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APPENDIX C1

Marist Holdings Limited, The Mission
Special Character Zone,
Transportation Report

Marist Holdings Limited

The Mission Special Character Zone

Traffic Engineering Report

November 2016

TDG Ref: 14331 161124 The Mission Special Character Zone.Docx

Marist Holdings Limited

The Mission Special Character Zone

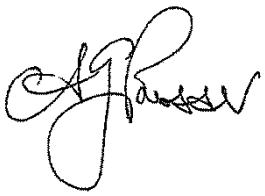
Traffic Engineering Report

Quality Assurance Statement

Prepared by:

Andrew Prosser

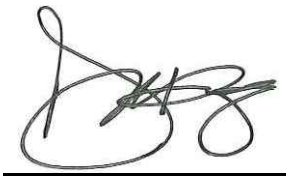
Technical Director



Reviewed by:

Don McKenzie

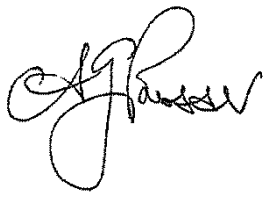
Director



Approved for Issue by:

Andrew Prosser

Technical Director



Status: Final report

Date: 24 November 2016

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1. Introduction

Marist Holdings Limited (**MHL**) is seeking a private plan change to enable the establishment of a new residential subdivision on land currently zoned, in Napier's Operative District Plan, as 'Western Hills Residential' and 'Rural Residential'. The proposed site is owned by MHL and currently used as a pastoral farm with vehicular access available on Puketitiri Road, approximately 6km to the west of Napier City.

Traffic Design Group (**TDG**) has been commissioned to report on the traffic related effects of servicing a residential development at this location and of the general condition of the local roading network. As the exact details of the proposed development are still being determined, this traffic review is based solely on the information currently available from MHL. Accordingly, this traffic review is a preliminary one for the purposes of assessing the general transportation implications of the Plan Change and does not constitute a detailed transportation assessment.

On the instruction of MHL, the agreed scope of this review comprises several key elements and involves:

1. a general evaluation of the potential traffic volume generated by the proposed land use activities; and

2. an assessment of the condition and capacity of the local road network to support the predicted increased traffic flows.

The following tasks have been undertaken during the completion of this review:

1. an evaluation of the existing network condition and traffic environment;

2. a determination of the trip generation potential of the development; and

3. an evaluation of the appropriateness of the urban design principles being considered for this proposal.

In addition to these tasks, further safety opportunities have been identified for subsequent consideration.

This review has broadly focussed on the proposed concept design from a practical road construction and road safety engineering perspective. It also considers the relative merits of alternative solutions, but does not describe any specific detailed design work associated with those alternatives.

As will be described later in this report, subject to implementing some design changes, the proposed roading access arrangements are able to provide a safe, efficient and comfortable passage of vehicular traffic to and from the proposed development. Further, the introduction and adoption of the proposed conceptual design elements will enhance the development by minimising vehicular speeds and road noise to a level compatible with the semi-rural character and nature of the local environment. In this regard, care has been taken to balance the functionality of the roads with the need to create a transportation environment that is compatibly integrated with the high quality amenity and visual environment of the area.

To this end, and having assessed the conceptual roading design proposed for the Mission Heights, the overall design principles are considered consistent with accepted design practices that are followed in other centres including Auckland, Tauranga, Christchurch and Queenstown.

It is considered that there are no sections along the local road network that will require upgrading as a consequence of this proposal. Based on MHL's expectation that the proposed development would likely be built over a period no less than twenty years, it is considered prudent that the recommended roading improvements also be staged to coincide with the predicted levels of traffic demand created over this same time period.

The details of the recommended roading and safety engineering improvements are contained in the body of this report. The proposed changes have been made to improve the proposed intersection location(s) and their carriageway capacities, and to provide a safe, efficient and sustainable road network capable of managing all future demands. Although still subject to a full and comprehensive detailed design process (as will be set out in the application for a private plan change), the recommended changes have also been provided to properly address any potential visual and environmental effects to the semi-rural landscape.

2. Basis of Traffic Engineering Review

The key traffic matters that need to be addressed with the proposed private plan change relate to the expected change in the level of traffic activity associated with the residential development, and the manner in which this additional traffic activity is able to be accommodated and later absorbed by the local roading network once the development and internal access roads are connected with Puketitiri Road.

As the MHL Plan Change envisages a long-term solution for the Residential Precinct proposed within the new zone, with actual development yields being dependent on the final form in which development occurs over time, a range of potential lot yields at the site have been investigated each assuming that full development would not be completed within a minimum of twenty years. The options considered have included three incremental levels of residential development. The range selected has assumed incremental lot yields to a total of 450, 525 or 600 residential lots respectively.

Access to the proposed subdivision is planned via two access roads which will connect with Puketitiri Road. From there a series of other new internal roads are to be built to further link and service the proposed residential lots. The final position and design of the proposed access roads have been broadly reviewed and are discussed separately in Chapter 5 of this report.

3. Location on Roading Network

The proposed Residential Precinct is located approximately 700 metres west of the Prebensen Drive / Puketitiri Road intersection. Puketitiri Road is classified as a District Arterial road and is reported by Council to have an Average Annual Daily Traffic Volume (**AADT**) of around 900vpd and a posted speed limit of 100 km/h. The road is positioned on the western fringe of Napier City Council's (**NCC**) boundary with Hastings District Council (**HDC**), and primarily services pastoral farms, viticulture, forestry and lifestyle residential properties. Some 2.8% of all traffic travelling along this section of Puketitiri Road is reported as being heavy commercial vehicles.

Puketitiri Road traverses across hilly and undulating terrain and generally follows a gully between two hillsides. Most of its carriageway consists of 2 x 3metre wide lanes with carriageway delineation provided in the form of centreline markings, edge lines, edge marker posts and curve advisory signage.

During 2000/2001 NCC reconstructed the first 900 metres of Puketitiri Road (from Prebensen Drive to Fryer Road) to a full 8.5m carriageway width. This work included widening at the access locations of this planned subdivision. More recently, NCC has also provided additional seal widening on several of the tighter curves located to the west of the proposed development. The extent of the additional widening is however restricted due to the close proximity of hill cuttings and abrupt gullies.

The road reconstruction and seal widening works is understood to have been completed in preparation of not only residential development on the MHL property but also the future traffic demands predicted to be generated by other new subdivisions and lifestyle blocks further to the north on Puketitiri Road.

The local terrain continues to restrict the alignment of the remaining portion of Puketitiri Road and, as such, the presence of several significant topographical features and tight geometric elements constrain vehicular speeds along the road.

4. Proposed Development

The proposal as currently anticipated will consist of no more than 600 residential lots of mixed size and building types (including some rural residential development). While the actual number of residential lots are expected to be around 525 (i.e. at medium density), this review has additionally considered the traffic related effects of a broader range from 450 to 600 lots. Additionally, the internal roading dimensions servicing the development have yet to be determined and these will be developed to acceptable engineering standards and will adopt design principles used successfully at other similar styled residential developments designed to be in keeping with the underlying topography within New Zealand.

The MHL concept plan allows for the implementation of urban design measures including large grassed and landscaped verges, the adoption of clustered parking precincts, landscaping and tree plantings, and shared vehicular / pedestrian access ways. These features have been planned with a view to integrating living with community and reserve spaces and maximising "walkability" within the development site.

Access to the proposed subdivision is planned via two new roads which will connect Puketitiri Road with a series of other new internal roads and ultimately the individual lots. The final position and design of the two new entranceways, providing access to the future residential Subdivision, have been evaluated and are discussed separately in Chapter 4 of this report.

The proposed lots will potentially range in size between 400 and 1,250m^2 while the internal roading dimensions, servicing these lots are also expected to vary, ranging between 4.0 and 7.0 metres in width. All intersections will be controlled by either Give Way priority treatments at standard tee or cross road junctions.

5. Traffic Generation

5.1 Daily Traffic Flows

As reported earlier, the subdivision is assumed to be developed in several stages over a minimum of twenty years. Three possible residential scenarios have been investigated to determine a range of traffic generation potential of the site. The scale of these options has been discussed with MHL and is considered to provide a suitable basis to assess the appropriateness of the planned roading access arrangements, and the ability of Council's roads to service all future traffic demands.

The three possible residential scenarios considered for this review are:

i) establishment of 450 residential lots

ii) establishment of 525 residential lots

iii) establishment of 600 residential lots

Conservatively, the proposed development is assumed to be completely occupied by permanent residents and therefore no consideration has been given to any potential reduction in traffic generation by possible absentee and/or holiday home owners. On this basis, the average occupancy rate of the proposed subdivision would remain at 100% in the future.

Based on trip generation predictive models as published by New Zealand Land Transport Agency (**NZTA**)[1], residential land uses typically generate between about five and fourteen vehicle movements per day per dwelling, with residential developments described as typically generating between six and eight vehicle movements per day per dwelling.

Other available research of traffic generation rates as published by the RMS[2] indicates that standalone dwellings typically generate around nine vehicle movements per day per dwelling, while medium density residential developments are described as having generations of between:

- 4 and 5 vehicle movements per day for one and two bedroom dwellings
- 5 and 6.5 vehicle movements per day per for dwellings with three or more bedrooms

Other surveys undertaken of residential developments by TDG within New Zealand suggest average trip rates of between one and eight vehicle movements per day.

[1] Research Report 439 "Trips and Parking Related to Land Use " NZTA
[2] "Guide to Traffic Generating Developments", Roads and Maritime Services (RMS) formerly Roads and Traffic Authority of New South Wales

From these various sources, and for the range of possible residential intensities being considered in this instance, it is conservatively expected that an average rate of eight vehicle movements per day per dwelling will appropriately reflect the proposed residential component, and that this rate should be applied as the basis for calculating the projected traffic volumes of the three residential proposals and their associated effects.

Applying this trip rate to the three residential scenarios produces generated traffic volumes in the order of 3,400 vpd, 4,200 vpd or 4,800 vpd respectively when fully occupied. For the above reasons this broad assessment also anticipates that these daily volumes would be consistent throughout any given year into the future.

5.2 Predicted Peak Hour Traffic Demands

Based on the trip rates described above, the maximum peak hour traffic demands for the proposed development will be in the order of 450 vehicles per hour (**vph**), 525 vph, or 600 vph (for each of the three residential options all fully occupied).

In determining these hourly rates it is considered that each of the residential lots will generate on average one vehicle movement per hour.

6. Proposed Access and Road Network Improvements

This review has been undertaken to confirm the ability of the proposed access road to support the planned development and the level of improvements required to manage the predicted increase in traffic volumes.

As already mentioned, the Residential Precinct of the Mission Special Character Zone will have two separate access points, both intersecting with Puketitiri Road.

6.1 Main Entrance

The main entrance to the proposed subdivision is to be located some 680m north of the Prebensen Drive / Puketitiri Road roundabout. The general location of this main entrance was first established when NCC reconstructed Puketitiri Road. The final height and alignment of Puketitiri Road was changed substantially to provide the most appropriate alignment and access for this proposed development.

The proposed main entrance design has adopted Council's preferred intersection treatment, except for the inclusion of a dedicated left turn lane for traffic exiting onto Puketitiri Road, heading towards the north (i.e. in an uphill direction). It is assessed that the volume of traffic wishing to make this manoeuvre will be low and the inclusion of such a dedicated lane is not considered to be justified. Rather, the majority of traffic generated by the proposed development will arrive at this intersection from the south (from Napier) and will exit the main entrance travelling back down the hill towards Napier.

It is also considered that the inclusion of the proposed right turn bay for traffic turning into the subdivision site will be superior for the volume of traffic expected to enter the subdivision from the west. It is however accepted that the inclusion of this bay will provide improved separation and reduce conflicts at the proposed entrance. The increased width created by the right turn bay will provide acceleration and merge opportunities for traffic exiting the main entrance wishing to travel to the south, downhill towards Napier.

The proposed left turn drop lane and new splitter islands will assist in separating the traffic movements and any potential conflicts at the entranceway.

The design of this main entrance is therefore considered to be appropriate and is expected to have the capacity needed to not only manage the traffic generated by the maximum 600 lot development scenario but also future traffic demands placed on Puketitiri Road.

6.2 Secondary Entrance

The secondary entranceway will require sufficient clearance from the existing Poraiti Road treatment. As it will essentially provide a rear access to the proposed development, this secondary accessway is not expected to cater for a large volume of traffic. Nevertheless, it is recommended that this second entrance is located at least 100m west of Poraiti Road.

At this preferred location, the design of this entranceway will be able to be developed consistent with Council's long term goal of widening Puketitiri Road to a nominal 8.5 metre width. Sufficient separation is available from Poraiti Road, and the inclusion of a central splitter island at the site entrance will assist to separate the various traffic movements at the proposed treatment and will provide increased delineation and intersection conspicuity.

With the adoption of standard design principles and implementation of this recommendation, it has been broadly assessed that the design and position of this second entrance will be appropriate and will be able to service the proposed development in a safe and efficient manner.

Based on the access road locations, the topographical limitations and the associated impacts of implementing large scale roading works in this particular environment, it is recommended that the vertical geometry of both access roads matches localised gradients as much as practically possible. When reviewing the accessibility and appropriateness of both access roads, the overall concept and nature of the proposal must also be considered. It is acknowledged in this regard that MHL intends to implement a variety of urban design elements to enable the development to be integrated with the landscape and its natural environs. Notwithstanding these intentions, and acknowledging the potential environmental and amenity related impacts of implementing large scale roading works at this location, the proposed access roads will be able to appropriately manage the predicted traffic demands. Additionally, the adoption of appropriately proportioned horizontal and vertical elements will act as speed controls and will further assist the desired intention of achieving a low speed environment within the proposed site.

6.3 Network Improvements

Based on the predicted levels of traffic generated by the proposed development, it is assessed that the local road network that is expected to connect and service the proposal is able to easily accommodate the predicted flows without the need for any further improvement works.

Determination of an appropriate intersection control at this location requires a balancing of traffic engineering requirements with the overall integrity of the local environment. It is therefore recommended that the final intersection design at this location be developed to limit all visual effects (i.e. caused by additional signage, street lighting and earthworks) while also achieving a safe and efficient treatment to manage all road user demands.

7. Proposed Internal Roading

7.1 Geometric Design Standards

Although the exact nature and detail of the internal roads cannot be confirmed at this conceptual stage, it is understood their outcome will be developed from an extensive investigation and design process. The internal roading features and geometric elements will incorporate design solutions from a wide range of disciplines, including specialist urban designers, traffic and civil engineers, and landscape architects. The roads will be developed to incorporate best practice engineering solutions to match the local environment and to provide safe and efficient linkages for vehicular and non-vehicular users alike.

Overall, it is envisaged that the proposed development will be based on providing liveable neighbourhood principles and will be developed to provide street forms with a high degree of interconnectivity that are more amenable to walking and cycling. These forms will encourage alternative transport modes and improve the overall amenity to the local residents. The internal roads will be designed with careful attention to street cross-section, street layout, and features such as small reserves, liveable neighbourhoods encouraging community interaction between residents while improving security and liveability.

TDG has assisted with the design of residential developments incorporating these design philosophies throughout New Zealand.

Based on these experiences, it was found the roading forms designed to have narrower carriageways with shorter block lengths, and features such as sharp bends, naturally reduce vehicle speeds to the level appropriate for the local environment. Vehicle movement still has to be catered for, but this provision is found to be better balanced with the need for walking, cycling and engendering a community, particularly in a high amenity environment such as that proposed for the Mission Special Character Zone.

Application of these liveable neighbourhood principles have also been shown to significantly improve road safety and as such, are now readily adopted by other local authorities in New Zealand as suitable and sustainable alternatives solutions to the more traditional District Plan and Engineering Code of Practice standards.

TDG has evaluated the general form of the various subdivision roads, and can confirm that the horizontal and vertical design for each of the internal roads can be developed to either meet NCC's roading design standards or to follow best national design practices. The roads have been designed to provide a safe and efficient transportation system within the proposed development, without compromising the safety to road and non-road users alike.

The horizontal and vertical design is also intended to adopt a design speed of 50km/h. With the installation of a variety of urban landscaping themes and traffic calming treatments, the average operating speed is however expected to be around 40km/h.

The proposed internal roading network is also expected to incorporate a range of carriageway dimensions and road reserve widths to manage vehicular speeds and to create a pleasant and quiet environment for residents and visitors alike.

7.2 Proposed Carriageway Dimensions and Road Reserve Widths

The internal roading design of the development will offer a range of carriageway treatments and road reserve widths. While the exact details of these particular elements have yet to be finalised, TDG has evaluated the principles of establishing this design philosophy relative to the local topography as well as in the context of their expected performance, level of service and possible position within the proposed subdivision network. To assist with this evaluation, further comparisons have also been made with new residential subdivisions established at other locations within New Zealand.

It is expected that the development will offer different pavement widths ranging between 4.0 and 7.0 metres. Other differences are understood to include variations of grassed berm / planted verges, footpath widths (either 1.5 or 2.0 metres wide) and the placement of on-street car parking provisions. The provision of 2.5 metre wide parallel parking precincts (presumably in clusters) and on both sides of the road is also anticipated. These parking areas are also expected to be separated by the regular placement of native or deciduous trees.

The actual number of on-street car parking spaces that will be available has yet to be derived and will be confirmed during the detail design phase of this project. NCC's Operative District Plan and Engineering Code of Practice do not specify the number, or ratio, of on-street carparking provisions required for new residential streets. Based on other experience, TDG has estimated that an appropriate ratio for this subdivision would be at least 1.1 parking spaces per residential dwelling (excluding properties which do not front the road reserve). The final design is expected to meet this recommended criterion, and the on-street parking precincts can be easily accessed without affecting the performance and efficiency of the local roads.

It is appreciated that carriageway dimensions offering a 6.0m roadway (i.e. 2 x 3.0m lanes) is below Council's current standards for roads servicing more than 60 lots. However, these dimensions compare favourably with other residential developments already established in other centres including at Auckland, Tauranga, Taupo, Christchurch and Queenstown. As such, they are considered to be in line with current best practice. TDG also considers that 3.0m traffic lanes are appropriate for roads operating under 50km/h speed restrictions and this width will provide plenty of spare space to facilitate vehicles movements into and from the adjacent parallel parking spaces. Furthermore the 85th percentile vehicle is 1.890m wide which will allow 1.10m clearway within each traffic lane.

Emergency vehicles will be able to gain access to all properties with the application of such carriageway features.

Having reviewed other subdivision developments, their roading conditions and size, it is concluded that the concept design will be acceptable and that it will provide viable alternatives to Council's current roading standards.

7.3 Proposed Internal Intersection Treatments and Cul-de-Sac Designs

The proposed intersections on the internal roading network are understood to include the installation of standard "T" GIVE WAY priority control treatments. The location and introduction of such intersection controls has been assessed to be appropriate for the scale and traffic generation potential of the development. Furthermore, these treatments will control traffic movements in an appropriate, safe and effective manner. TDG's assessment of the internal intersection controls are formed on the basis that they will be designed to meet Austroads and national design standards.

Cul-de-sac treatments are proposed at the ends of most of the local roads and their final shape and design will be confirmed during the detail design phase. Several of these local roads are expected to be extended as the residential roads may also expand further towards the south in the future. The provision of the cul-de-sacs will assist traffic to turn in the interim period and the installation of parking bays at each location will further assist visitors to the site.

7.4 Street Lighting and Landscape Planting

Although the exact details of the arrangements for street lighting and landscaping have not been included at this early conceptual stage, it is acknowledged that these items will be carefully designed to ensure they meet the appropriate standards. Street light outputs will be designed to meet AS/NZS1158 and all the final landscaping will not interfere with luminare coverage.

8. Summary

This report provides a traffic engineering review of the proposed residential development in the Mission Special Character Zone to support a private plan change. The appropriateness of the intended design elements are outlined, and further road safety considerations are identified.

On the basis that the proposed second entrance will be positioned as recommended in this report, the proposed access roads that are intended to support the proposed development will be of an appropriate standard to meet the immediate and future needs of the proposed development and the local roading network. The proposed concept design meets most, but not all current Council roading standards, which reflects a desire to achieve better environmental outcomes in a manner that also achieves the required levels of safety, capacity and amenity.

With the appropriate engineering and application of design principles, it is concluded that the proposed residential subdivision to follow the private plan change request will offer a properly balanced level of service for all users. It will provide good quality access to, from and within the site in a manner that will not compromise the safety or convenience of any road users.

TDG

C2

APPENDIX C2

Engineering Location Plan of Second Intersection with Puketitiri Road

Tuesday, December 20, 2016 0 20mm

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	Revision A	JO	GE / AP	AP	21/12/16

MISSION HOLDINGS LTD
MARIST HEIGHTS

TRAFFIC ADVISE
INTERSECTION CONCEPT LAYOUT

TDG

ACENZ ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND
ISO 9001 QUALITY ASSURED

STATUS: WORKING PLOT | REV

DATE: 12/20/16 | SCALE: 1:1000 @ A3

TDG DRAWING NO. 14331-N1A | SHEET NO. 1 of 2 | A

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Tuesday, December 20, 2016 0 20mm

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	Revision A	JO	GE / AP	AP	21/12/16

MISSION HOLDINGS LTD
MARIST HEIGHTS

TRAFFIC ADVISE
INTERSECTION CONCEPT LAYOUT - SIGHTLINES

TDG

ACENZ ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND
ISO 9001 QUALITY ASSURED

STATUS: WORKING PLOT
REV: A
DATE: 12/20/16
SCALE: 1:1000 @ A3
TDG DRAWING NO.: 14331-N1A
SHEET NO.: 2 of 2

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C3

APPENDIX C3

Mission Special Character Zone Private Plan Change Further Information Request - Traffic Response

Traffic Design Group Limited
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PO Box 30-721, Lower Hutt 5040, New Zealand
P +64 4 569 8497 www.tdg.co.nz

Marist Holdings (Greenmeadows) Limited
C/-Mitchell Daysh Limited
PO Box 149
Napier 4110

TDG Ref: 14331.001
13 April 2017

Attention: **Philip McKay**

Dear Phil

Mission Special Character Zone Private Plan Change Request
Further Information Request – Traffic Response

Council has sought further information in relation to a number of key matters. It is appropriate that we respond in relation to 'Financial Contributions' and 'Traffic Assessment and Secondary Access'. We do so below, and for ease of reference, repeat the information request.

1. Financial Contributions

The Council is currently investigating the upgrade of Puketitiri Road in the vicinity of the proposed secondary access. As such, the Council does not yet know how much the upgrade will cost, its extent or timing or indeed, whether Council will even commit to undertake the work itself in the first instance. Given this, it is requested that further information be provided on how potential adverse traffic effects along this section of Puketitiri Road will be mitigated.

The November 2016 Traffic Engineering Report sets out the following that is relevant in responding to this matter:

- Page 2 – *It is considered that there are no sections along the local road network that will require upgrading as a consequence of this proposal.*
- Page 8 – *The design of this main entrance is therefore considered to be appropriate and is expected to have the capacity needed to not only manage the traffic generated by the maximum 600 lot development scenario but also future traffic demands placed on Puketitiri Road.*
- Page 8 – *The secondary entranceway will require sufficient clearance from the existing Poraiti Road treatment. As it will essentially provide a rear access to the proposed development, this secondary accessway is not expected to cater for a large volume of traffic.*
- Page 9 – *Based on the predicted levels of traffic generated by the proposed development, it is assessed that the local road network that is expected to connect and service the proposal is able to easily accommodate the predicted flows without the need for any further improvement works.*

As above, the secondary access is not required for the purposes of traffic capacity. Rather, and as assessed and reported, the main access can be relied on to serve all traffic movements to and from the site.

By comparison, the secondary access is considered desirable from a traffic capacity perspective, and will provide local connectivity and access resilience when it is added. As such, it is not an essential component of the overall site development, and can be designed and achieved in a way that integrates with Council's further future upgrades of Puketitiri Road in due course.

There is no need for interim mitigation or a traffic threshold that triggers the need for the secondary access.

2. Traffic Assessment and Secondary Access

It is requested that the following issues be resolved prior to the subdivision stage:

(a) The Traffic Design Group's (TDG) Traffic Engineering Report (Appendix C of the Assessment of Environment Effects Report) does not include any traffic generation for the proposed neighbourhood centre. Given the lack of any convenience retail or local servicing in the general area, it is possible that the centre will generate trips from outside the development. As such, an assessment of this element should be provided, including potential effects on the Secondary Access / Puketitiri Road / Poraiti Road intersection.

(b) The TDG report should include some justification that the local road network is able to easily accommodate the predicted flows. This can be provided with traffic flow diagrams and intersection analysis.

(c) The plan change does not include a Traffic and Development Threshold Limit standard to trigger the need to provide the Secondary Access on Puketitiri Road. It is requested that such a threshold limit (or equivalent) be included. Refer to Condition 27.36 in The Business Park Zone-Condition Table in the District Plan as an example.

Each of these three points is addressed in turn.

2.1 Neighbourhood Centre

It is accepted that the local amenities of the neighbourhood centre may attract customer trips from outside the development, from the adjacent Poraiti area. Equally, establishment of a neighbourhood centre will not require residents of the Mission site to travel outside the area for local services.

As such, it is anticipated that the net level of traffic associated with the neighbourhood centre will be minor, and not material to the assessment of traffic additions and changes.

In any event, it is also noted that the residential trip assessment recorded in the November 2016 report (Page 7) is regarded as generous, based on an average rate of eight vehicle movements per day per dwelling. Moreover, a high residential yield scenario of 600 dwellings has also been assessed, presenting a further conservative aspect of the assessment.

2.2 Local Network Assessment

The November 2016 report presents an assessment basis for three residential yield scenarios (450, 525 and 600 lots). The details of Page 7 estimate the generated traffic volumes, as follows:

Scenario	Daily Traffic	Hourly Traffic
450 lots	3400vpd	450vph
525 lots	4200vpd	525vph
600 lots	4800vpd	600vph

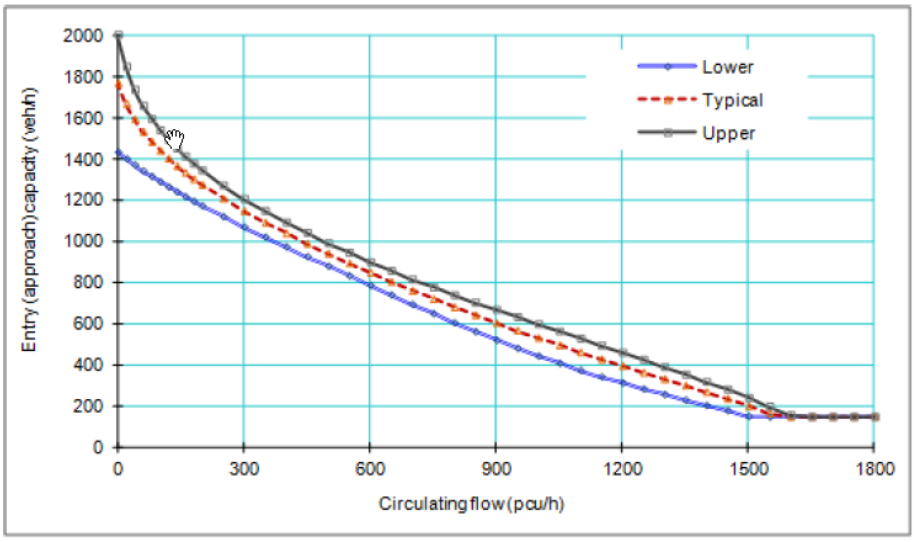
These volumes will be added gradually as the residential stages take effect, over the course of the 20+ years of development.

As previously reported, Puketitiri Road currently carries around 900vpd. It is classified by Council in its hierarchy as a Principal Road, for which volumes of up to around 7,000vpd are contemplated. The separate industry-recognised provisions of NZS4404 (the NZ Standard for Land Development and Subdivision Infrastructure), includes comparative best practice for road design. For Road Type 'E13' which provides an 8.4m road carriageway (being almost identical to the current 8.5m standard of Puketitiri Road), serving up to 800 residential dwellings, NZS4404 suggests volumes could be in the order of 8,000vpd.

The future anticipated volumes on Puketitiri Road (with the Mission site fully developed) remain below these volume classifications.

Intersections usually present the capacity limiting parts of network. In this location, it is relevant to consider the nearby Prebensen / Church / Puketitiri roundabout. It currently handles about 7,000vpd on the Prebensen–Church corridor and 900vpd to and from Puketitiri Road. Its large design has been future-proofed for residential growth in the area.

Reference can be made to the industry-recognised Austroads Guide to Traffic Management Part 3, which presents some helpful guidance in relation to roundabout capacity. Figure 6.7 of that Guide, as repeated below, charts the upper and lower bound capacity estimates for single-lane roundabouts such as the Prebensen /Church / Puketitiri one. It shows the relationship between entering and circulating traffic volumes, and the levels at which a larger-capacity roundabout would be needed.



Note: Output from SIDRA INTERSECTION.

Figure 6.7: Upper and lower bound capacity estimates for a single-lane roundabout (with inscribed diameter 40 m and other roundabout geometry parameters set to default values)

In the current situation, the roundabout handles smaller volumes of circulating traffic, related to the smaller volumes turning to and from Puketitiri Road. With the Mission site fully developed, future volumes using Puketitiri Road would be similar to Prebensen Drive and Church Road (as accounted for by the existing roundabout design), and the interplay of entry and circulating flows could be of the order of 600vph and 400vph respectively.

Even at these future volumes, the existing single-lane roundabout is shown to have sufficient future capacity to absorb these additional traffic volumes.

As such, there is not considered to be any traffic capacity limitations on this local part of Napier roading network that would present concerns for development of the Mission site.

2.3 Traffic Threshold

For the reasons described above, both in terms of local network capacity and also local in relation to the secondary access, there is not assessed to be a need for a traffic and development threshold limit.

We trust this further information and clarifications suitably address the traffic-related mattes raised.

We are available to discuss further if needed, including with Council.

Yours sincerely
Traffic Design Group Ltd

Mark Georgeson
Director
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C4

APPENDIX C4

Mission Special Character Zone Private Plan Change Further Information Request - Second Traffic Response

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TDG Ref: 14331.001
25 May 2017

Issued via email: **philip.mckay@mitchelldaysh.co.nz**

Dear Phil

Mission Special Character Zone Private Plan Change Request
Further Information Request – Second Traffic Response

Further to our response dated 13 April 2017, and discussions at the subsequent meeting with Napier City Council on 21 April, various traffic matters have been raised that require further response, that can be grouped in relation to:

- the expected use and design of the second entrance (west of Poraiti Road); and
- the nature and traffic demand of the Neighbourhood Centre.

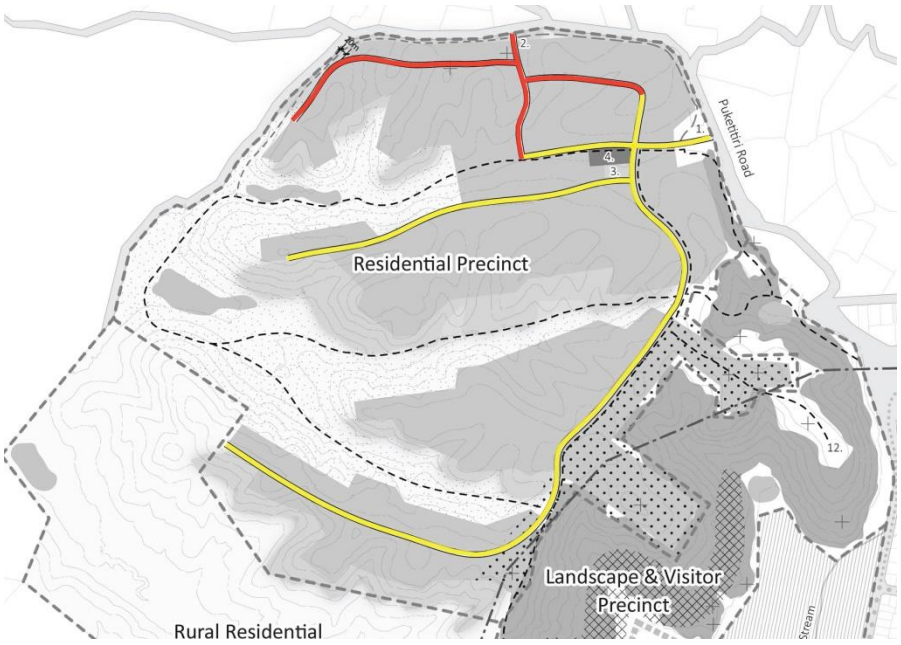
We provide the following comment and discussion in relation to each.

1. Second Entrance

Napier City Council has very recently undertaken a count record of traffic movements on Puketitiri Road, in a location between Fryer Road and Poraiti Road. That is, a location to the east of the second access (and east of Poraiti Road).

The details show an approximate 2,500 to 3,000vpd and around 250 to 300vph using this section of Puketitiri Road. Other Council records for Poraiti Road show it handling around 1,000vpd. From these details, it can be reasonably assumed that current traffic volumes on Puketitiri Road to the west of Poraiti Road are of the order of 1,500 to 2,000vpd and 150 to 200vph.

In estimating the volume of traffic that might use the second access, as compared with the first access, once the site is fully developed, it is reasonable to assume that motorists would take the shortest and quickest available route. This is identified on the abbreviated image of the Structure Plan below, with the yellow coloured roads and adjacent land uses identified as those most conveniently accessed via the first access, and those coloured red relating to the second access. From a distance perspective, these respectively equate to 76% / 24% of the identified roading system. That is, 24% of site traffic could be reasonably expected to find the second access convenient.



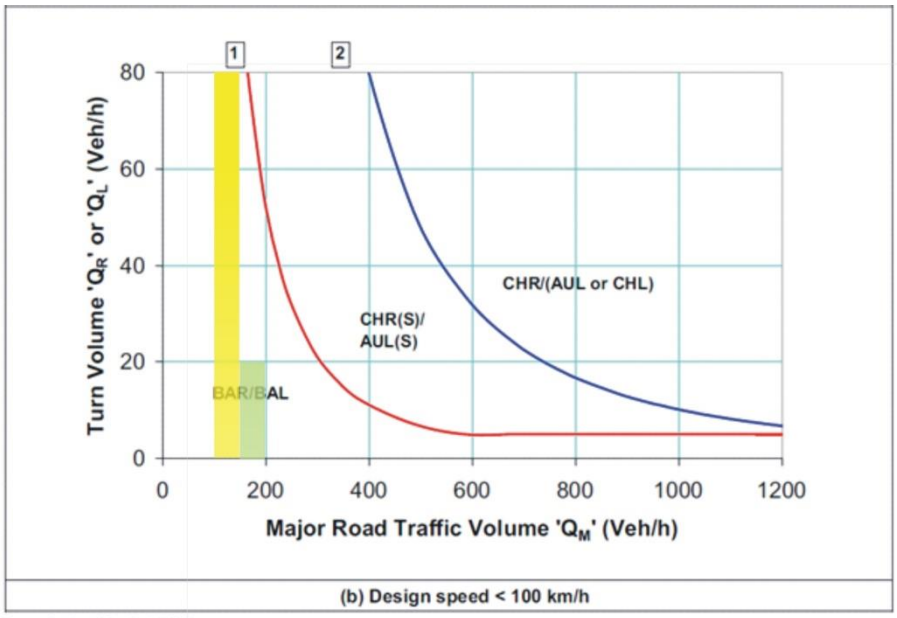
It is acknowledged that there could be variations around these estimates, with perhaps more generally between 20 and 30% using the second access. On the basis of a fully developed site (up to 550 lots), at an average of 1 vehicle movement per hour per dwelling, and up to 30% use, the second access could attract 160vph (in and out). In the same manner as the first access, these movements would predominantly involve left-turns-in and right-turns-out, and involving potentially:

- 110vph out (70%) and 50vph in (30%) during the weekday AM commuter peak; and
- 60vph out (35%) and 100vph in (65%) during the weekday PM commuter peak.

Very few vehicles are anticipated to turn to and from the west, from which the type of right turn treatment is determined.

In understanding the type of intersection treatment warranted in this instance, reference can be made to industry-recognised Austroads Guide to Road Design Part 4A relating to intersections. Figure 4.9 of that Guide, as repeated below, shows the type of intersection treatment that is appropriate, based on varying major road volumes and turning volumes, as follows:

- BAR / BAL, being Basic right and left turn treatments;
- CHR(S) / AUL(S), being a short Channelised right turn treatment and a short Auxiliary left turn design; and
- CHR / AUL or CHL, being a full Channelised right turn treatment and either a full Auxiliary left turn design or full Channelised left turn design.



Source: Arndt and Troutbeck (2006)

Figure 4.9: Warrants for turn treatments on the major road at unsignalised intersections

Based on the above traffic volume interpretations, the above chart has been annotated to show where the respective peak uphill traffic volumes (yellow), two-way traffic volumes (green), and turning volumes, lie in terms of determining the appropriate treatment. These confirm that a BAR / BAL intersection treatment is appropriate, as provided for by the concept design included at Appendix F of the application.

This does not prevent other higher-order intersection treatments being developed and implemented by Council, including for example to integrate with other road and intersection improvements along Puketitiri Road, but rather serves to indicate that the relevant capacity can be afforded at the second access in the form of a BAR / BAL design, based on a generous 30% use at the time of full development.

2. Neighbourhood Centre

The Neighbourhood Centre is shown indicatively in the Structure Plan with a total site area of 2,200m². As previously described, it is proposed that activities in the Centre would serve a local purpose and involve local service businesses such as a café, take-away food and hairdresser. The comparatively small 2,200m² site area reflects this purpose.

Even then, the Neighbourhood Centre site would involve not only the activity buildings, but also the supporting carparking, and related access, landscaping and amenity provisions. At the District Plan requirement of '1 park per 20m²' for shops, the site may provide for say 4-6 tenant spaces with a combined overall floor area of 800-1,000m². Depending on the type and mix of tenants these activities could have widely different traffic characteristics, and generate perhaps between 40 and 80 vehicle movements per hour, at a rate of 4-8vph per 100m².

Most visits to the Neighbourhood Centre will be made by residents of the Mission site but, as previously acknowledged, some customer trips may be made beyond the Mission site, principally from the Poraiti area, involving up to a quarter of the total, or say 20vph.

Such additions would have no affect on the determinations made above in respect of the intersection form of the second access and moreover, it is again noted that the residential trip

assessment is based on a generous average rate of 1vph per dwelling, wherein some of these trips will in practice be made internally to the Neighbourhood Centre.

We trust this further assessment provides the necessary information to clarify Council's traffic interest in respect of the second access and Neighbourhood Centre.

As always, glad to discuss further if needed.

Yours sincerely
Traffic Design Group Ltd

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