Traffic Solutions Ltd

PROPOSED FUEL FACILITY

68-72 GREAT SOUTH ROAD, POKENO

Traffic Impact Assessment

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1. INTRODUCTION

This report assesses the traffic effects of a proposed fuel facility development at 68-72 Great South Road in Pokeno. The site is located on the northern side of Great South Road as indicated on Figure 1. The site has frontage to Great South Road and Market Street. It also shares its western boundary with the Church Street road reserve, although Church Street does not physically exist.

Figure 1: Site Location

This report includes the following:

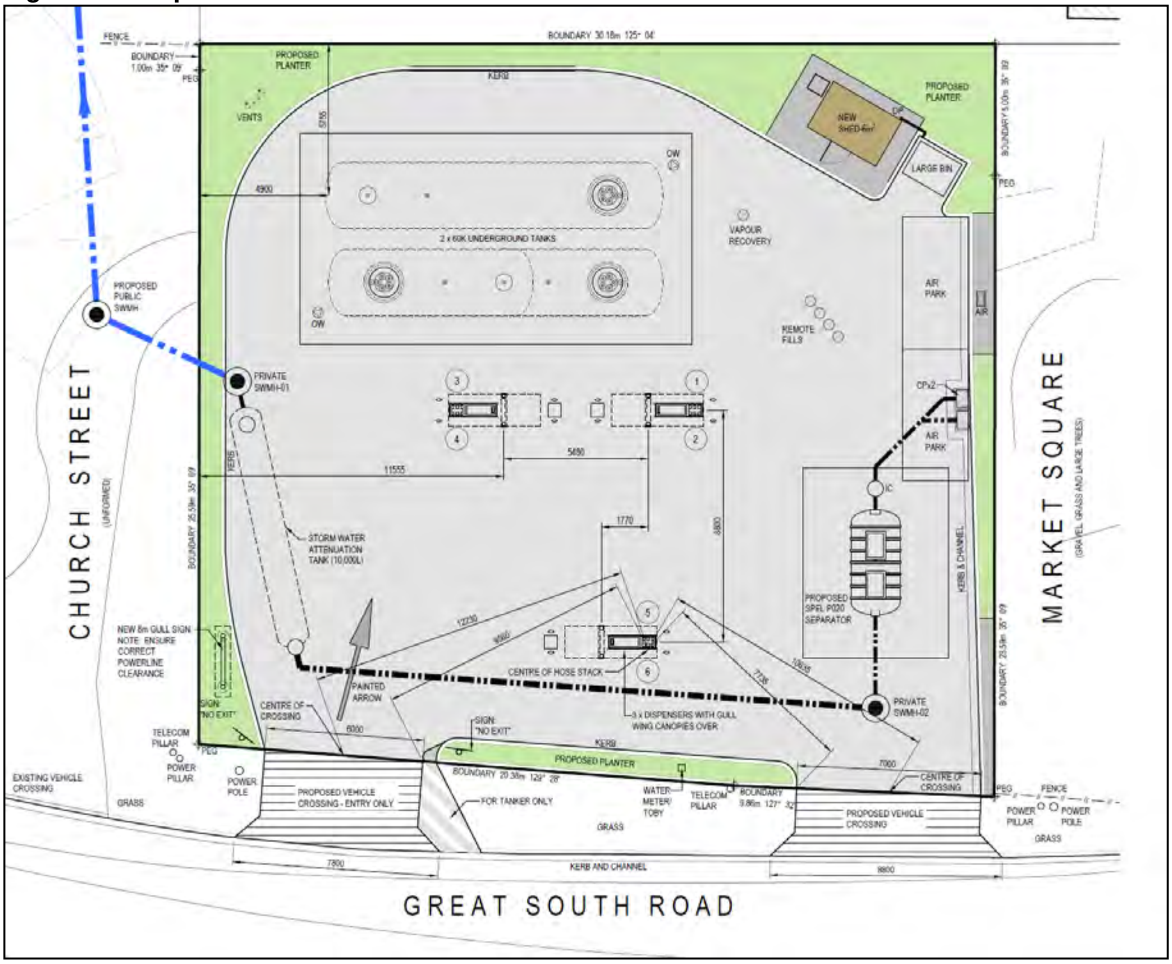
- a description of the existing and proposed activities on the site
- description of the adjacent transport network
- assessment of compliance with District Plan requirements
- assessment of the traffic effects on the operation of the transport network
- assessment of vehicle access
- parking assessment
- loading and unloading
- on-site vehicle manoeuvring

2. EXISTING AND PROPOSED DEVELOPMENTS

The site is presently occupied by two dwellings. One is used as residential, the other is a real estate office. These will be removed.

The layout of the proposed new fuel facility is shown on the plans prepared by Technitrades Architecture Limited dated 02/06/2020. The site plan (drawing 2998-B03 Rev F) is shown on Figure 2:

Figure 2: Proposed Site Plan



The service station forecourt will contain 3 pump islands with 6 service positions. There will be no canopy. There will also be no shop, car wash or mechanical workshops. There will be a small shed for maintenance gear, an air hose and a bin.

The existing development is presently accessed at two locations. One is off Great South Road via a driveway within the Church Street road reserve. The other is to Market Street, which intersects directly at the intersection with Great South Road. Both accesses will be removed and replaced by two new crossings directly into the site off Great South Road, that are designed specifically for the proposed activity.

Two carpark spaces will be provided at the air hose. There will be room for other vehicles to park around the site if they need to, although it is anticipated there will be little demand for parking other than for refuelling on the forecourt and at the air hose.

3. DISTRICT PLAN REQUIREMENTS

3.1 Road Classifications

Roads adjoining the site are is classified in the Council's road hierarchy as follows:

- Great South Road — national route
- Market Street — local

The classification of Great South Road as a national route is outdated since it is no longer part of State Highway 1. The road now acts more as if it is a collector road.

3.2 Parking Space Requirement

Table 51.A in the Franklin section of the operative Waikato District Plan requires at least the following parking be provided:

Service station:	0m² shop @ 1 space per 30m²	0	
	plus 0 workshop bays @ 4 spaces per bay	0	
	plus 2 spaces per air/vacuum hose	2	
		2	spaces

Two parking spaces are marked for the air hose, in accordance with the requirement.

3.3 Loading Space Requirement

Rule 29.5.7 states for sites in the Business zone that one loading space be provided per site. No loading spaces are specifically marked, nor is it practicable to do so, however, there will be room for unloading of fuel. The requirement is effectively met.

3.4 Vehicle Access

Rule 29.5.8 lists the following vehicle crossing requirements:

- One crossing per property
- Any property having a frontage in excess of 15m but less than 60m shall be permitted a second crossing. Any property with a frontage exceeding 60m in length shall be permitted one further crossing.
- The maximum width of any crossing shall be 6m at the boundary line with provision for a splay, provided that the length of crossing on the kerb line shall not exceed 7m. The total width of such crossings shall not exceed 50% of the frontage of front sites.
- A minimum distance of 2m shall be provided between two crossings to act as pedestrian refuge.

The site has road frontage totalling 58m excluding the Church Street frontage, and thus two crossings are permitted. Two are proposed.

The proposed vehicle crossings will be 6m and 7m wide at the site boundary. One (the western access) complies but the other (the eastern access) is wider than the rule permits.

The combined crossing widths will be less than 50% of the site frontage. The crossings will be more than 2m apart, for pedestrian refuge. These requirements are met.

Rule 29.5.16 requires that fuel dispensers at service stations be at least 12m from the mid-point of any vehicle entrance, to ensure that vehicles can park well clear of the vehicle entrances and provide room for queuing on-site. The nearest fuel dispenser to the road will be 10.5m from the mid-point of the western entry and 10.2m from the mid-point of the eastern access, while the furthest dispensers will be 13.4m and 15.8m from the vehicle accesses. The separation distances from the nearest pump island to the vehicle accesses are not quite met.

Access is assessed in more detail later in this report.

4. EXISTING TRANSPORT NETWORK

Figure 3 shows the site in the context of the adjacent road environment.

Figure 3: Existing Road Environment

Adjacent to the site, Great South Road is 17m wide between kerbs. The roadway contains one traffic lane in each direction separated by a flush median, plus sealed shoulders. The shoulder on the southern side is wide enough to accommodate street parking.

The horizontal alignment is straight from the site eastwards. Westwards from the site is a 130m radius curve, which has a maximum safe operating speed of 55 to 60 km/h[1]. The vertical alignment is almost level.

Market Street is 10m wide between kerbs where it intersects with Great South Road, although further north the roadway narrows somewhat. The road has a straight and almost level alignment, with clear visibility along it. North from Great South Road the road is a cul-de-sac. The road also extends southwards from Great South Road, forming a cross-intersection with Great South Road.

Its intersection at Great South Road is uncontrolled on the north approach, and has a "Stop" sign control on the south approach. There is a left turn slip lane and associated traffic island into the north part. The slip lane extends across the Great South Road frontage of the site, although being on a taper it is not a full lane width adjacent to the site.

The legal speed limit on all roads in the immediate vicinity is 50 km/h.

Traffic count data provided by the Council shows that the roads near the site carry the following daily traffic volumes:

- Great South Road — 3,995 vehicles per day
- Market Street (north of Great South) — 20 vehicles per day
- Market Street (south of Great South) — 175 vehicles per day

The Market Street counts are based on estimates made by the Council in 2019. These appear to be somewhat on the light side. Based on the amount of development along the road, I suspect that part to the north of Great South Road carries about 130 vehicles per day.

The Great South Road count is dated 2015. Allowing for some traffic growth I estimate the road now carries about 4,500 vehicles per day.

These flows are all well within the capacity of a two-laned road.

Hourly flows are not available but typically weekday morning and evening commuter peak flows are usually about 10% of daily flows.

During the 5-year period 2015 to 2019, no accidents were recorded to have occurred on Great South Road between and including the intersections at Pokeno Road just west of the site and Market Street just east of the site. This part of Great South Road, including the two intersections, appears to be operating safely.

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[1] According to Austroads Guide to Road Design Part 3: Geometric Design

5. TRAFFIC GENERATION AND DISTRIBUTION

5.1 Traffic Generation

The following sources have been used to assess the traffic generation characteristics of the proposed fuel facility:

- New Zealand Trips and Parking Database (NZTPDB)
- Institute of Transportation Engineers (ITE) "Trip Generation 7th Edition"
- Roads and Traffic Authority New South Wales (RTA) "Guide to Traffic Generating Developments"
- Traffic generation surveys carried out by Traffic Solutions Limited at service stations elsewhere.

The traffic generation characteristics of service stations vary widely depending on passing traffic flows, popularity, fuel prices and selection of other merchandise offered for sale, although at this facility there will be no other merchandise for sale.

The RTA Guide provides formulae that can be applied to estimate traffic flows at service stations, which is based on site area and shop floor area. Applying the formula based on site area, the proposed fuel facility generates about 35 vehicle trips per hour (tph) in the weekday evening commuter peak traffic period.

ITE provides actual count data at service stations with convenience stores. That source suggests that the peak average rate of traffic generation of service stations is 12 to 15 tph per fuel service position. With 6 existing service positions, that equates to between 70 and 90 tph at the existing service station. However, I consider these flows are too high for this facility because there will be no convenience shop associated with it, which would have generated some traffic in its own right if one were provided.

Surveys I have carried out at other sites in the past indicate that service stations operating well can generate between 110 and 150 vehicle trips during a one-hour period. However, these also invariably include shops so it is unlikely this fuel facility will generate traffic this high.

On occasions, fuel is offered at discounted prices. The limited data that is available suggests very little effect at some locations, with increases in the range of 50% to 100% in other locations. The data suggests that service stations located adjacent roads with high traffic volumes typically have a lower increase in the number of transactions than those service stations located on roads with low traffic volumes. It is also noted that competing service stations offer similar price promotions, often at the same time as any Gull promotion. Price promotions are also common in many other retail sectors. For this traffic generation assessment, based on the above data, I consider it is reasonable to assume that traffic flows on and off the site could potentially increase by up to about 25% over normal when discounts are offered.

For the purpose of this assessment, I estimate that the proposed redeveloped fuel facility could generate a maximum turning flow up to about 60 tph at the site accesses, under normal circumstances.

The majority of traffic turning in and out of services stations, including unmanned fuel facilities, is usually "pass-by" and "diverted-linked" traffic. Pass-by trips are trips that are already on the road network but just call in on the way past. These are not additional flows on the road network although they do generate turn movements on and off the road network. Diverted-linked trips are those that are already on the network but deviate somewhat in their journey to call into a site. ITE suggests that about 85% of traffic turning at service station accesses is pass-by or diverted-linked traffic. Assuming that will be the case at this site then I consider that the proposed fuel facility will actually generate no more than 10 new, or “primary”, vehicle trips per hour on the road network.

Such an increase in flow is negligible and I consider it will have almost no effect on network capacity. Even if fuel discounts are offered, I do not consider that the number of additional vehicles on the transport network would have a significant effect on its operation.

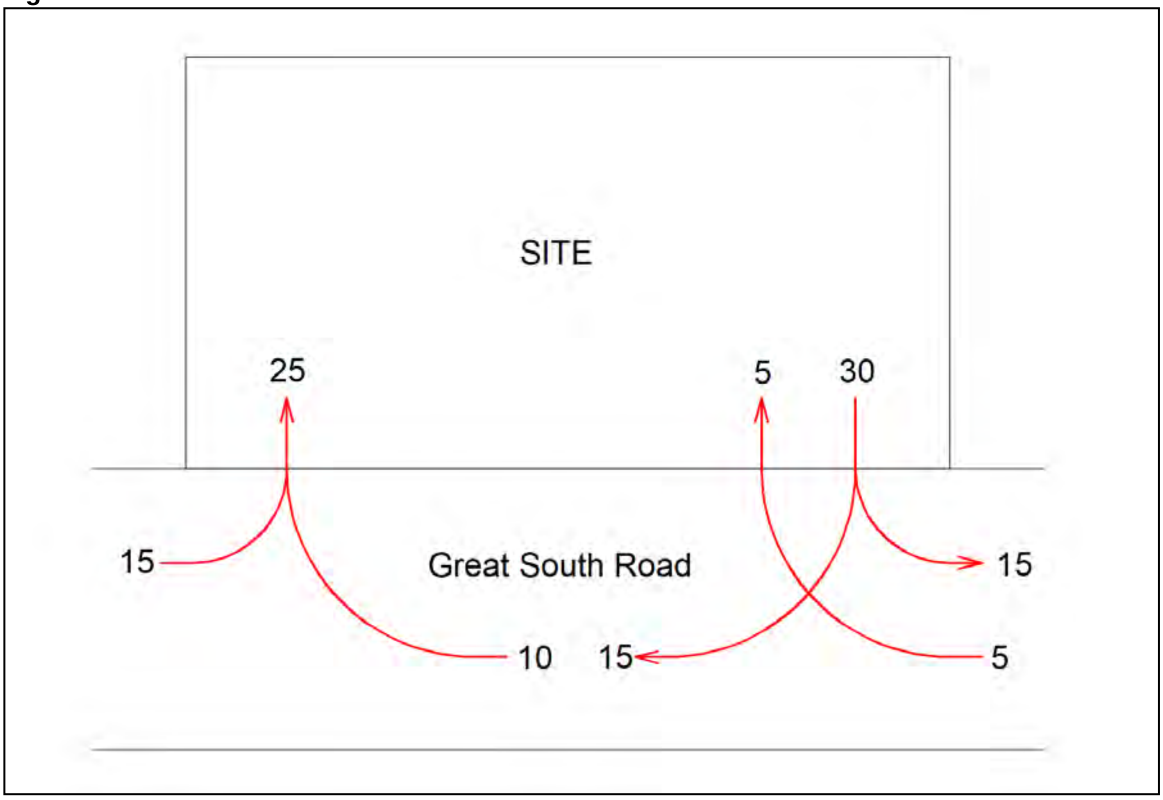
A peak hourly flow of 10 tph equates to a daily volume of about 100 additional vehicles per day on the transport network.

There is an existing fuel facility just to the east of the site. Access to the fuel facility is available directly off Great South Road some 45m east of the site, which is too far away to affect, or be affected by, vehicles turning at the proposed new fuel facility. Some customers presently refuelling at the existing facility may choose to refuel at the proposed one instead when it opens, as is their personal choice, but other than that I do not consider there will be any interaction between traffic accessing the two fuel facilities.

5.2 Distribution of Generated Traffic

I predict that turning flows at the site accesses will likely occur as indicated on Figure 4.

Figure 4: Turn Flows at Site Accesses



Thus the highest turn movement will likely be about 15 tph at any one access. In my opinion these turning flows will be accommodated on Great South Road and at the site accesses easily, particularly considering that there is a flush median on Great South Road which will safely accommodate right turn manoeuvres.

6. SITE ACCESS

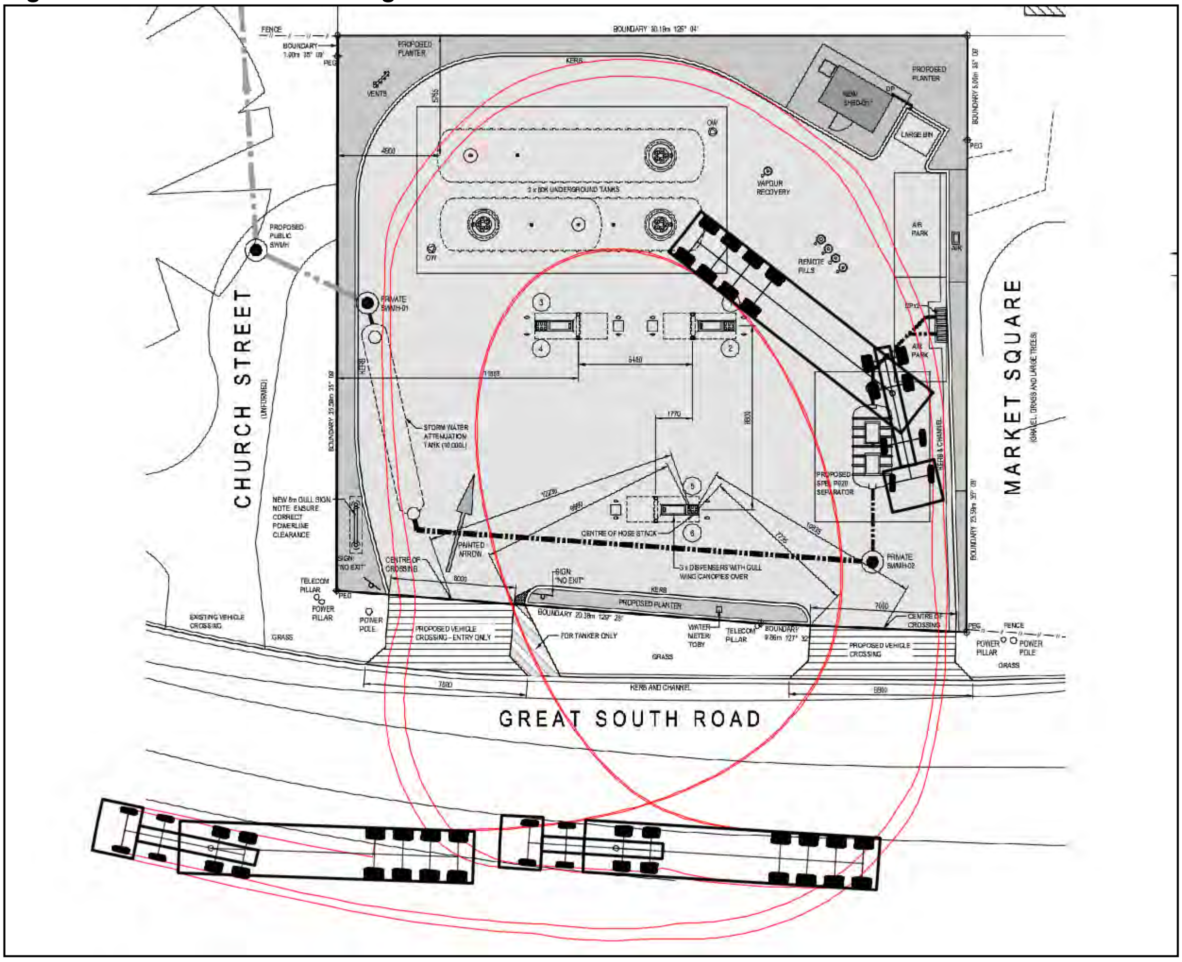
The site is presently served by two accesses, one off Great South Road via the Church Street paper road and one directly at the intersection of Market Street with Great South Road. These accesses will both be removed.

The following two new site accesses are proposed:

- A new crossing at the western end of the site frontage. This will be an entry only.
- A new crossing at the eastern end of the site frontage. This will cater for all turn movements but will predominantly be an exit.

The western entry will be 6m wide at the site frontage boundary. The eastern exit will be 7m wide. These widths are necessary to accommodate the tracking path of a fuel delivery tanker, as indicated by the vehicle path shown in Figure 5.

Figure 5: Fuel Tanker Tracking



The tracking path was generate using Autodesk Vehicle Tracking software. It represents a 19.45m long quad semi-trailer truck rig as indicated, which could potentially be used for delivery at this fuel facility.

Figure 5 shows the path of the tanker right turning into and out of the site.

If a tanker were to arrive from the west (north) it would not be able to left turn into the site because there will be insufficient width and flare at the western vehicle crossing. To provide such a flare would require further widening of the crossing, particularly at the kerb. However, Gull NZ has advised that tankers will arrive at the site only from the east (south) as part of their fuel delivery operations, and therefore the need to accommodate the left turn tracking of these vehicles does not arise.

It can be seen on Figure 5 that the widths proposed for the two accesses are the minimums necessary to cater for this vehicle adequately.

Customers' vehicles left turning into the site can do so directly, using the existing left turn slip lane to decelerate in partially, to minimise obstructing through traffic flow on the road.

Similarly, vehicles left turning out of the site can do so directly and safely.

Vehicles right turning into the site will be able to do so using the existing flush median on Great South Road. The flush median provides a shelter for right turning vehicles to wait on without risking a rear end collision or obstructing traffic flow on the roadway.

The western vehicle entry will be located 55m from the intersection of Pokeno Road with Great South Road, in particular from the right turn lane out of Pokeno Road. The eastern site access will be located 80m from the intersection. To determine the potential for conflicts with vehicles turning at the intersection, I have assessed the time it takes for a vehicle right turning out of Pokeno Road to reach the western site entry, which is 6.5 seconds based on a rolling start and normal acceleration rates. In the opposite direction, vehicles right turning out of the eastern site exit will reach the intersection in 8 seconds. Such times are easily sufficient to ensure that vehicles can access the fuel facility without causing conflicts between vehicles turning at the intersection. With clear visibility between the site accesses and the intersection and vehicles turning at the site accesses, I consider that the site accesses will operate safely in this regard.

Similarly, the eastern vehicle access will be located 40m west of the intersection at Market Street. There is a traffic island between the access and the main part of the intersection. On the same basis I estimate it will take about 5.5 seconds for a vehicle left turning out of the access to reach the intersection, which again is ample time for conflicts with vehicles turning into or out of the Market Street to be avoided. The eastern access is also located at the start of the slip lane for the left turn movement into Market Street. Even though the slip lane is at its full width adjacent to the access, it is close enough to the diverge that effectively, drivers using the access will not need to cross more than one lane of traffic. In addition, the number of left turn movements into Market Street is very low. In my opinion, conflicts will not occur between vehicles turning at the site access and vehicles turning at the Market Street intersection, and that the accesses will be safe in this regard.

There is a driveway to a small carpark associated with the community hall directly opposite the site. The relationship of that driveway with the proposed western service station access is such that vehicles right turning into each access will overlap, potentially causing conflict. However, the probability of such a conflict occurring is in my opinion minimal, firstly because drivers will be able to right turn into the eastern access to the fuel facility in the event that another vehicle is right turning into the opposite carpark at the same time, thus avoiding any conflict. Secondly, where turn movements overlap, one driver will usually yield to the other as an act of courtesy.

Vehicles right turning out of the site can also use the flush median if necessary, although traffic flows on Great South Road are not high enough that using the median as a staging area will normally be necessary.

Available sight distances have been measured from the two site accesses. These are summarised as follows:

Table 1: Sight Distances

Access	Sight Distance
West access - westwards - eastwards	 65m 300m+
East access - westwards - eastwards	 95m+ 300m+

The Land Transport New Zealand publication RTS 6 “Guidelines for Visibility at Driveways” recommends that sight distances be at least 90m at high volume property accesses on collector and arterial roads operating at 50 km/h, and 115m on collector and arterial roads operating at 60 km/h. High volume accesses are defined as catering for more than 200 vehicle movements per day.

The available sight distances towards the east easily exceed these recommendations from both accesses.

The available sight distance westwards from the eastern access exceeds the recommendation for the 50 km/h operating speed but falls slightly short of that for the 60 km/h operating speed. However, it does exceed the minimum visibility necessary for safe stopping, which is 56m at a 50 km/h operating speed and 75m at a 60 km/h operating speed. Safe stopping sight distance is that which is needed for an approaching driver to observe and react to an obstruction ahead, and emergency brake the vehicle to a stop before hitting the obstruction. Thus vehicles will be able to exit from the site at the eastern access with some margin of safety, even though the recommendation in RTS 6 for the 60 km/h operating speed is not quite met.

The available sight distance westwards from the western access is just 65m due to the location of the access in close proximity to the inside of the road curve west of the site. It exceeds the minimum for safety at a 50 km/h operating speed but is less than that needed for a 60 km/h operating speed, which could cause a traffic safety risk. Therefore I consider exit movements from the western access should be avoided, and hence it is intended that the western access be used only as an entry.

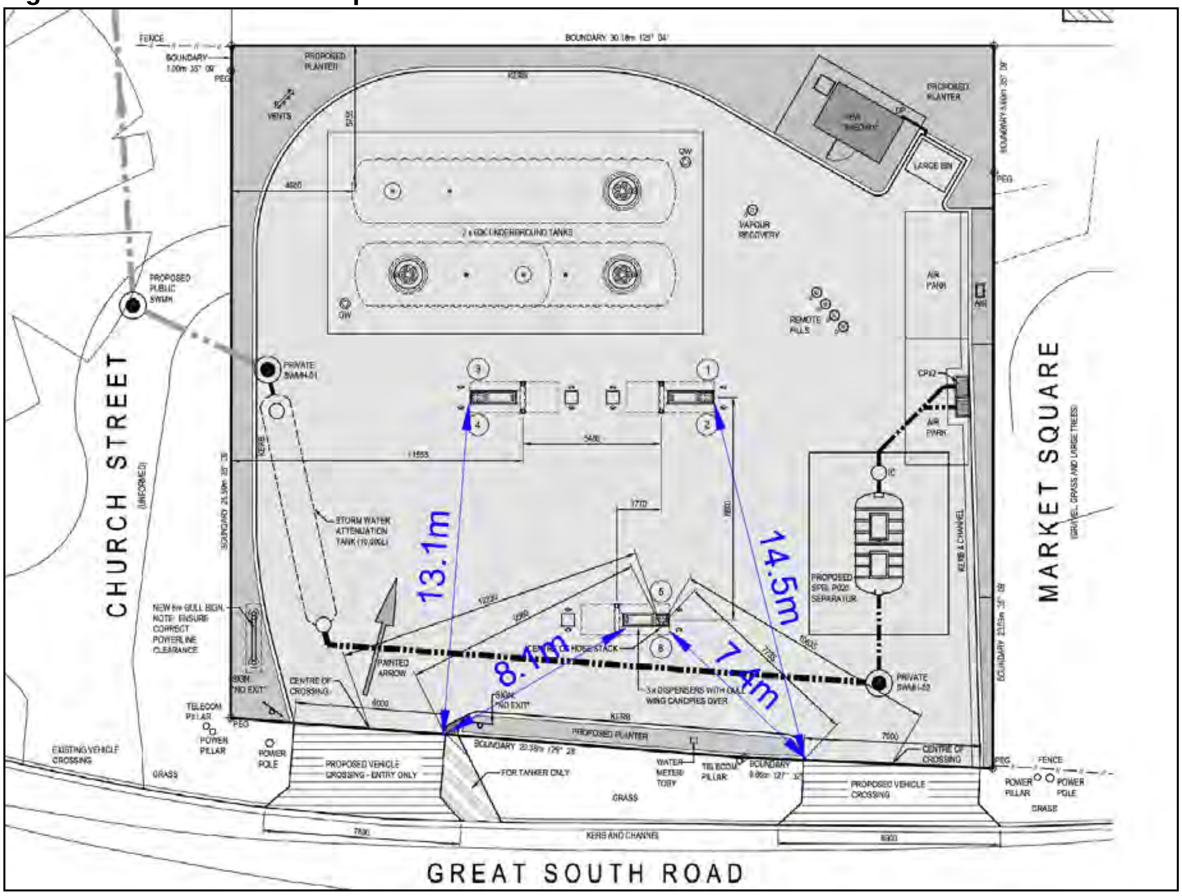
A painted arrow at the western access, pointing inwards, and appropriate “No Exit” signage, as indicated on the site plan, will help to reinforce this intention, and I recommend these be included.

7. SITE LAYOUT

The fuel facility will contain a total of 3 pump islands providing 6 service positions. These will be arranged parallel to Great South Road in a manner that they will be easily accessible by vehicles that enter the site at the western entry, and vehicles will be able to depart from them easily towards the eastern exit.

As indicated above, the nearest pump island to the road will be 10.2m and 10.5m from the mid-points of the site entries. These measurements are slightly short of the minimum specified in Rule 29.5.16 in the District Plan, which is 12m. The Land Transport New Zealand publication RTS 13 “Guidelines for Service Stations” recommends at least 7m of separation between service positions and nearest corners of the site entry points. The purpose of the District Plan requirement and the recommendation in RTS 13 is to reduce the possibility of vehicles queuing when accessing the pump islands and tailing back out of a site onto the roadway. The locations of the pump islands in relation to the nearest corners of the site entries (using the methodology in RTS 13) are dimensioned on Figure 6.

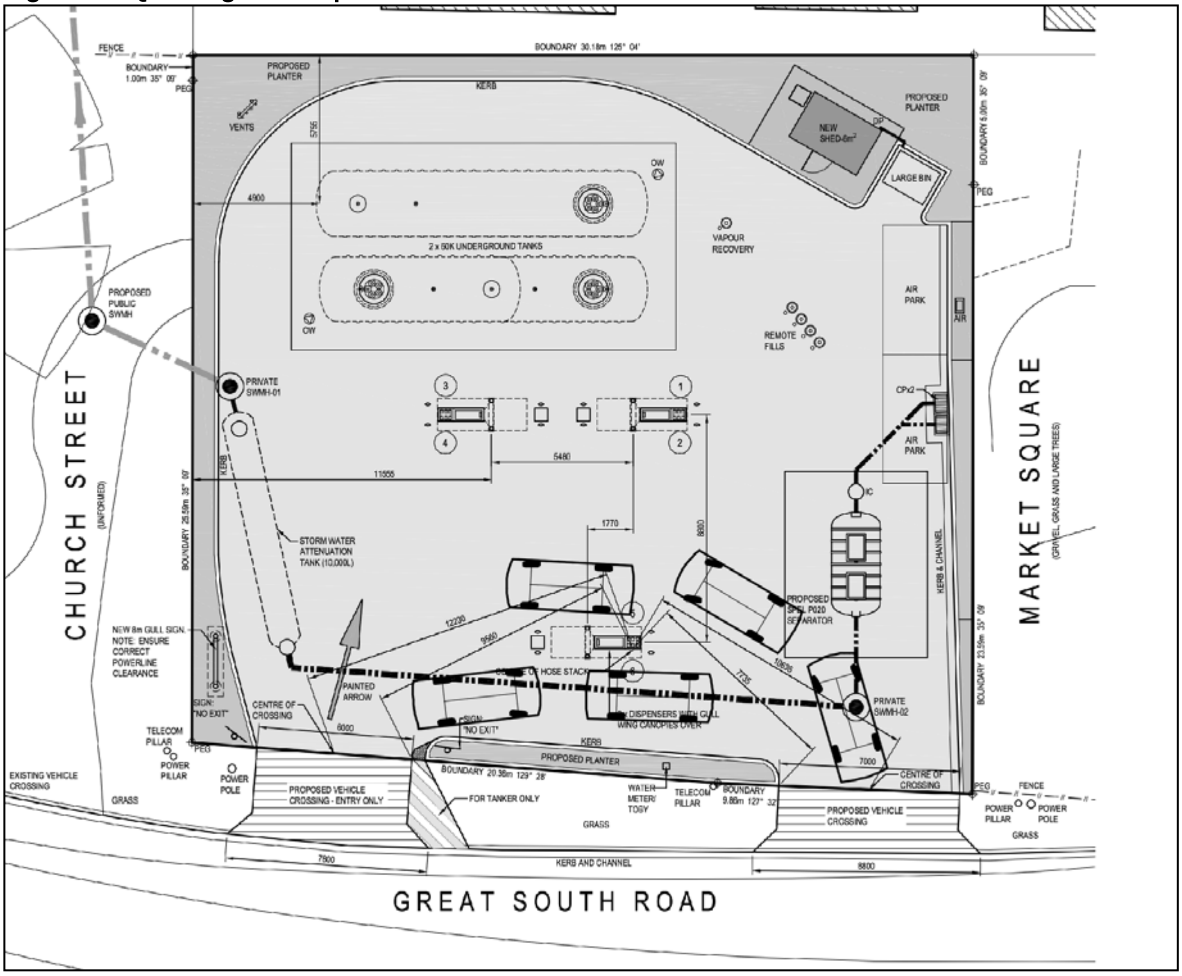
Figure 6: Locations of Pump Islands



Although the nearest pump island to the road does not comply with the minimum separation distance in the District Plan, they will all be more than 7m from both site accesses, and therefore meet the recommendation in RTS 13. RTS 13 is a commonly accepted guideline for service station and is recognised nationwide. Thus I consider that the separation distances between the pump islands and the site entries will be sufficient to avoid queuing off the site.

Figure 7 shows potential vehicle queues at the pump island closest to the site frontage (service positions 5 and 6 as numbered on the site plan).

Figure 7: Queuing at Pump Island - 1



The vehicle represented is a B85 design car (as defined in AS/NZS 2890.1:2004 "Parking Facilities – Off Street Car Parking"). Figure 7 shows that there is room for one vehicle to queue behind a vehicle refuelling at service position 6, and for two vehicles to queue behind a vehicle at service position 5.

Figure 8 shows potential vehicle queues at the pump island furthest from the site frontage (service positions 1 and 4).

Figure 8: Queuing at Pump Island - 2

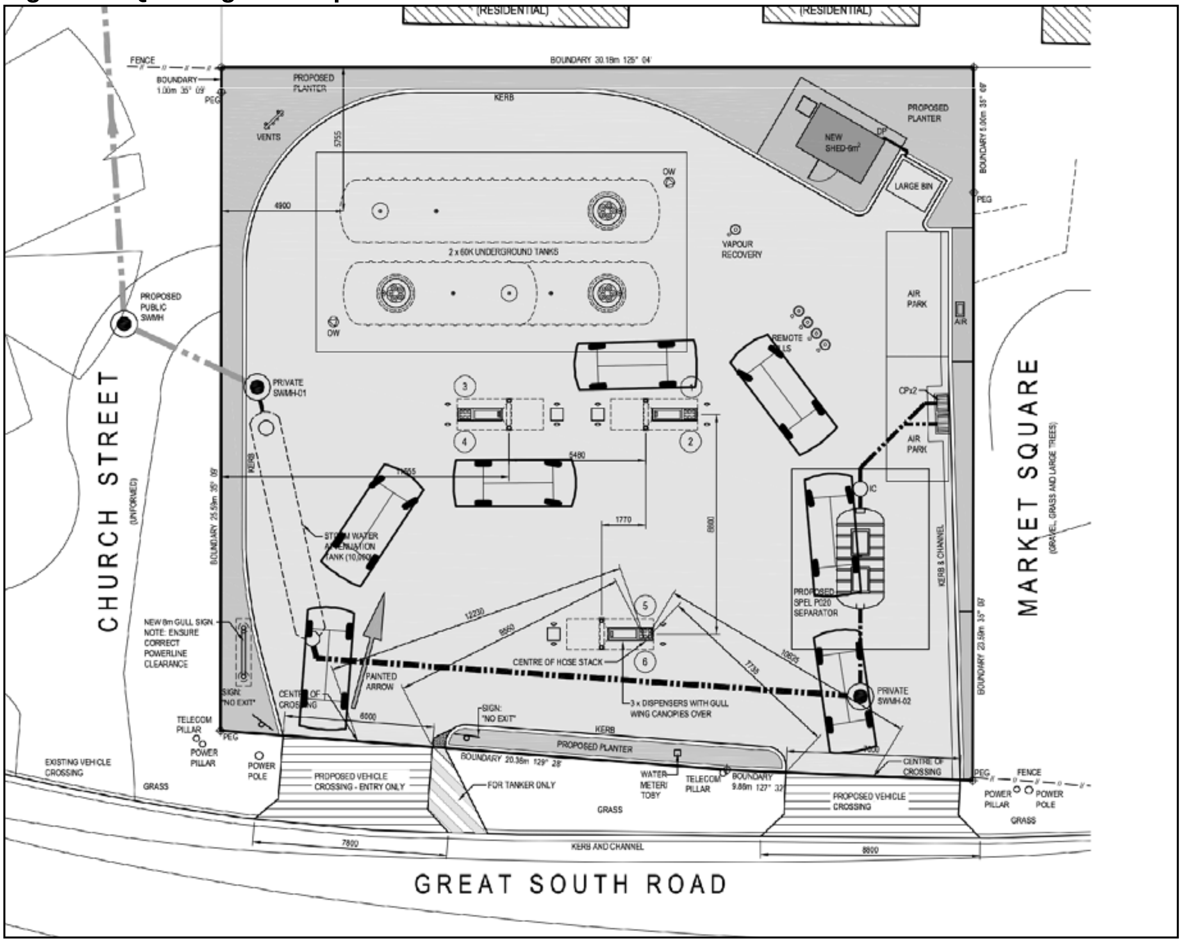


Figure 8 shows that there is room for two vehicles to queue behind a vehicle refuelling at service position 4. The same queue length will be available between service position 2 and the eastern access. There will be room for up to three cars to queue behind service positions 1 and 3.

I consider that all of the pump islands will be located far enough from the site accesses that there is little likelihood of vehicles queuing back out of the site while waiting for a service position.

Except for the parking associated with the air hose, there are no other parking spaces proposed, because there will be no shop, or permanent staff to create a demand for them.

As indicated above, the eastern access will be usable as an entry and an exit, but the western access will be an entry only. Customers who enter the site at the eastern access will be facing westwards when refuelling on the forecourt. Figure 9 shows the tracking path of a B85 car accessing the forecourt from the eastern access and how it will be able to manoeuvre within the site to avoid exiting via the western entry.

Figure 9: Customers Using Eastern Access Only

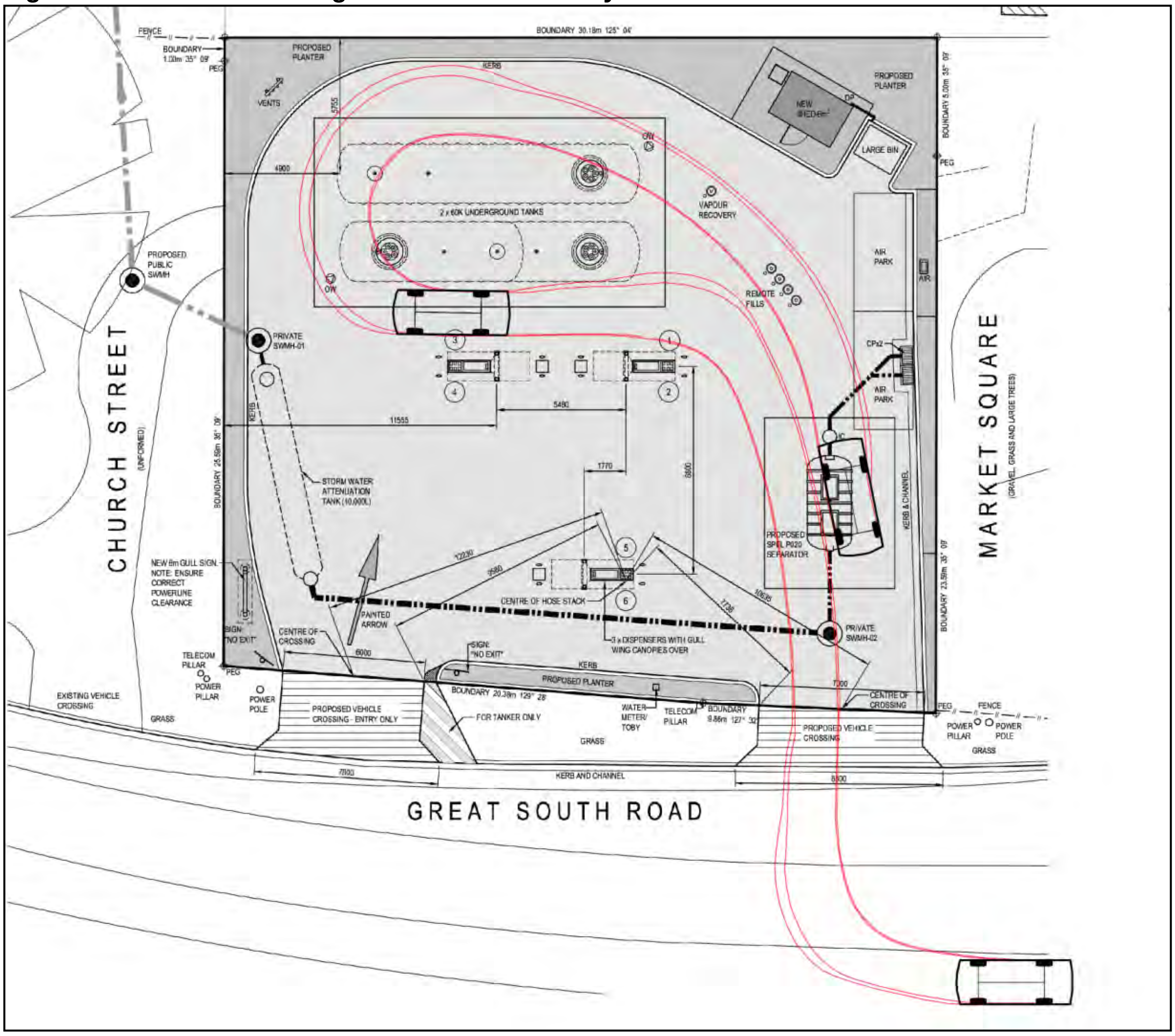


Figure 9 shows the car accessing service position 3, which I consider is the worst-case scenario in this respect because it will require a tighter turn when U-turning within the site to leave than cars from any other service position. On Figure 9 I have also assumed all the service positions will be occupied, although in reality this will often not be the case, which will provide more options for turning within the site than that depicted in the Figure. I consider that these vehicles will be able to exit back to Great South Road satisfactorily, via the eastern access.

Semi-trailer trucks delivering fuel to the fuel facility will enter the site at the western entry and exit from the site at the eastern access, as indicated by the tanker tracking path shown in Figure 5 above. The tanker will stand in the eastern part of the site while unloading. The tracking paths show there will be ample room for this without obstructing the site accesses or access to pump islands, except service position 1 as numbered on the site plan. In my opinion, fuel delivery vehicles will be able to stand as long as necessary without unduly obstructing other vehicles manoeuvring about on the site.

I consider that the proposed site layout will easily accommodate vehicles manoeuvring at the pump islands, vehicles manoeuvring at parking spaces, fuel delivery activity, and generally moving about on the site.

8. CONCLUSIONS

The proposed fuel facility development will generate some more traffic on the adjacent road network than the existing activities that occupy the site. However, the majority of traffic accessing the facility will be pass-by traffic that is on Great South Road anyway, so the number of actual additional vehicle movements on the network will be very low. I consider that the traffic flows will be well within the available spare capacity of the network, and that traffic generation effects will be insignificant.

I consider that the vehicle accesses will easily cater for the traffic flows that will use them. The available sight distances from the proposed eastern access will be adequate for vehicles to exit from the site safely. I consider that the sight distance westwards from the proposed western access will not be sufficient for safe operation. However, it is proposed to use this access as an entry only, to help ensure an acceptable level of traffic safety. "No Exit" signage and arrow markings will be installed to convey this intention to customers. In addition, I consider that there will be adequate separation between the site accesses and the intersections at Pokeno Road and Market Street, that conflicts between vehicles turning at the site accesses and vehicles turning at the intersections are unlikely to occur.

Parking for two cars is required, for the air hose. The plans show two marked parking spaces. The parking requirement is met.

The site layout will easily cater for parking, vehicle manoeuvring and fuel delivery. Available queuing space at pump islands will meet the minimum recommendations for distance from site accesses in the Land Transport New Zealand publication RTS 13, the nationally accepted guideline for service station design.

Taking all of the above matters into consideration, I consider that the proposed fuel facility will have less than a minor effect on the operation of the road network, and traffic safety. In my opinion, resource consent could be granted from a traffic engineering perspective.

Ian Constable
Traffic Engineer