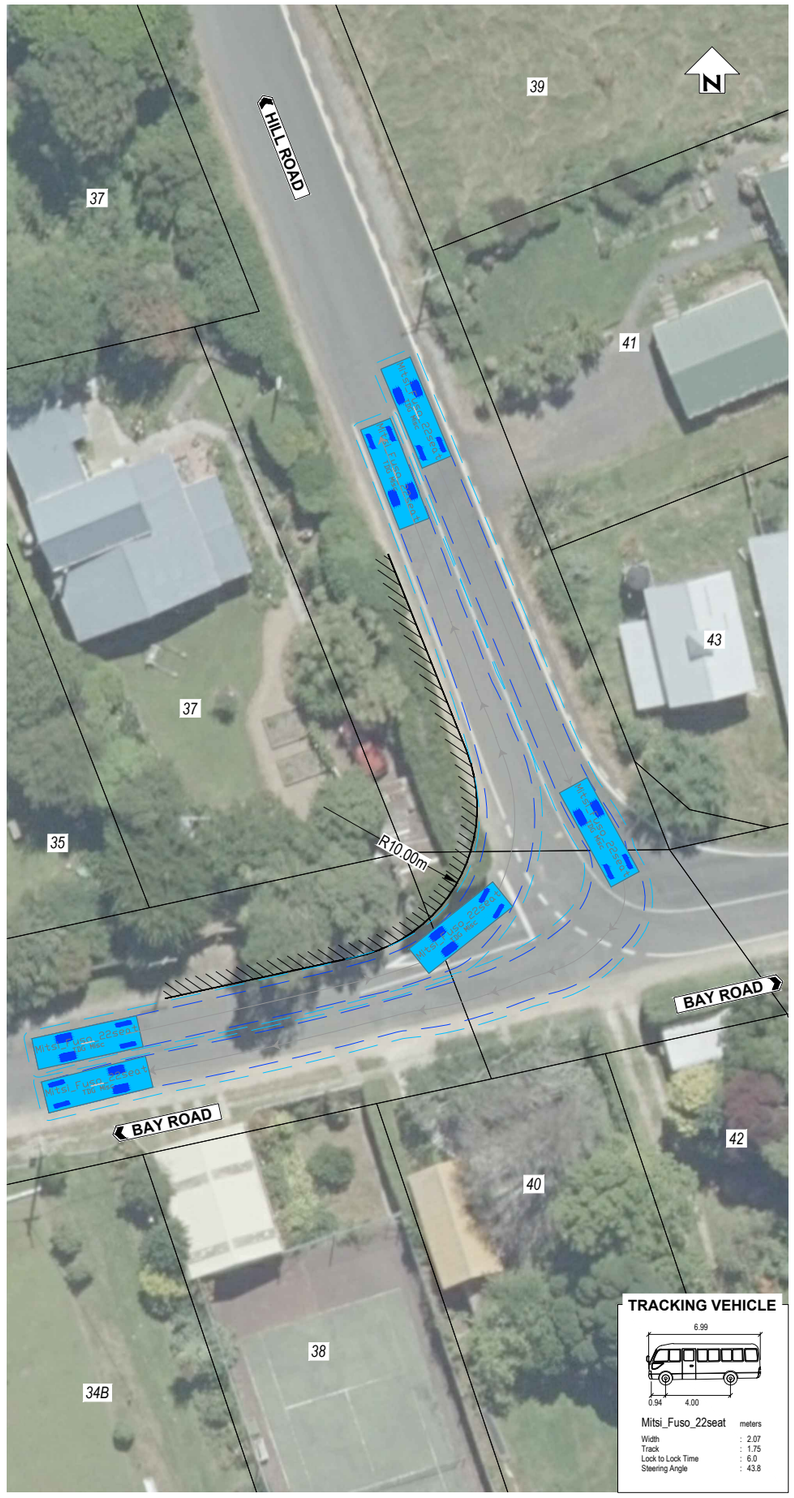
	meters
Car Width	: 1.87
Trailer Width	: 2.50
Car Track	: 1.87
Trailer Track	: 2.50
Lock to Lock Time	: 4.0
Steering Angle	: 33.6
Articulating Angle	: 70.0



TRACKING VEHICLE

VW_Maui Plat_B4_Berth

	meters
Width	: 2.20
Track	: 2.20
Lock to Lock Time	: 6.0
Steering Angle	: 43.8



TRACKING VEHICLE

Mitsi_Fuso_22seat

	meters
Width	: 2.07
Track	: 1.75
Lock to Lock Time	: 6.0
Steering Angle	: 43.8

5 0 5 10m

SCALE 1:200

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
A	FOR REVIEW	SP	CR		02.09.20

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APPROVED		
PROF REGISTRATION:		

Stantec

Client:

20 BAY ROAD, WARRINGTON
BAY ROAD/HILL ROAD INTERSECTION

VEHICLE TRACKING
SHEET 2 OF 3

Status Stamp: **FOR REVIEW**

Date Stamp: **02.09.20**

Scales: AS SHOWN

Drawing No.: 310003165-01-001-SK001-2

Rev.: A

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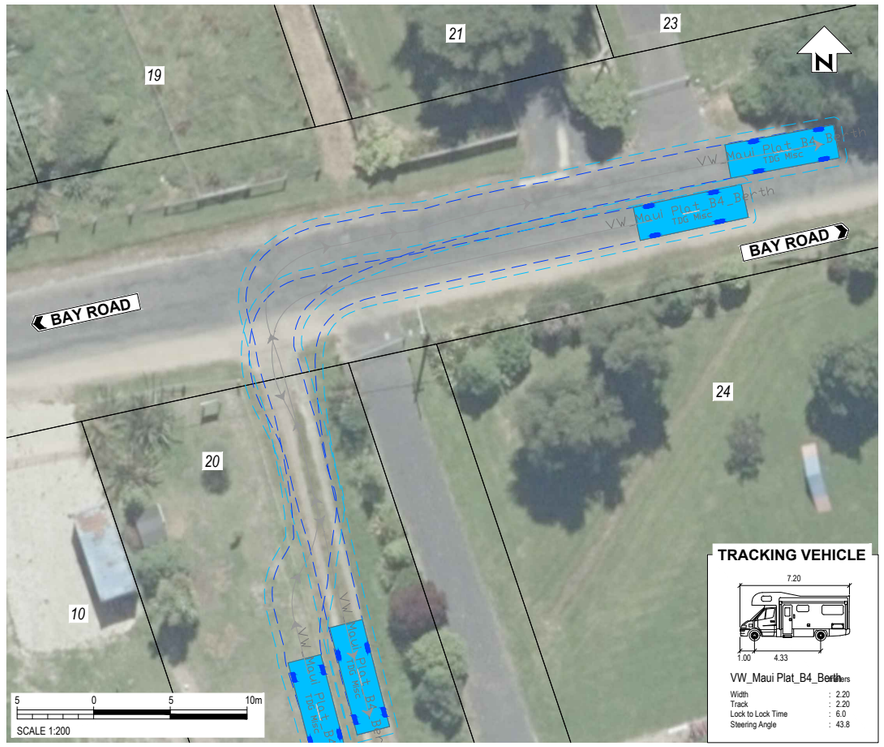
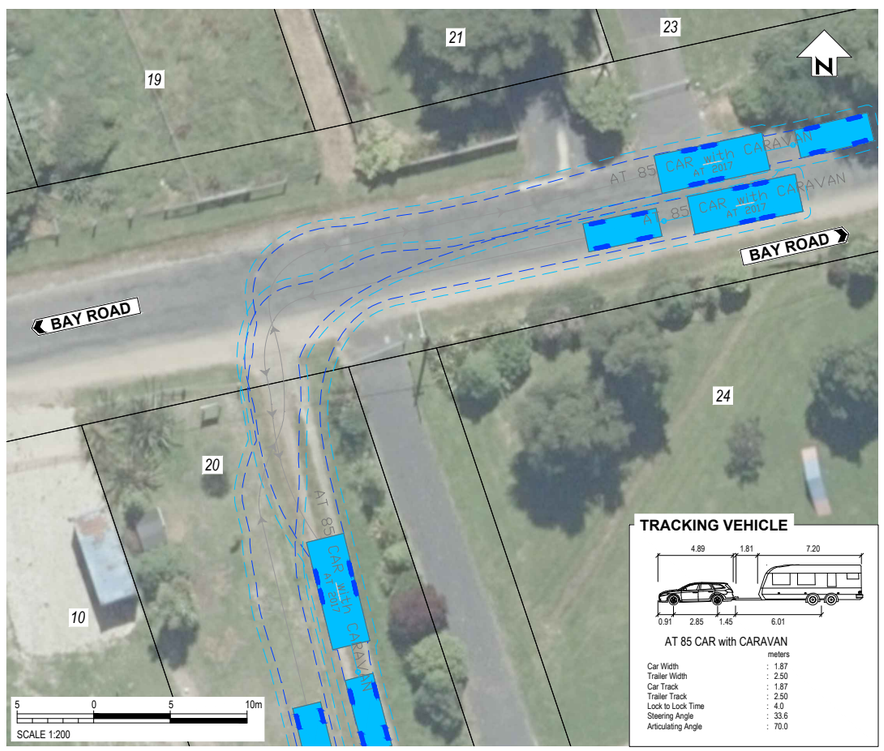


TRACKING VEHICLE

VW_Maui Plat_B4_Berth — meters

Width	: 2.20
Track	: 2.20
Lock to Lock Time	: 6.0
Steering Angle	: 43.8



TRACKING VEHICLE

AT 85 CAR with CARAVAN — meters

Car Width	: 1.87
Trailer Width	: 2.50
Car Track	: 1.87
Trailer Track	: 2.50
Lock to Lock Time	: 4.0
Steering Angle	: 33.6
Articulating Angle	: 70.0

TRACKING VEHICLES

VW_Maui Plat_B4_Berth — meters

Width	: 2.20
Track	: 2.20
Lock to Lock Time	: 6.0
Steering Angle	: 43.8

AT 85 CAR with CARAVAN — meters

Car Width	: 1.87
Trailer Width	: 2.50
Car Track	: 1.87
Trailer Track	: 2.50
Lock to Lock Time	: 4.0
Steering Angle	: 33.6
Articulating Angle	: 70.0

NOT FOR CONSTRUCTION

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CAD REVIEW		
APPROVED		
PROF REGISTRATION:		

Stantec

Client:

20 BAY ROAD, WARRINGTON
ACCESS & SITE

VEHICLE TRACKING
SHEET 3 OF 3

Status Stamp: **FOR REVIEW**

Date Stamp: **02.09.20**

Scales: AS SHOWN

Drawing No.: 310003165-01-001-SK001-3

Rev.: A

20/11/2018 4:43 p.m.

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ATTACHMENT 2 – Rules Assessment

20 Bay Road – Rules Assessment

- Rule under appeal

Table 1-1: Rules assessment – Dunedin Second Generation Plan (2GP)

Rule	Reason	Status	Performance Standards	Comment on compliance
Residential Zone				
Land Use Activity Rule 15.3.3.1 – Performance standards that apply to all land use activities	**Complies with all performance standards**	Permitted	15.5.1 Acoustic insulation (noise sensitive activities only)	While visitor accommodation is a noise sensitive activity, the activity is not located in any of the areas identified in the rule. ***Not applicable***
			15.5.3 Electrical interference	Activities must be designed and located to ensure that there are no effects from electrical interference on surrounding sites. ***Complies***
			15.5.5 Light spill	Any provision of outdoor lighting will be shielded or directed away from site boundaries. ***Complies***
			15.5.10 Noise	Zoning of receiving properties: 1. East – zoned recreation 2. North – Township and Settlement **1.** 50 dB LAeq (15 min) / 7.00am to 7.00pm; 45 dB LAeq (15 min) / 7.00pm to 10.00pm; 40 dB LAeq (15 min); and / 10.00pm to 7.00am

Rule	Reason	Status	Performance Standards	Comment on compliance
				<table><tr><td></td><td></td><td></td><td>70 dB LAFmax[1]</td></tr><tr><td>**2.**</td><td>55 dB LAeq (15 min)</td><td>50 dB LAeq (15 min)</td><td>40 dB LAeq (15 min); and 70 dB LAFmax[2]</td></tr></table> ***Complies***
			Setback from National Grid (National Grid sensitive activities only)	***Not applicable – none in proximity***
			Structure plan mapped area performance standards (where relevant)	***None are relevant to the site***
Land Use Activity Rule 15.3.3.22 – Visitor Accommodation	The use of residential zoned land for visitor accommodation (campground). **Complies with all performance standards**	**Restricted Discretionary**	15.5.2 Density	Site area = approx. 2.8419ha (28,419m²) Allows up to 355 visitor accommodation units. Proposing up to 150 caravans or self-contained vehicles. ***Complies***
			15.5.8 Minimum car parking	Based on definition of 'visitor accommodation unit' – this rule is not applicable.
			15.5.10 Mobility parking	There is ample space on site to manoeuvre and park this many

[1] Note - appeal only relates to Port Activity in the Industrial Port Zone as being considered earthworks - small scale; and earthworks for underground fuel storage systems

[2] Note - appeal relates to a Fonterra Limited request to increase the night time noise emission limits

Rule	Reason	Status	Performance Standards	Comment on compliance
				vehicles and therefore it is considered no infringement of the mobility parking requirement is created. ***Complies***
			Minimum vehicle loading	Based on definition of 'visitor accommodation unit' – this rule is not applicable. ***Not applicable***
Development Activity Rule 15.3.4.1 – Performance standards that apply to all development activities	The following activities proposed on the site are included within the sub-category 'site development activities': – *parking, loading and access* – *vegetation clearance.* **Complies with all performance standards**	Complies	15.6.4 Natural Hazards Performance Standards	***Not applicable***
			15.6.10 Maximum building site coverage and impermeable surfaces	Max building coverage (structures greater than 10m2) = 40% Max building , structures and impermeable surfaces = 70% ***Complies***
			15.6.13.2 Setback from scheduled tree	Provisions relate to activities in the dripline of scheduled trees. There are no scheduled trees in proximity to or within the site. ***Not applicable***
			Structure plan mapped area performance standards (where relevant)	***None are relevant to site***
Development Activity Rule 15.3.4.2 – Performance standards that apply to all building and structures activities	Small shed meets definition of 'structures', therefore this rule is applicable.	Complies	a. Boundary setbacks	
			b. Building length	
			c. Fire fighting	

Rule	Reason	Status	Performance Standards	Comment on compliance
	Complies with all performance standards		d. Height in relation to boundary	
			e. Maximum height	
			f. Number, location and design of ancillary signs	
			g. Setback from coast and water bodies	
			h. Setback from National Grid	
Residential Zone – Development activities on a scheduled heritage site, where visible from an adjoining public place or a public place within the heritage site.				
Development Activity Rule 15.3.4.20	The small shed (registration kiosk) meets definition of 'structures' and exceeds 2m² building footprint.	**Restricted Discretionary**	15.6.11 Number, location and design of ancillary signs 15.6.11.2 All signs in residential zones a. Signs must not be attached to roofs. b. Signs must not project higher than the lowest point of the roof, except as mounted flat against a parapet or gable end. c. Signs must have a maximum of 2 display faces per sign. d. Where attached to a building, signs must not protrude from a building façade by more than 1m.	***Complies with signage requirements.***

Rule	Reason	Status	Performance Standards	Comment on compliance
			Ancillary to commercial activities and community activities: a. Maximum 1 sign per site attached to a building. b. The height, above ground level, at the highest point of any sign, attached to a building is 4m. c. Signs must have a maximum area per display face of 1.5m²,	
Development Activity Rule 15.3.4.22	Parking, loading and access *Parking, Loading and Access means: New or additions and alterations to vehicle tracks, driveways, parking areas, manoeuvring areas, and loading areas. Note that vehicle tracks and driveways include vehicle crossings and vehicle accesses.*	**Restricted Discretionary**	Parking, loading and access standards (must comply with Rule 6.6)	The proposed parking does not comply with: – *Rule 6.6.1.4 Gradient of parking areas* – *Rule 6.6.1.5 Surfacing and marking of parking areas* – *Rule 6.6.1.6 Lighting of Parking Areas*
Rural Coastal				
Land Use Activity Rule 16.3.3.1 – Performance standards that apply to all land use activities	***Complies with all performance standards***	Permitted	a. Acoustic insulation (noise sensitive activities only)	While visitor accommodation is a noise sensitive activity, the activity is not located in any of the areas identified in the rule. ***Not applicable***
			b. Electrical interference	Activities must be designed and located to ensure that there are no effects from electrical interference on surrounding sites.

Rule	Reason	Status	Performance Standards	Comment on compliance
				Complies
			c. Light spill	Any provision of outdoor lighting will comply with these standards. ***Complies***
			d. Noise	***Complies***
			e. Setback from National Grid (National Grid sensitive activities only)	***Not applicable – none in proximity***
Land Use Activity Rule 16.3.3.38[3] – Visitor Accommodation	The use of rural zoned land for visitor accommodation (campground).	**Discretionary**	Nil	
Development Activity Rule 16.3.4.1 – Performance standards that apply to all development activities	The following activities proposed on the site are included within the sub-category 'site development activities': – *parking, loading and access* – *vegetation clearance.* **Complies with all performance standards**	Complies	a. Natural Hazards Performance Standards	Natural Hazard 3 overlay and no new buildings containing residential activity. ***Not applicable***
			b. Setback from scheduled tree	Provisions relate to activities in the dripline of scheduled trees. There are no scheduled trees in proximity to or within the site. ***Not applicable***
Development Activity Rule 16.3.4.2 – Performance standards	Small shed meets definition of 'structures', therefore this rule is applicable.	Complies	a. Boundary setbacks	
			b. Fire fighting	

[3] Note - appeal relates to BP new hazard facility mapped area only

Rule	Reason	Status	Performance Standards	Comment on compliance
that apply to all building and structures activities			c. Maximum height	
			d. Number, location and design of ancillary signs	
			e. Reflectivity (landscape and coastal character overlays)	
			f. Setback from coast and water bodies	
			g. Setback from National Grid	
Rural Zone – Development activities on a scheduled heritage site, where visible from an adjoining public place or a public place within the heritage site.				
Development Activity Rule 16.3.4.17	The small shed (registration kiosk) meets definition of 'structures' and exceeds 2m² building footprint.	**Restricted Discretionary**	Nil	
Development Activity Rule 16.3.4.19 – Performance standards that apply to Parking, loading and access	Parking, loading and access activities are proposed.	**Restricted Discretionary**	Parking, loading and access standards (must comply with Rule 6.6)	The proposed parking does not comply with: – *Rule 6.6.1.4 Gradient of parking areas* – *Rule 6.6.1.5 Surfacing and marking of parking areas* *Rule 6.6.1.6 Lighting of Parking Areas*
Transportation – Rule 6.6 Parking, Loading and Access Standards				
6.6.1 Car Parking Design – Rule 6.6.1.1 Minimum parking space dimensions	There is ample space on site to manoeuvre and park vehicles (including 5 mobility spaces required by rule 15.5.10 and	Complies	(b) Parking spaces provided for all other activities must have the following minimum dimensions, to allow for 99th	

Rule	Reason	Status	Performance Standards	Comment on compliance
	other parking areas proposed on the site) and therefore it is considered no infringement of the mobility parking requirement is created.		percentile design motor vehicles (See Appendix 6B, figures 6B.1, 6B.3 and 6B.6):	
6.6.1 Car Parking Design – Rule 6.6.1.2 Minimum manoeuvring space dimensions for parking areas		Complies		
6.6.1 Car Parking Design – Rule 6.6.1.3 Minimum queuing space for parking areas		Complies		
6.6.1 Car Parking Design – Rule 6.6.1.4 Gradient of parking areas	May not comply as 1 in 20 is very flat however the site (though not steep) does vary in grade likely to exceed 1 in 20 in areas	**Restricted Discretionary**	The gradient of parking areas provided for any activity other than standard residential must not exceed 1 in 20 in any one direction.	
6.6.1 Car Parking Design – Rule 6.6.1.5 Surfacing and marking of parking areas	Will not conform to these standards including: – *Will not be hard surfaced;* – *Parking spaces will not be permanently marked;* – *Mobility spaces will not be permanently marked;*	**Restricted Discretionary**	Parking areas (including associated access and manoeuvring areas) provided for any activity other than standard residential, must: be hard surfaced; have individual parking spaces permanently marked; and	
6.6.1 Car Parking Design – Rule 6.6.1.6	The parking area is required to be illuminated to a minimum maintained level of 2 lux, with high uniformity.	**Restricted Discretionary**	Parking areas must be illuminated to a minimum maintained level of 2 lux, with high uniformity, during the hours	

Rule	Reason	Status	Performance Standards	Comment on compliance
	As it is expected that vehicles may enter during night-time hours, however the site is not anticipated to be lit during this time, consent would be required.		of operation, if all of the following circumstances apply: i. the parking area is provided for any activity other than standard residential; ii. the parking area is designed to accommodate 4 or more vehicles; and iii. the parking area will be used at night.	
6.6.1 Car Parking Design – Rule 6.6.1.7 Access to Parking areas	Designed to allow vehicles using the spaces to enter and exit the site without the need to move a vehicle occupying any other parking or vehicle loading space on the site.	Complies		
Rule 6.6.2 Vehicle Loading Design	No loading or unloading areas provided therefore these rules are **not applicable**.	Not applicable		
Rule 6.6.3 Vehicle Access Design and Location	Refer to Integrated Transport Assessment for compliance.	Complies		
Earthworks activities 8A.3.2.1 – Performance standards that apply to all land use activities				
8A.3.2.1 – Performance standards that apply to all land use activities		**Non-complying**	Archaeological sites: Earthworks must comply with Rule 13.3.3 – An archaeological authority is required for the proposed earthworks	An archaeological authority is being applied for but not currently obtained

Rule	Reason	Status	Performance Standards	Comment on compliance
		Complies	Rule 8A.5.3 Batter gradient	Will comply with cut and fill requirements outlined in rule.
		Complies	Rule 8A.5.4 Setback from property boundary, buildings, structures and cliffs	Not applicable
		Complies	Rule 8A.5.5 Setback from National Grid (earthworks)	Not applicable
		Complies	Rule 8A.5.6 Setback from network utilities	Not applicable
		Complies	Rule 8A.5.7 Sediment control	Earthworks will be undertaken using best practice sediment control management to prevent sediment entering water bodies, stormwater networks, or the coastal marine area, or going across property boundaries.
		Complies	Rule 8A.5.8 Removal of high class soils	No high-class soils
		Complies	Rule 8A.5.9 NZ Environmental Code of Practice for Plantation Forestry	No plantation forestry
		Complies	Rule 8A.5.10 Setback from scheduled tree	No scheduled trees
Earthworks activities Rule 8A.3.2.2 Earthworks – Small Scale		Permitted	a. Earthworks - small scale thresholds[4]	Earthworks will be considered 'large scale' All indigenous vegetation clearance that occurs in an ASBV, ONF, ONCC,

[4] Appeal only relates to Port Activity in the Industrial Port Zone as being considered earthworks - small scale; and earthworks for underground fuel storage systems

Rule	Reason	Status	Performance Standards	Comment on compliance
				HNCC, or NCC and is not included in Rule 10.3.2.1.a is considered indigenous vegetation clearance – large scale.
Earthworks activities Rule 8A.3.2.3 Earthworks – Large scale	Over such a large area, the proposal will likely involve more than 200 m² of earthworks within the Rural Coastal / Natural Coastal Character part of the site. The total area is difficult to determine at this stage as will depend on final agreed treatment/cover of land in places. Consent is sought as a precaution and with conditions proposed.	**Restricted Discretionary**	8A.5.10 Setback from coast and water bodies states that: Earthworks – large scale must comply with Rule 10.3.3 Refer assessment below in which compliance with Rule 10.3.3 is achieved.	
Natural Environment				
10.3.2 Vegetation Clearance	Clearance of a pest plant listed in Appendix 10B (Includes Broom) always considered indigenous vegetation clearance – small scale.	Complies	10.3.2.1 Indigenous vegetation clearance – small scale thresholds All indigenous vegetation clearance that occurs in an ASBV, ONF, ONCC, HNCC, or NCC and is not included in Rule 10.3.2.1.a is considered indigenous vegetation clearance – large scale. All other indigenous vegetation clearance must not exceed the following maximum areas on any site, over the time period indicated, to be considered	Any other indigenous vegetation to be cleared would not exceed 500m2 within the coastal rural zone.

Rule	Reason	Status	Performance Standards	Comment on compliance
			indigenous vegetation clearance – small scale:	
	Vegetation clearance not required within 20 m of MHWS or of 20 m of any wetland identified in App A1.2.	Complies	10.3.2.2 Protected areas (vegetation clearance)	
	No removal of species outlined in this rule.	Complies	10.3.2.3 Protected species (indigenous vegetation clearance)	
10.3.3 Setback from Coast and Water Bodies	New structures and earthworks will be set back beyond the features identified in this rule.	Complies	New buildings and structures, additions and alterations, earthworks - large scale, storage and use of hazardous substances, and network utility activities must be set back as outlined in rule.	
10.3.4 Tree Species	Forestry and shelterbelts not proposed.	Not applicable	Requirements regarding forestry and shelterbelts.	
10.3.5 Number and Location of Permitted Buildings	Only the small registration kiosk (less than 10 m²) is proposed.	Complies	In the Natural Coastal Character (NCC) overlay a maximum of three new buildings less than or equal to 60m² footprint may be erected per site, provided that they are located within 30m of any building greater than 60m² footprint on the same site.	
10.3.6 Reflectivity	Materials will adhere to these requirements.	Complies	Exterior surfaces, including roofs, that have a light reflectance value (LRV) of 30% or less	

Rule	Reason	Status	Performance Standards	Comment on compliance
Natural Hazards				
Rule 11.3 Natural Hazards Performance Standards	Site subject to Hazard 3 (coastal) Overlay Zone (part of site parallel with coastline but not entire part of site zoned rural), Risk: Low, Location: South Dunedin, Otago Harbour, Long Beach & Blueskin Bay (Area B) The proposal does not involve 'new buildings'.	Complies	11.3.3 Relocatable Buildings *(note rule under appeal)* In the hazard 3 (coastal) overlay zone, new buildings containing residential activity on the ground floor must be relocatable.	***Rule is not applicable***
Heritage – Warrington moa hunting site (NZAA Reference 144/177) and Plan IDA040, Appendix A.1.1				
Rule 13.3 Development Performance Standards	Not applicable.	Complies	13.3.1 Building Colour – Relevant to paint on a roof or wall of a 'building'.	
	Not applicable.	Complies	13.3.2 Materials and Design – Relevant to a character-contributing building, any protected part of a scheduled heritage building or scheduled heritage structure, or any non-protected part of a scheduled heritage building within a heritage precinct.	
	An archaeological authority is being applied for but not yet obtained.	***Non-complying***	13.3.3 Archaeological Sites – Earthworks on a scheduled archaeological site must have an archaeological authority if required.	

Rule	Reason	Status	Performance Standards	Comment on compliance
Manawhenua – Wāhi Tupuna Mapped Areas, Pūrākaunui to Hikaroroa to Huriawa; Okahau; and Blueskin Bay				
Rule 14.3.2.1 Assessment of performance standard contraventions	All performance standard contraventions: – *Rule 6.6.1.4 Gradient of parking areas* – *Rule 6.6.1.5 Surfacing and marking of parking areas* – *Rule 6.6.1.6 Lighting of Parking Areas*		*Potential circumstances that may support a consent application.* *General assessment guidance.*	
Rule 14.4.2.1 Assessment of All restricted discretionary activities	– *Rule 15.3.3.22 Visitor Accommodation* – *Rule 15.3.4.28 All other new structures* – *Rule 15.3.4.30 Parking, loading and access* – *Rule 16.3.4.16 All other new structures* – *Rule 16.3.4.19 Parking, loading and access* – *Rule 6.6.1.4 Gradient of parking areas* – *Rule 6.6.1.5 Surfacing and marking of parking areas* – *Rule 6.6.1.6 Lighting of Parking Areas* – *Rule 8A.3.2.3 Earthworks – Large scale*		General assessment guidance: a. Council will consider the findings of any cultural impact assessment provided with a resource consent application, where required (see Special Information Requirements - Rule 14.7). b. In assessing the effects on Manawhenua and their relationship with a wāhi tūpuna mapped area, Council will consider the values in Appendix A4. Potential circumstances that may support a consent application: c. The development incorporates conservation activity that will have significant positive effects	

Rule	Reason	Status	Performance Standards	Comment on compliance
			on biodiversity or natural character values.	

Table 2: Compliance assessment – Operative Dunedin City District Plan 2006 (ODP)

Rule	Reason	Status	Performance Standards
Rural Zone			
Rule 6.5.7 Any activity not specifically identified as permitted, controlled, discretionary or prohibited by the rules in this zone or in the rules of Sections 17 to 22 of this Plan is non-complying. This rule does not apply to activities identified as permitted, controlled or discretionary in the rules of Sections 13 to 16 of the Plan, regardless of where in the zone those activities are undertaken.	Following the approach taken for existing NZMCA activities in Dunedin, the proposed activity is not deemed to be defined as a commercial residential activity, nor a recreational activity. As it is not specifically provided for as a permitted activity and does not fit comfortably within the above definitions, it is deemed to be non-complying.	Non-complying	Nil Rule 6.7 Assessment of Resource Consent Applications
Rule 6.5.3 Conditions Attaching to Permitted Activities	*(v) Design of parking spaces* *May not comply as 1 in 20 is very flat however the site (though not steep) does vary in grade likely to exceed 1 in 20 in areas.* *Applied for as a precaution.*	Restricted Discretionary	**Car Parking Loading and Access** – On-site car parking shall comply with the performance standards of Section 20 (Transportation – See below)
		Complies	**Noise, Glare, Lighting and Electrical** Interference (Refer to the performance standards of the Environmental Issues Section).

Table 2: Performance Standards

Transportation – Rule 20.5.5 Parking Performance Standards *(Policies 20.3.1, 20.3.4)*		
(v) Design of parking spaces	a. The gradient for off-street parking surfaces for all non-residential activities shall be no more than 1 in 20 in any one direction. b. The surface of all parking, associated access and manoeuvring areas (except parking areas for residential activities requiring 5 or less car parking spaces) shall be formed, hard surfaced and, if impermeable surfacing is used, drained, and parking spaces permanently marked. [Amended by Plan Change 10, 18/1/11] c. All parking areas, excluding those for residential activities, which are designed to accommodate 4 or more vehicles and which are used at night shall be illuminated to a minimum maintained level of 2 lux, with high uniformity, during the hours of operation. d. The dimensions of all spaces shall comply with the appropriate dimensions in Appendix 20B. e. All parking areas shall have clearly defined access and the remainder of the property road boundary shall have a physical barrier which separates the parking area from the road. [Inserted by Consent Order, 20/12/01]	
(vi) On-site manoeuvring	(b) All on-site manoeuvring areas for non-residential activities shall be designed to accommodate at least a 99 percentile design motor vehicle, as shown in Appendix 20C, unless otherwise specified. This manoeuvring area shall be provided without the need for a turntable. [Amended by Plan Change 10, 18/1/11] (c) On-site manoeuvring shall be provided to ensure that no vehicle is required to reverse either onto or off	

	a national, regional, district or collector road, identified on District Plan Maps 73 and 74. (e) For non-residential activities, on-site manoeuvring for a 99 percentile motor vehicle shall be provided to ensure that no 99 percentile motor vehicle is required to reverse onto or off a site where: (i) 5 or more parking spaces share a common access; or (ii) The activity is on a rear site.	
Transportation – Rule 20.5.7 Vehicle Access Performance Standards *(Policies 20.3.1, 20.3.4, 20.3.5, 20.3.8)*		
(i) Maximum number of vehicle crossings	1 crossing is permitted	1 crossing is provided **Complies**
(iii) Distances of vehicle crossings from intersections	(b) In all cases where a site adjoins a legal road that is constructed of hard surfaced footpath or carriageway, the vehicle access shall be hard surfaced from the edge of the existing hard surfacing on the footpath or carriageway to the property boundary and for a minimum of 5m inside that boundary. (c) In all zones other than Rural and Rural Residential, the full length of any private way that serves 2 or more units shall be hard surfaced. (e) Vehicle access shall be designed to minimise longitudinal gradients; and the maximum change in gradient without transition for all vehicular access shall be no greater than 1 in 8 for summit grade changes or 1 in 6.7 for sag grade changes.	**Complies**
(v) Dimension requirements for vehicle access on a site	(a) For all sites except those specified in Rules 8.9.2(ix)(c) and 9.8.2(viii)(a)(i) in Sections 8: Residential and 9: Activity, the maximum width of each vehicle crossing shall be in accordance with the standards set out in Table 20.6:	**Complies**

	Other Activities = 9m (b) The minimum widths of all private ways and vehicular access on a site shall be in accordance with the standards set out in Table 20.7. Minimum formed width = 5 m	
Environmental Issues – Rule 21.5.1 Performance Standards: Noise Limits – General Levels		
(i) Maximum L10 and Lmax Limits		Subject to (ii), the maximum noise limits generated by any activity shall not exceed: (a) The maximum day-time, night-time and shoulder period L10 noise limits identified on District Plan Maps 62 to 70, measured at the boundary or within any other property within the same noise area, except that in the case of noise generated within any Rural or Residential Zone noise shall be measured at or within the notional boundary of any dwelling not on the same site. (b) Between 9.00 pm on any night and 7.00 am the following day no noise shall exceed an Lmax of 75 dBA measured at the boundary of the site or within any other site.
(ii) Limits applying at Noise Area Boundaries		At the boundary of any noise area, the maximum level of noise generated by any activity in the noise area shall not exceed: (a) Day-time: the lower of the day-time maxima for the noise area within which the activity is located and any adjoining noise area. (b) Night-time: the lower of the night-time maxima for the noise area within which the activity is located and any adjoining noise area. (c) Shoulder period: the lower of the shoulder maxima for the noise area within which the activity is located and any adjoining noise area.

(iii) Shoulder Period Limits		Where there is a difference in noise limits between day and night-time, a shoulder period will apply which reduces the allowable day-time level by 5 dBA during that shoulder period.
Rule 21.5.4 Performance Standard: Glare and Lighting		
(i) Glare and lighting	Except in any Industrial 1 or Port Zone, no activity shall result in greater than: (a) 16 lux of light onto any other site in a Residential Zone, measured inside that site. (b) 8 lux of light onto any other site used for residential purposes during night-time hours, measured at the windows of any such residentially occupied building. *This rule does not apply to headlights of motor vehicles.*	
Rule 21.5.5	Except in any Port Zone, electrical interference emanating from any site shall not be discernible beyond that site.	

ATTACHMENT 3 – Pavement Options Memo and Plan

20 Bay Road, Warrington – Pavement Options

This report has been prepared for the benefit of the NZ Motor Caravan Association. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	30/6/2020	First Issue	N Lister	K Bombay	L Paterson	D Evans

1 Background

The site at 20 Bay Road Warrington, has historically been used as a Kings School training facility and motor caravan park. It is proposed by the NZ Motor Caravan Association (NZMCA) to develop the site into a more formal caravan park, by completing a range of improvements over the site, semi-formalising parking arrangements with landscaping, and introduce additional amenity plantings.

It is proposed to upgrade the entry driveway to a higher standard un-sealed gravel surface than currently exists, while the remainder of the site will remain as a grass covered area.

Figure 1: Indicative Site Plan.

Located within the main site are areas of historical and archaeological significance, with near and at surface artefacts being identified. The previous use of the site, resulted in the disturbance of some of these identified areas, either as the result of ground contouring works, or due to vehicle traffic driving over the site.

This report details a range of options which could be implemented to successfully allow the historical areas to remain undisturbed while the NZMCA operate a motor caravan park on the site. Generally, this will take the form of protecting any artefacts in place, by the use of geotextile fabric and geosynthetic grids, to provide a separation and reinforcement layer, on top of the existing ground surface, followed by the placement of fill effectively burying the artefacts.

Note while the word “pavement” is used throughout this report, other than the access driveway, the nature of the proposed development is not for a standard road pavement to be constructed, rather a reinforced or unreinforced soil pavement. As such some of the normal pavement design methods are not directly applicable to this situation.

The key item to ensure a suitably durable topsoil / grass surface for the expected traffic loadings is surface drainage. Once topsoil is wet or saturated the strength of the material reduces rapidly.

2 Design Traffic

The site is expected to be trafficked by a range of vehicles varying from private cars towing caravans to medium commercial vehicles (bus, campervan, recreational vehicle). With the movement of vehicles per day expected to peak at 100 vpd during the high season.

The total expected Design Equivalent Standard Axle (DESA) for use in the pavement design is based on the vehicle profile and volumes presented in the separate Integrated Transport Assessment report. The following design parameters have been used to calculate the design traffic loadings:

- Design life = 25 years
- Heavy Commercial Vehicle (HCV) growth = 0% (assumed)
- %HCV = 3.4% (ITA report based on 50% Class 4 and 100% Class 5 vehicles)
- ESA/HCV = 1.44 (Transit 2007 NZ Supplement to Austroads, in lieu of any site specific data)
- Number of Heavy Vehicle Axles Groups (NHVAG) per HCV = 2.4 (Transit 2007 NZ Supplement to Austroads, in lieu of any site specific data)
- ESA/HVAG = 0.6 (Transit 2007 NZ Supplement to Austroads, in lieu of any site specific data)
- Annual Average Daily Traffic (AADT) = 100

A 25 year in service DESA of **4.4×10^4** ESA is calculated for the new access road and wider site, DESA calculation included in **Appendix A**. Note this is a very low expected traffic volume however, should be conservative due to the higher percentage of these vehicles being partially laden, compared to normal HCVs which typically will have higher loading factors.

3 Geotechnical Investigation

A brief geotechnical investigation has been completed over the site with six test pits being completed across the extent of the site. The Geotechnical Assessment is included in **Appendix B.**

3.1 Subsurface Ground Conditions

The test pits indicate that the site is generally underlain by:

- a layer of TOPSOIL / organic matter to approximately 250mm, varying to 100mm to the South West of the site
- underlain by a subgrade of mainly SAND with minor silt varying to a sandy SILT to the North of the site.

3.2 Subgrade CBR for Design

Based on the subgrade descriptions logged as part of the geotechnical investigation and with reference to Austroads 2012 Table 5.4, reproduced below, we would expect a subgrade CBR of approximately 10% for the SAND subgrade, and 2% for the SILT subgrade, assuming fair to poor drainage conditions.

Table 5.4: Typical presumptive subgrade design CBR values

Description of subgrade		Typical CBR values (%)	
Material	Unified Soil Classification	Excellent to good drainage	Fair to poor drainage
Highly plastic clay Silt	CH ML	5 4	2–3 2
Silty-clay Sandy-clay	CL CL	5–6	3–4
Sand	SW, SP	10–18	10–18

Based on the site scala penetrometers and lab soaked CBR testing, a range of subgrade CBR varying from 3.5% to 19% across the site has been identified. These results indicate potentially weaker areas of SAND subgrade being present in pockets across the site than the presumptive values provided by Austroads.

3.3 Design Subgrade CBR

We have adopted a subgrade **design CBR of 4%** for use in the design:

4 Design Pavement

Based on the design traffic and subgrade CBR values a design pavement depth of 290mm is calculated.

For a typical two layer road pavement (subbase, and basecourse) this would normally require a 190mm of AP65 subbase followed by 100mm of AP40 basecourse. Minimum layer depths are governed by the need to achieve 2.5 times the maximum particle size to allow full compaction.

The above design pavement is only directly applicable to the accessway construction as this is to be constructed of compacted granular materials but provides an indication of suitable treatments for the wider sider which is to remain grassed.

4.1 Accessway

This area has the highest concentration of vehicle loadings, as it funnels vehicles from Bay Road into the site proper.

The above design values are deeper than the 250mm required depth of compacted granular material contained in the DCC consent. The required 250mm pavement depth is expected to be sufficient due to the accessway remaining unsealed, therefore being able to be repaired / strengthened relatively easily by adding additional material, and the conservatism in the traffic loading calculations.

If the accessway is to be sealed with a chipseal or asphalt, then consideration should be given to increasing the depth of pavement provided.

4.2 Campervan / Caravan Parking Area

A grassed soil “pavement” is proposed for the remainder of the site. Three separate grassed “pavement” designs are described below, to account for the vehicle circulation area where concentrated traffic movements on site may cause topsoil / turf damage, the identified area of archaeologically significance requiring protection treatment, and the balance of the site.

4.2.1 Circulation Areas

The areas of higher or concentrated traffic movements, such as near the kiosk / transition from the granular accessway onto the grassed area and the turning areas at the head of each lane, are at risk of damage if driven on when wet. It is recommended that a suitable soil reinforcement is provided in these areas. An example of a suitable proprietary product, Cirtex SurePave, is provided in **Appendix C**.

There are other products available from different manufacturers, which provide the same or a similar function, which may also be suitable. This product class works by reinforcing the top 50 – 75mm of topsoil with reinforcement matt. The matt typically has a “honey comb” arrangement of open cells, which provides confinement to the topsoil layer, allowing the applied wheel loading to be spread across a wider area of the topsoil below without inducing additional compaction.

Generally the installation of this type of product requires the following steps:

- stripping of ~50mm of the topsoil / turf layer,
- levelling of the site with imported topsoil or sand to ensure drainage fall is maintained,
- placement of the proprietary soil reinforcement mats,
- filling the reinforcement mat cells with topsoil,
- sowing grass or laying turf (aka Readylawn)

4.2.2 Area of Archaelogical Significance

The areas identified as containing near or at surface artefacts, requires some form of protection from direct traffic loading to ensure any artefacts remain protected and un-damaged. **Figure 2** below shows the indicative extent of the archaeological area with minimal cover to the layer of interest.

Figure 2: Areas of Archeological Interest identified during Site Survey, Feb 2020.

To provide protection in this area it is proposed to complete an “overlay” pavement design, with limited to no excavations being completed, by placing additional imported material above the existing surface level. This area is proposed to be mainly a parking area, with circulation limited to the northern entry to the lane between parking spaces rather than in a concentrated area as such it is expected that the un reinforced surface could remain as long as it is well compacted following grass strike and has sufficient fall to ensure positive runoff of surface water.

A geotextile fabric and geogrid reinforcement layer is proposed to be laid on the existing surface prior to the overlay. This has a two fold benefit, firstly the geogrid layer helps spread any imposed traffic loading across a wider area of the existing ground minimising the chance of deformation from occurring and / or damage to near surface artefacts.

Secondly, the geofabric and geogid layer provides a physical barrier that will highlight to anyone excavating on site, that they have reached the depth of archaeological significance.

To ensure adequate drainage is achieved a drainage layer of coarse sand is proposed directly above the geofabric and geogrid layer. This layer ideally would drain to daylight or via subsoil drains to a suitable outfall.

In this area the construction of this pavement would take the following steps:

- spray existing grass with a suitable herbicide,
- mow the dead grass close to the existing surface level, and remove clippings to waste,
- place geofabric and geogrid layer,
- place 100mm coarse sand drainage blanket,
- place 200mm minimum imported topsoil across the area,
- level site to ensure positive drainage is achieved,
- sowing grass or laying turf (aka Readylawn)
- roll area once grass strike has been achieved, to ensure a suitably compact surface.
- monitor site, and retrofit soil reinforcement matt if required.

4.2.3 Balance of Site

For the remainder of the site, some relevelling / recontouring will be required to ensure positive drainage is maintained, especially given the proposed overlay to the archaeological area may fill some of the natural flow paths, and to provide a smoother surface for vehicle ride. This relevelling should be completed via the importation of additional topsoil to the site as a fill operation, rather than a combination cut and fill operation, to minimise any excavations required.

In this area the construction would take the following steps:

- spray existing grass with a suitable herbicide,
- mow the dead grass close to the existing surface level, and remove clippings to waste,
- place varying depth of imported topsoil across the area,
- level site to ensure positive drainage is achieved,
- sowing grass or laying turf (aka Readylawn)
- roll area once grass strike has been achieved, to ensure a suitably compact surface.
- monitor site, and retrofit soil reinforcement matt if required.

5 Construction Considerations

Some construction requirements are outlined below. These comments do not constitute a specification, however a technical specification will be required to allow the successful construction of the upgrade.

5.1 Imported Topsoil

The imported topsoil should be a high quality freely draining sandy LOAM or gravely LOAM material, to ensure there is sufficient strength in the topsoil to counteract the imposed loads. If there is too high a content of CLAY or SILT the topsoil is likely to pug under imposed wheel loads.

5.2 Construction Sequence

The construction sequence should be staged to minimise the over tracking of unprotected, or wet soils. Once the soil support matrix is damaged by trafficking of wet soils, the only repair possible is drying of the soil, followed by hoeing in place back to a fine particle size, followed by relaying. If this occurs then the chance of over excavating or hoeing through the existing surface is a risk.

5.3 Pavement Drainage

Protection of the pavement against damage induced by water within the pavement or ponding on the surface is a critical aspect of the pavement design.

A subsoil system may be required to allow removal of excess water from the subgrade and minimise the overlaying topsoil form becoming affected by moisture and will assist in maintaining the pavement in a good condition over its life.

Special care will be needed when installing any subsoil drains as they are likely to need to be installed below the existing surface level, to allow for positive drainage.

5.4 Ongoing Maintenance

With a trafficked grass area, some ongoing maintenance and remediation of damaged areas of the topsoil surface and grass is expected. Imposed wheel loads and concentrated traffic have the potential to over compact the surface or damage the grass covering. This damage can be minimised by rotating the use of the individual parking areas, to ensure even vehicle loading across the site.

The main accessway being unsealed will require ongoing addition of new wearing course to replenish the surface, and potentially regrading to ensure positive drainage and removal of any potholing.

Appendix A: Design Traffic Loading

20 Bay Road, Warrington

		Start	End	Length (m)
RP	-	-	-	-

Topography& Charactristics:

Flat to rolling, grassed "paddock"

AADT:	100
HCV:	3.4%
Traffic Growth:	0.00%

N_{DT} =365*AADT*DF*%HCV/100*LDF*CGF*NHVAG

AADT	100
DF	1
%HCV	3.4
LDF	1
CGF	25
NHVAG	2.4

Design Period		25	years
Annual Growth Rate		0	%
CGF=Y+((Y/2)*(Y-1)*i))	.	CGF=	25

N_{DT} 74,460

DESA=ESA/HVAG*N_{DT}

ESA/HVAG	0.6
DESA	**44,676**

Appendix B: Geotechnical Assessment

Bay Road Development

This report has been prepared for the benefit of the New Zealand Motor Caravan Association. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
			D Crawford	L Paterson	L Paterson	D Evans

1 Introduction

1.1 Brief

The New Zealand Motor Caravan Association has asked Stantec to carry out soil testing to inform future pavement design, for the potential development of a campground on the site.

1.2 Location

The site location is 20 Bay Road Warrington, 5065177 (Situation) LOT 1 DP 10272.

Figure 1.1 Bay Road Site Map

1.3 Testing

The soil sampling was carried out by Lee Paterson and Dylan Crawford of Stantec. Prior to sampling beginning all underground services were clearly identified by Delta. The site visit was carried out under the supervision of a representative from the New Zealand Historic Places Trust.

Shallow test pits were dug out by hand, with 15kg samples removed for lab testing. Topsoil was completely removed before the samples were collected. Scala penetrometer testing was carried at each of the six sites.

2 Testing

2.1 Test Pit Locations

The figure below shows the location of the six test pits.

Figure 2.1: Test Pit Locations

	Pit 1	Pit 2	Pit 3	Pit 4	Pit 5	Pit 6
Easting	397316	397340	397399	397452	397367	397321
Northing	811391	811302	811235	811165	811167	811259
Height R/L (m)	10.1	3.92	5.78	4.58	5.76	2.32

*NZGD2000 / NZVD 2016

A photo of each test pit location is attached in appendix A.

2.2 Test Pit Scala Results

At each of the six sites topsoil depths were 250mm, with the exception of site five, where topsoil depths were 100mm.

The Scala results are shown in the following table.

Depth BGL (m)	Scala 1	Scala 2	Scala 3	Scala 4	Scala 5	Scala 6 (attempt 1)**	Scala 6 (attempt 2)**
0.1	4	5	2	3	2	2	2
0.2	5	4	2	4	3	2	2
0.3	7	5	3	4	3	Refusal	3
0.4	6	7	4	3	3		Refusal
0.5	9	7	4	3	4		
0.6	9	6	4	2	5		
0.7	10	5	4	1	4		
0.8		4		1	4		
0.9							
1.0							
1.1							

*Blow Counts Per 100mm

** Site 6 appeared to be in the middle of a manmade flood path, which had bluestone placed in it. The bluestone caused two test refusals at a depth of 0.4m.

2.3 Lab Results

Samples were tested by Central Testing Services, Alexandra.

	Pit 1	Pit 2	Pit 3	Pit 4	Pit 5	Pit 6
Topsoil Thickness (mm)	225	250	250	250	100	250
Lab CBR%	4.5%	18%	7%	16%	3.5%	19%

A full copy of the lab results is attached in appendix B.

APPENDIX A Test Pit Site Photos

Stantec

Photographic Log

Client:	**New Zealand Motor Caravan Association**	**Project:**	**Bay Road Development**
Site Name:		**Site Location:**	**20 Bay Road, Warrington**

Photograph ID: 1 **Photo Location:** Test Pit 1 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	
Photograph ID: 2 **Photo Location:** Test Pit 2 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	

Client:	**New Zealand Motor Caravan Association**	**Project:**	**Bay Road Development**
Site Name:		**Site Location:**	**20 Bay Road, Warrington**

Photograph ID: 3 **Photo Location:** Test Pit 3 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	
Photograph ID: 4 **Photo Location:** Test Pit 4 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	

Client:	**New Zealand Motor Caravan Association**	**Project:**	**Bay Road Development**
Site Name:		**Site Location:**	**20 Bay Road, Warrington**

Photograph ID: 5 **Photo Location:** Test Pit 5 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	
Photograph ID: 6 **Photo Location:** Test Pit 6 **Direction:** **Survey Date:** 13/05/2020 **Comments:**	

APPENDIX B Lab Results

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 20/1109

Date: 26 May 2020

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	**Stantec New Zealand, P.O. Box 4, Dunedin**	**Attention:**	**D. Crawford**
Job Description:	**20 Bay Road, Warrington Investigations**		
Sample Description:	**See Below**	**Client Order No:**	**N/A**
Sample Source:	**See Below**	**Sample Label No:**	**See Below**
Date & Time Sampled:	**13-May-20**	**Sampled By:**	**Unknown**
Sample Method:	**Test Pit ***	**Date Received:**	**18-May-20**
Test Method:	**NZS 4407:2015, Test 3.15**		

LABORATORY SOAKED CBR RESULTS			
Sample Source:	**Test Pit 1**	**Test Pit 2**	**Test Pit 3**
Sample Label No:	**38012**	**37918**	**38010**
Sample Depth: (mm)	**300**	**Not Stated**	**Not Stated**
Fraction Tested:	**-19.0 mm**	**Whole soil**	**-19.0 mm**
Sample Description:	**Sandy SILT with minor clay and trace of gravel (minor organic matter)**	**SAND with minor silt (trace of organic matter)**	**SAND with minor / some silt and minor gravel (trace of organic matter)**
Condition of Sample:	**Soaked**	**Soaked**	**Soaked**
Surcharge Mass: (kg)	**4.0**	**4.0**	**4.0**
Time Soaked:	**4 days**	**4 days**	**4 days**
Swell: (%)	**1.2**	**0.0**	**0.4**
Water Content as Compacted: (%)	**22.6**	**13.3**	**8.6**
Water Content From Under Plunger: (%)	**30.1**	**22.7**	**26.2**
Dry Density As Compacted: (t/m^3)	**1.37**	**1.57**	**1.44**
CBR Value @ 2.5 mm Penetration:	**4.5**	**17**	**5**
CBR Value @ 5.0 mm Penetration:	**4.5**	**18**	**7**
Reported CBR Value:	**4.5**	**18**	**7**

Notes:

- ***The material was received in a natural state.***
- ***The sample was compacted to NZ Standard Compaction at the water content as received.***
- ***The rate of penetration was 1.10 mm / min.***
- ***Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005, the sample method * and sampling.***
- ***This report may not be reproduced except in full.***

Tested By: **C. Fisher** **Date:** **21 to 26-May-20**

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 20/1109

Date: 26 May 2020

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	**Stantec New Zealand, P.O. Box 4, Dunedin**	**Attention:**	**D. Crawford**
Job Description:	**20 Bay Road, Warrington Investigations**		
Sample Description:	**See Below**	**Client Order No:**	**N/A**
Sample Source:	**See Below**	**Sample Label No:**	**See Below**
Date & Time Sampled:	**13-May-20**	**Sampled By:**	**Unknown**
Sample Method:	**Test Pit ***	**Date Received:**	**18-May-20**
Test Method:	**NZS 4407:2015, Test 3.15**		

LABORATORY SOAKED CBR RESULTS			
Sample Source:	**Test Pit 4**	**Test Pit 5**	**Test Pit 6**
Sample Label No:	**38002**	**38000**	**37998**
Sample Depth: (mm)	**Not Stated**	**Not Stated**	**Not Stated**
Fraction Tested:	**Whole soil**	**-19.0 mm**	**Whole soil**
Sample Description:	**SAND with minor silt (trace of organic matter)**	**SAND with some silt (trace of organic matter)**	**SAND with minor silt (trace of organic matter)**
Condition of Sample:	**Soaked**	**Soaked**	**Soaked**
Surcharge Mass: (kg)	**4.0**	**4.0**	**4.0**
Time Soaked:	**4 days**	**4 days**	**4 days**
Swell: (%)	**0.0**	**0.0**	**0.2**
Water Content as Compacted: (%)	**8.9**	**4.4**	**11.3**
Water Content From Under Plunger: (%)	**24.4**	**26.5**	**19.6**
Dry Density As Compacted: (t/m^3)	**1.49**	**1.40**	**1.58**
CBR Value @ 2.5 mm Penetration:	**14**	**2.5**	**16**
CBR Value @ 5.0 mm Penetration:	**16**	**3.5**	**19**
Reported CBR Value:	**16**	**3.5**	**19**

Notes:

- *The material was received in a natural state.*
- *The sample was compacted to NZ Standard Compaction at the water content as received.*
- *The rate of penetration was 1.10 mm / min.*
- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005, the sample method * and sampling.*
- *This report may not be reproduced except in full.*

Tested By: **C. Fisher** **Date:** **21 to 26-May-20**

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Appendix C: Reinforced Soil Product Brochures

SurePave® Permeable Paving

Stabilise your Grass, Gravel & Decorative Stone.

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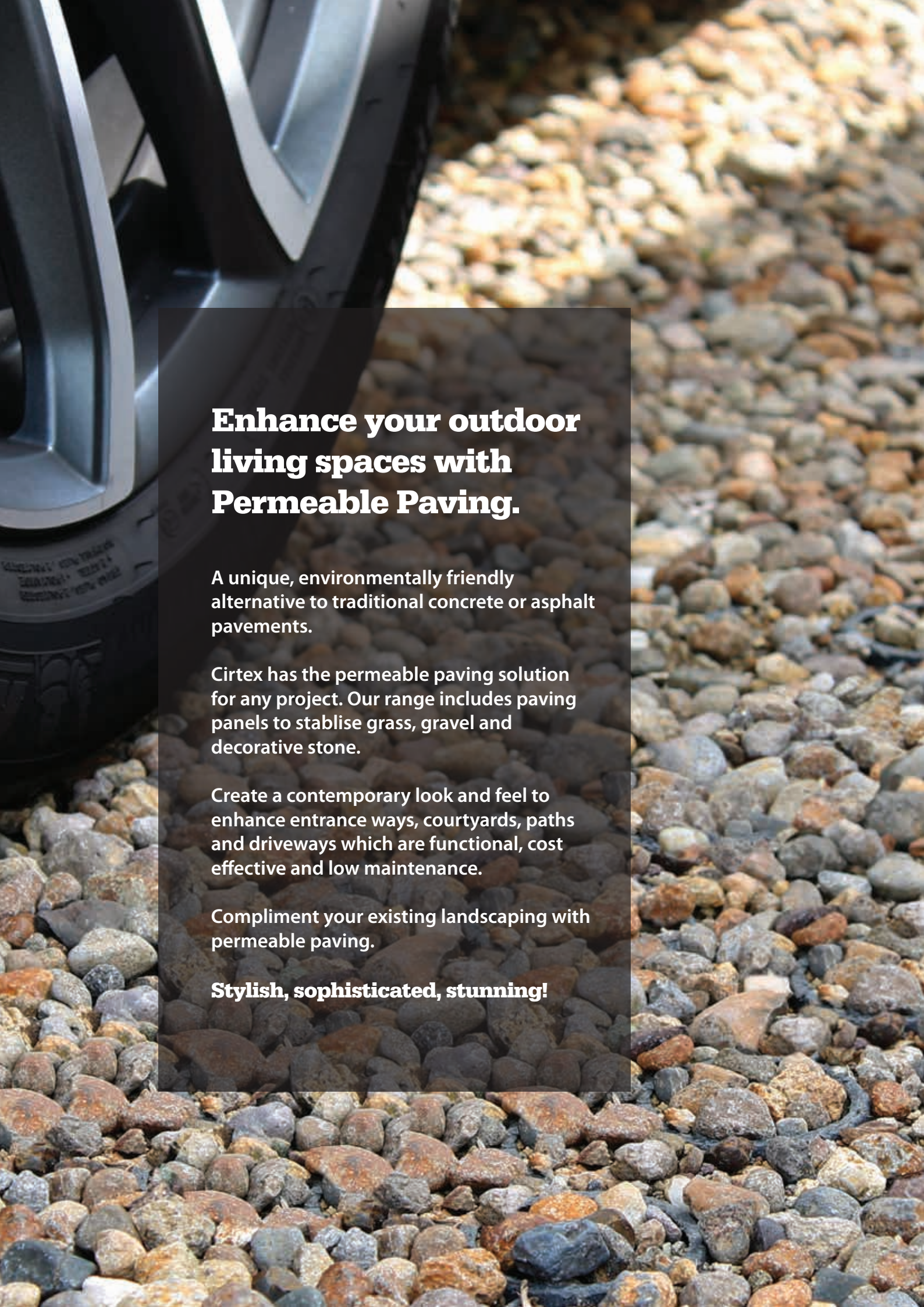


Enhance your outdoor living spaces with Permeable Paving.

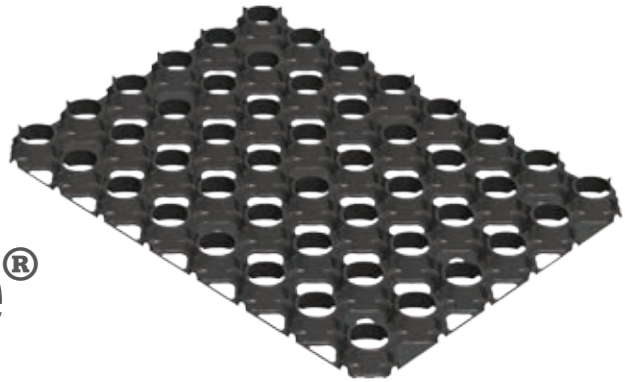
A unique, environmentally friendly alternative to traditional concrete or asphalt pavements.

Cirtex has the permeable paving solution for any project. Our range includes paving panels to stablise grass, gravel and decorative stone.

Create a contemporary look and feel to enhance entrance ways, courtyards, paths and driveways which are functional, cost effective and low maintenance.

Compliment your existing landscaping with permeable paving.

Stylish, sophisticated, stunning!



SurePave®

The Heavyweight in Permeable Paving

SurePave® permeable paving panels are the ideal solution for reinforcing grass, gravel and decorative stone in highly stressed areas, vehicle parking, driveways, golf courses, parks or hard stand areas for boats, trailers or caravans.

The robust cellular design of SurePave® offers a perfect paving alternative to concrete while still maintaining all the benefits of a hard pavement.

Porous and free draining, SurePave® allows water to be absorbed easily creating a safe and functional surface that is natural and attractive.

Significant features of SurePave® paving panels include a unique positive interlocking system to ensure panels are held in place, a small panel size for ease in transportation/installation, and the ability to withstand loads of over 700 tonnes per square metre when filled.

If you are wanting a paving solution that encompasses style and functionality, that can withstand heavy duty usage for years to come, look no further than the SurePave® Paving System.

SUREPAVE® PANELS

Code 76148
Product SurePave Black 0.5m² Panel
Size 816mm x 612mm

SUREPAVE® SPECIFICATIONS

STRUCTURE	Interlocking Open Structure Hollow Pavers
LOCKING SYSTEM	Positive Lock Clipping System
PANEL DIMENSIONS	816mm x 612mm x 40mm
MATERIAL	Polypropylene Recycled
UNIT WEIGHT	2kg
CRUSH STRENGTH UNFILLED	>133 tonnes/m²
CRUSH STRENGTH FILLED WITH STONE	>740 tonnes/m²
TEST METHODS	Compression, NZS 3116 : 1991, App A & B

SurePave® for Grass

SurePave® Permeable Paving panels are designed to stabilise and support grass. Create a free draining, strong surface that is environmentally friendly and functional.

Interlocking panels are positioned beneath the grass surface, evenly distributing the load to the base below. This minimises compaction and eliminates pot holes, ponding or damage to the ground below.

Features & Benefits

- **Quick and easy to install**
- **Free draining permeable surface**
- **Protects tree roots**
- **Solid, stable surface**
- **Naturally appealing**
- **Cost effective**
- **Easily uplifted to access amenities**
- **Environmentally friendly**
- **Rated for residential, commercial and industrial use**

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✓ Quick

✓ Easy

✓ Smart

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SurePave® Installation for grassed surfaces

1 Measure the area to be covered and calculate how many panels are required. (2 panels per m^2).

2 Skim off existing vegetation.

3 Establish a consistent level or gradient.

4 Use good screened topsoil or sand and spread a thin layer over prepared base to create an even bed.

5 Lay panels ensuring they are interlocked correctly. Trim to shape with a circular saw, or similar, where required.

6 Fill with good screened topsoil up to 10mm above the top of the panels and sow grass or lay turf.

***Note: A base course may be required depending on the existing soil conditions and/or projected traffic volumes. If in doubt either email info@cirtex.co.nz or visit www.cirtex.co.nz to view the installation video.**

SurePave® for Gravel

Permeable Paving offers an attractive alternative to concrete and asphalt pavements. SurePave® surfaces are free draining, structurally strong, aesthetically appealing and cost effective.

SurePave® interlocking paving panels are designed to stabilise decorative stones and gravel, giving these areas the feel of a hard pavement while still maintaining an attractive natural look.

SurePave® paving panels are inherently strong and have the ability to withstand heavy traffic in areas with constant pedestrian or vehicle use.

Interlocking panels are positioned beneath the aggregate surface, evenly distributing the load to the base below. This minimises compaction and eliminates pot holes, ponding or damage to the ground below.

Features & Benefits

- **Quick and easy to install**
- **Free draining permeable surface**
- **Pedestrian, car and truck use**
- **Creates a solid, stable surface**
- **Enhances the natural beauty of grass, gravel and decorative stone**

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✓ Quick

✓ Easy

✓ Smart

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SurePave® Installation for gravelled surfaces

1 Excavate ground shape and levels to achieve sufficient grading and load bearing base.

2 Depending on the soil type and loading, a geotextile is recommended to be laid on the sub-grade surface.

3 Compact a suitable base course material to sufficient depth, ensuring that the area is shaped to prevent ponding.

4 A geotextile can be laid on top of the base course as a separation layer between this and the sandy topsoil bedding layer to prevent migration of the particles.

5 Install edging restraints. AluExcel Paver restraint system is recommended.

6 Place a 25mm bedding layer of clean, sharp sand over the base course layer and screed to level.

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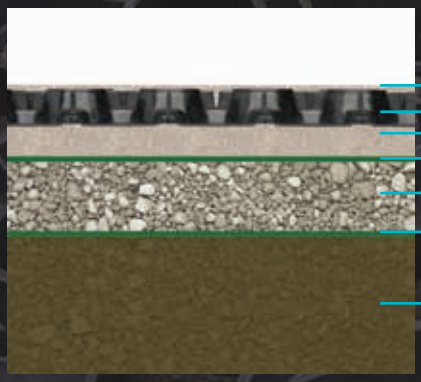

For more information email info@cirtex.co.nz or visit www.cirtex.co.nz to view the installation video.

7 Lay panels ensuring they are interlocked correctly. Trim to shape with a circular saw, or similar, where required. On steep slopes or heavy turning areas use steel anchors.

8 Fill the panels with specified angular roading aggregate or decorative gravel to finished levels (7mm - 19mm aggregate size is recommended).

9 Use a plate compactor to consolidate the filling material into the panels. Fill any voids that show with more aggregate. Filling material should just cover paver's.

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ORIGINAL SIZE A1

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
A	FOR REVIEW	NL	KB		15.09.20

SURVEYED		
DESIGNED		
DRAWN	NIGEL LISTER	15.09.20
CAD REVIEW		
APPROVED		
PROF REGISTRATION:		

Stantec

Client:

20 BAY ROAD, WARRINGTON
ACCESS & SITE

STAGE 2 PAVEMENT / REINFORCED GRASS
SHEET 1 OF 1

Status Stamp: **SKETCH**

Date Stamp: **15.09.20**

Scales: AS SHOWN

Drawing No.: 310003165-01-001-SK004-1

Rev.: A

20/11/2018 4:43 p.m.

U:\310003165\06 Technical\08 Pavement\Pavement Plan

ATTACHMENT 4 – Noise Emissions Memo

Memorandum

To	James Imlach
From	Richard Jackett
Office	Petone
Date	30/10/2019
File	3-C1629.00 00007 02
Subject	NZMCA Weedons Park Noise Emissions

Introduction

The New Zealand Motor Caravan Association Inc. (NZMCA) operates a member-only vehicle-based campground at 286 Jones Road, Rolleston (Figure 1) named Weedons Park. The site is consented to accommodate up to 130 motorhomes at any one time.

I was engaged by NZMCA to undertake 24-hour noise monitoring of the ambient noise level at Weedons Park in September 2019 to inform expert noise evidence in support of the NZMCA's submission on the nearby Roydon Quarry application. Whilst on site I also conducted additional noise measurements of campground activities with the intention of informing future noise assessments of NZMCA parks. This memo summarises my observations of campground activities and provides measurements of their noise emissions.

Methodology

All noise measurements were made between 10:30am on 10 September and 10:30am on 11 September 2019. The 24-hour sound level meter (SLM) was positioned in the northern-most corner of the NZMCA site (Figure 1). Other measurements were undertaken at various locations within the site.

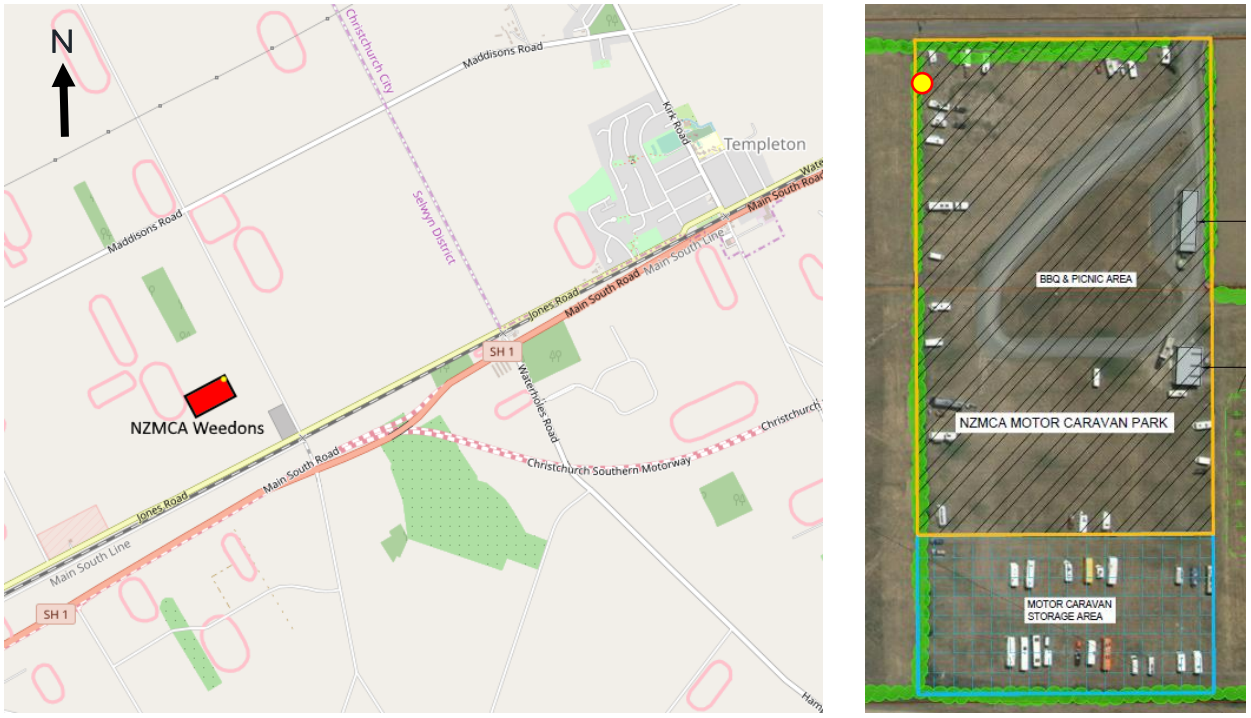

Figure 1: Location of the Weedons NZMCA Park (left) and the site plan (right) showing the 24-hour noise monitoring location as a yellow dot.

The instrumentation used was:

- Rion NL-32 Sound Level Meter, S/N: 00851394 (calibrated 11/7/19) [24-hour]
- Bruel & Kjaer 2250 Sound Level Meter, S/N: 3027649 (calibrated 10/1/19)
- Norsonic Nor1256 Sound Calibrator, S/N: 125626168 (calibrated 11/7/19)
- Davis Instruments TurboMeter wind speed indicator

The weather remained cold and fine throughout, and windspeeds were between 1 m/s to 4 m/s during my noise measurements of campground activities.

Observations

The noise environment at NZMCA Weedons Park was dominated by noise generated off-site, and could be summarized as "working-rural, with distant highway traffic, occasionally punctuated by passing trains and aircraft".

When on site, members spent most of their time inside their vehicles (the weather was fine, but cold). Quiet conversations took place between members walking around the park during the day time, but these were limited to 2 or 3 people at a time. Members mentioned that on nice days they might enjoy 'happy hour' on the benches outside the shed, but this did not happen when I was on site.

There were some dogs present but no barking was heard over the entire time I attended the site.

Vehicle traffic in and out of the site occasionally generated low levels of noise. This was a mix of cars and utes (going out for the day or for supplies) and towed or self-powered motorhomes arriving or leaving the park.

I observed a total of 28 motorhomes and caravans staying overnight on the site during the survey. Two generators were in operation between 5pm and 8pm on 10 September. Members appeared to prefer to operate their generators in the morning from about 9am onwards. A maximum of 3 generators were operating at any one time in the morning. Members noted that generator usage was sometimes necessary in winter, but they preferred to charge caravan batteries at powered sites, from solar panels (viable in summer), or from driving/idling their vehicles. Generator usage appeared to generally follow the NZMCA policy of 'a maximum of two 2-hour stints between 8am to 8pm'.

I observed no noise-generating activity on site after 8pm (I departed after 10pm), except for a few vehicles quietly arriving or leaving.

The 6 or 7 members I spoke with indicated that the peacefulness of the park was a key factor in their decision to visit the site. All members that were operating generators appeared to be knowledgeable about how loud their generator was compared with other generators on the market. The "Honda" was mentioned as being the quietest by two non-Honda owners.

Results

24-hour noise survey

The ambient noise level at NZMCA Weedons Park is not especially relevant to the noise emission of the park, because it is dominated by activities occurring off-site, particularly road traffic noise from SH1 and aircraft overflights to and from Christchurch airport. However, the results are included for completeness in Table 1 below. The L_{Aeq} noise level represents an 'energy average' of noise over the given time period, which is strongly influenced by the loudest noise events (e.g. aircraft), whereas the $L_{90(15min)}$ parameter represents the 'background' noise level (e.g. the hum of road traffic).

Table 1: Noise levels at NZMCA Weedons over different periods of a 24-hour survey

Time	Period	Duration, t (hours)	Noise Level (dB $L_{Aeq(t)}$)	Background (dB $L_{90(15min)}$)
6am – 7am	Early Morning	1	53.3	49.9
7am – 6pm	Day	11	51.2	46.6
6pm - 8pm	Early Evening	2	49.3	45.4
8pm – 10pm	Late Evening	2	49.6	41.5
10pm - 6am	Night	8	47.4	38.0

Generator noise

Noise measurements of three generators operating under load were obtained and are presented below for the standard separation distance of 7-metres:

Generator Make/Model	***Noise Level*** $dB\ L_{Aeq(1\ min)}$ *@ 7m*
Newman 1000W	61
Ryobi 1600W (full load)	63
Honda (on ute, model not available)	59

Each generator had a different tone. The Honda was noticeably deeper than the others, and was subjectively less obtrusive. It was mounted within the flatbed of a ute instead of on the grass like the other generators, so the actual emission level may be slightly lower (in the absence of reflections from the ute tray).

Vehicle drive-by noise

The typical vehicle drive-by sound level on gravel was 75 dB L_{Amax} at 7 metres from the nearside wheel path. Engine noise contributed at low frequencies, but the crunch of the gravel was the dominant source in determining the maximum drive-by level.

Conclusions

- There is some variation between noise emission levels of gas-powered generators. The noise emission of a single generator at full load may be conservatively estimated as 63 dB $L_{Aeq(15min)}$ at 7-metres.
- Members reported that they use powered sites and solar panels in preference to gas-powered generators, but that sometimes generator usage was necessary, particularly in winter. My observations from a 24-hour period in winter was that out of 28 over-nighting motorhomes and caravans:
  - Four members operated generators.
  - A maximum of three generators operated at one time (spread across the site).
  - No single generator operated for more than 2.5 hours at a time.
  - No generators operated outside of the allowed hours of 8am to 8pm.
- A conservative value for vehicle drive-by noise may be taken as 75 dB L_{Amax} at 7-metres from the nearside wheel path.
- While I was in attendance I observed some conversations occurring between members, but this was at a low level and would not have been audible from outside of the site. I did not hear any shouting or barking at any time over the 24-hour survey.