

Ms V Sankar
Northland Transportation Alliance

29 May 2023

Copy via email: vaishali.sankar@nta.govt.nz

Dear Vaishali,

ACCESS TECHNICAL REVIEW – GULL SERVICE STATION, MOLESWORTH DRIVE, MANGAWHAI

Further to your instruction, we have undertaken a peer review of the access arrangement at the proposed Gull Station on Molesworth Drive in Mangawhai.

1 SCOPE OF REVIEW

We understand from your email that the proposal is for a self service Gull Service Station, with entry via the existing crossing at the northern end of the site on Molesworth Drive and a new two-way crossing providing for egress from the proposed service station as well as entry for the neighbouring commercial development. This second access would pass over an existing 'segregation strip' which was created as part of a previous residential development in the Molesworth Drive / Estuary Drive vicinity in 2014.

The key item you require a technical review of relates to the possible removal of the existing segregation strip thereby enabling the proposed second vehicle crossing to be provided.

I have reviewed the following documents:

- "Proposed Gull Service Station, Molesworth Drive, Mangawhai" undertaken by TPC dated September 2022;
- "Molesworth Drive, Mangawhai Resource Consent Application Issue - 07-09-2022" Drawing set prepared by Technitrades Architecture;
- "Gull Mangawhai Access Arrangements, Safe System Assessment Framework" letter prepared by NCC Consulting Engineers and dated 15 May 2023.

Commute visited the site on 9 May 2023.

2 SEGREGATION STRIP

The sites frontage is subject to an existing segregation strip which it is understood was introduced as part of a previous residential development in the Molesworth Drive / Estuary Drive vicinity in 2014. At this time Molesworth Drive was a high speed environment and its

intent was to reduce direct access on to Molesworth Drive with development on the subject lot to access off Estuary Drive (being a lower speed / lower hierarchy road).

The extent of the segregation strip is shown in blue on Figure 2-1 below. It is approximately 95m long and the area circled in red is the existing vehicle crossing which is not within the segregation strip.

Figure 2-1: Extent of segregation strip



In summary, based on the current traffic volumes and speeds on Molesworth Drive and with the upgrades proposed (turn bay etc), we concur with TPCs analysis that the provision of an additional crossing is able to be executed in such a way, so as to maintain the existing safety and efficiency of the current carriageway for the following reasons:

- The nature of Molesworth Drive has changed since the segregation strip was applied. It continues to be a primary collector / arterial within the road network, however it now has a posted speed of 50 km/hr (versus 80 km/hr previously). In addition, there is a raised table some 40m north of the existing vehicle crossing further reducing speeds in the vicinity of the site.
- Comparatively, whilst the proposed new vehicle crossing will likely carry a greater number of trips when compared to individual residential crossings, the construction of one new crossing across the segregation strip (serving the proposed development with forwards only movements) is considered preferable to multiple residential crossings with a high chance of reverse manouveres as well.

3 ACCESS LOCATION AND LAYOUT

We have reviewed the proposed access location and its operation.

All sight distances from here are considered acceptable.

With regard to vehicle movements, the proposed access is well placed to ensure ease of movement for passenger vehicles and refuelling trucks to exit the site. As the existing northern access is entry only it is considered likely that users of the service station will only

3.1 SHARED PATH

Since the segregation strip was introduced, a 3m wide shared path facility also now runs along the sites frontage. Where possible vehicle crossings over this should be minimised.

Suitable intervisibility between pedestrians / cyclists using the shared paths and vehicles manoeuvring in / out of the proposed vehicle crossings is able to be achieved.

The overall width of the vehicle crossing over the shared path is some 15-25.5m as a result of the heavy vehicle tracking. Where possible (if at all) the crossing width should be narrowed. Shifting the shared path away from the kerb and closer to the boundary would help with this.

It is considered that with the correct treatment a vehicle crossing is able to be safely constructed here.

4 SSAF REVIEW

A review of the SSAF has been undertaken. This concludes the following in relation to the users of the shared path;

- An access that serves as both an exit and an entry (ie. two-way) is a higher risk than a single direction access (one-way). This is due to the increased number of conflict points and that users of the shared path will have to be aware of vehicles approaching them from two directions. In addition, in the eyes of a shared path user, a vehicle going in one direction may mask a vehicle coming in the opposite direction.
- The likelihood and severity of a crash between a shared path user and a vehicle using the access can be reduced by providing a raised platform crossing of the access and providing appropriate paving and markings to make the priority for shared path users clear.

The following recommendations are made to ensure that the accesses cross the existing shared path as safely as possible;

- The proposed two-way access will add to the potential conflicts between turning vehicles and users of the shared path. To minimise conflicting movements, both on Molesworth Drive and the crossing of the shared path, the accesses off Molesworth Drive should be one-way (one for entry, one for exit). This will also enable one of the two right turn bays on Molesworth Drive to be removed;
- To minimise the likelihood of high severity conflicts between turning vehicles and users of the shared path a raised platform should be provided at both accesses;
- Paving and markings should be used make the priority for shared path users clear; and
- The shared path should be set back 3-5m so that turning vehicles can wait for users of the shared path clear of the through lane of Molesworth Drive.

The full SSAF is attached as Appendix A.

In general, the conclusions and recommendations within the SSAF align with the review undertaken by Commute. Relocating the shared path back towards the lot boundary will also

reduce the crossing width for pedestrians / cyclists as well as the likelihood of a vehicle sitting across the shared path and blocking the way for users whilst waiting to exit the site.

5 CONCLUSION

Overall, it is considered that:

- Since the inception of the segregation strip the operation of Molesworth Drive has changed to provide a much lower speed environment (lower posted speed as well as nearby traffic calming), as such, it is considered that the access is able to be constructed in a safe manner for both vehicle movements and shared path users, such that the removal of the segregation strip is possible.
- Exit only access should be considered for the service station, this would reduce the number of conflicts arising from the refuelling trucks tracking. Two-way access is not considered necessary for the service station activity on its own.

I trust this is sufficient for your requirements. Should you have any queries, please do not hesitate to be in touch.

Yours sincerely

Commute Transportation Consultants

Hollie Yukich



Senior Transport Consultant

hollie@commute.kiwi

APPENDIX A: SSAF REPORT

15 May 2023

Northland Transportation Alliance

Attention: Vaishali Sankar

RE: Gull Mangawhai Access Arrangements, Safe System Assessment Framework

With regards to your request to carry out a Safe System Assessment Framework on the proposed access arrangements to a proposed Gull Service station and associated commercial development. The subject site is defined as Lot 1 DP 341981 and is located on the corner of Molesworth Drive and Estuary Drive.

Road environment

The existing road environment is as follows;

Molesworth Drive

- AADT – 9764 (2022),
- HCV – 7%,
- Posted speed limit – 50km/h,
- Speed environment – 60km/h.

Estuary Drive

- AADT – 1026 (2022),
- HCV – 7%,
- Posted speed limit – 40km/h,
- Speed environment – 40km/h.

Mangawhai Shared Path

The Mangawhai Shared Path passes along the Molesworth Drive frontage of the subject site, the section of shared path on the frontage has recently being completed and works are currently underway to extend the shared path further south, As it currently stands the shared path between Mangawhai and Mangawhai Heads is currently incomplete, therefore its current usage in all likelihood not representative of its future usage.

Intersection of Molesworth Drive and Estuary Drive

This intersection is a simple priority intersection.

Site access.

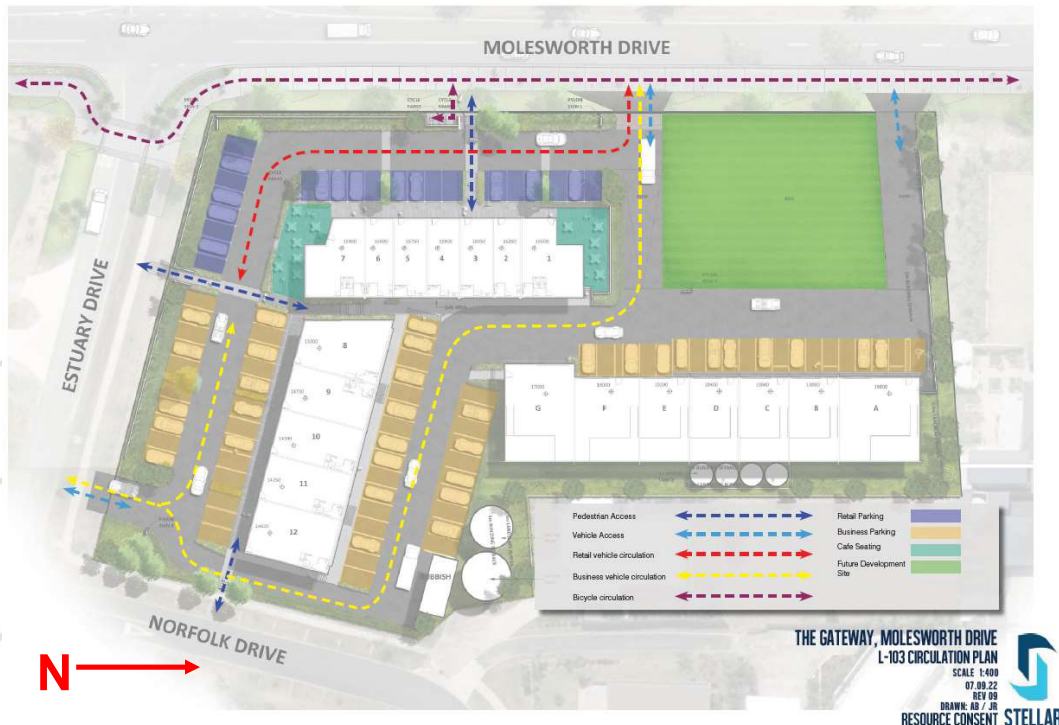
Lot 1 DP 341981 currently has an access off Molesworth Drive by means of a formed access at the north end of the subject site, there is a segregation strip for the remainder of the frontage with Molesworth Drive.

The Proposal

The proposal comprises two primary components.

- A self-service petrol station,
- A commercial development,

The layout of development is as follows;



As indicated above the vehicle access is via three accesses, one off Estuary Drive and two accesses off Molesworth Drive. Of the two access off Molesworth Drive one will utilise the existing vehicle crossing which will be upgraded and one will be a newly created access. The more southerly access off Molesworth Drive and the access off Estuary Drive will be used by traffic in both directions. The more northerly access off Molesworth Drive will be used as an access only.

For the purposes of this review the access onto Estuary Drive will not be considered any further.

Anticipated traffic movements

Information supplied by the NTA indicates a total number of anticipated daily traffic movements of 1850/day, this is made up as follows;

Table 6 – Traffic Generation Potential

Activity	Area	Daily Traffic	Weekday PM Peak Hour
Gull service station	6 pumps	900	90
Retail	472m ² + 100m ² outdoors ¹	680	95
Office	1,028m ²	150	20
Industrial	1,020m ²	120	15
Total		1,850	220

In addition, once completed it is anticipated that the shared path will have a total of 300 users per day. It is assumed that of these 300 movements, 150 will be pedestrians and the other 150 movements are other modes (cyclists, E-bikes, E-scooters etc.)

Safe System Assessment Framework (SSAF)

A safe system assessment has been carried out in accordance with the procedures set down in the “Waka Kotahi NZ Transport Agency Safe System Audit Guidelines.”

Five scenarios have been assessed, these being;

- The existing access, Lot 1 DP 341981 not developed,
- The existing access used to its current consented extent,
- The existing and proposed access used to access or egress the proposed Gull service station,
- The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development,
- The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development with appropriate mitigation measures at the point where the traffic accessing/egressing the development crosses the existing shared path.

The Safe System Framework is a matrix used to compare the safety performance of various options at the optioneering stage.

Table 1 below shows the Safe System Assessment Framework.

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	AADT; length of road segment	AADT; length of road segment	AADT for each approach; intersection size	AADT; length of road segment	AADT; pedestrian numbers; crossing width; length of road segment	AADT; cyclist numbers; pedestrians	AADT; motorcycle numbers; length of road segment
Likelihood	Speed; geometry; shoulders; barriers; hazard offset; guidance and delineation	Geometry; separation; guidance and delineation; speed	Type of control; speed; design; visibility; conflict points	Speed; sight distance; number of lanes; surface friction	Design of facilities; separation; number of conflicting directions; speed	Design of facilities; separation; speed	Design of facilities; separation; speed
Severity	Speed; roadside features and design (e.g. flexible barriers)	Speed	Impact angles; speed	Speed	Speed	Speed	Speed

Table 1 : Safe System Assessment Framework.

Table 2 below gives the matrix scoring system

Road user exposure	Crash likelihood	Crash severity
0 = there is no exposure to a certain crash type. This might mean there is no side flow or intersecting roads, no cyclists, no pedestrians, or motorcyclists).	0 = there is only minimal chance that a given crash type can occur for an individual road user given the infrastructure in place. Only extreme behaviour or substantial vehicle failure could lead to a crash. This may mean, for example, that two traffic streams do not cross at grade, or that pedestrians do not cross the road.	0 = should a crash occur, there is only minimal chance that it will result in a fatality or serious injury to the relevant road user involved. This might mean that kinetic energies transferred during the crash are low enough not to cause a fatal or serious injury (FSI), or that excessive kinetic energies are effectively redirected/dissipated before being transferred to the road user. Users may refer to Safe System-critical impact speeds for different crash types, while considering impact angles, and types of roadside hazards/barriers present.
1 = volumes of vehicles that may be involved in a particular crash type are particularly low, and therefore exposure is low. For run-of-road, head-on, intersection and 'other' crash types, AADT is < 1 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are < 10 units per day.	1 = it is highly unlikely that a given crash type will occur.	1 = should a crash occur, it is highly unlikely that it will result in a fatality or serious injury to any road user involved. Kinetic energies must be fairly low during a crash, or the majority is effectively dissipated before reaching the road user.
2 = volumes of vehicles that may be involved in a particular crash type are moderate, and therefore exposure is moderate. For run-of-road, head-on, intersection and 'other' crash types, AADT is between 1 000 and 5 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are 10–50 units per day.	2 = it is unlikely that a given crash type will occur.	2 = should a crash occur, it is unlikely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are moderate, and the majority of the time they are effectively dissipated before reaching the road user.
3 = volumes of vehicles that may be involved in a particular crash type are high, and therefore exposure is high. For run-of-road, head-on, intersection and 'other' crash types, AADT is between 5 000 and 10 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are 50–100 units per day.	3 = it is likely that a given crash type will occur.	3 = should a crash occur, it is likely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are moderate, but are not effectively dissipated and therefore may or may not result in an FSI.
4 = volumes of vehicles that may be involved in a particular crash type are very high, or the road is very long, and therefore exposure is very high. For run-of-road, head-on, intersection and 'other' crash types, AADT is > 10 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are > 100 units per day.	4 = the likelihood of individual road user errors leading to a crash is high given the infrastructure in place (e.g. high approach speed to a sharp curve, priority movement control, filtering right turn across several opposing lanes, high speed).	4 = should a crash occur, it is highly likely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are high enough to cause an FSI crash, and it is unlikely that the forces will be dissipated before reaching the road user.

Table 2 : Matrix scoring system.

Tables 3-7 below show the results of the assessment for the 5 options.

Table 3 : The existing access, Lot 1 DP 341981 not developed

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (/4)	3	3	3	0	4	4	2
Likelihood (/4)	2	2	3	0	0	0	2
Severity (/4)	1	1	1	0	2	2	2
Product	6	6	9	0	0	0	8
Total (/448)							29

Table 4 : The existing access used to its current consented extent

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (/4)	3	3	3	0	4	4	2
Likelihood (/4)	2	2	3	0	1	1	2
Severity (/4)	1	1	1	0	2	2	2
Product	6	6	9	0	8	8	8
Total (/448)							45

Table 5 : The existing and proposed access used to access the proposed Gull service station only,

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (/4)	3	3	3	0	4	4	2
Likelihood (/4)	2	2	3	0	2	2	2
Severity (/4)	1	1	1	0	3	3	2
Product	6	6	9	0	24	24	8
Total (/448)							77

Table 6 : The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (/4)	3	3	3	0	4	4	2
Likelihood (/4)	2	2	3	0	3	3	2
Severity (/4)	1	1	1	0	3	3	2
Product	6	6	9	0	36	36	8
Total (/448)							101

Table 7 : The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development with appropriate mitigation measures at the point where the traffic accessing/egressing the development crosses the existing shared path

	Run off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (/4)	3	3	3	0	4	4	2
Likelihood (/4)	2	2	3	0	2	2	2
Severity (/4)	1	1	1	0	2	2	2
Product	6	6	9	0	16	16	8
Total (/448)							61

Notes on the SSAF

The following notes apply to the SSAF

- Run off road and Head-on crash types apply to the traffic on Molesworth Drive, these are constant throughout the different assessments,
- Intersection crash types relate to the vehicle-to-vehicle collisions caused by vehicles turning in and out of the accesses, these are constant throughout the different assessments,
- Other, there are no 'other' crash types in the assessment,
- The 'pedestrian and cyclist' crash types relate to the various conditions that exist at the crossing of the shared path by the accesses,
- Motorcyclist crashes relate to crashes on Molesworth Drive involving motorcycles, these are constant throughout the different assessments,

Output from the SSAF

Table 8 below summarises the output from the SSAF.

Scenario	SSAF Score
The existing access, Lot 1 DP 341981 not developed,	29
The existing access used to its current consented extent.	45
The existing and proposed access used to access the proposed Gull service station,	77
The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development.	101
The existing and proposed access used to access/egress the proposed Gull service station and the proposed commercial development with appropriate mitigation measures at the point where the traffic accessing/egressing the development crosses the existing shared path.	61

Table 8 – Summary of SSAF results

Discussion

- In relation to the users of the shared path there is no safer alternative that no accesses across the shared path,
- An access that serves as both an exit and an entry is a higher risk than a single direction access. This is due to the increased number of conflict points and that users of the shared path will have to be aware of vehicles approaching them from two directions. In addition, in the eyes of a shared path user, a vehicle going in one direction may mask a vehicle coming in the opposite direction,
- The likelihood and severity of a crash between a shared path user and a vehicle using the access can be reduced by providing a raised platform crossing of the access and providing appropriate paving and markings to make the priority for shared path users clear.

Recommendations

The following recommendations are made to ensure that the accesses cross the existing shared path;

- To minimise conflicting movements, both on Molesworth Drive and the crossing of the shared path, the accesses off Molesworth Drive should be made one for entry one for exit. The proposed two-way access will add to the potential conflicts between turning vehicles and users of the shared path.
- This will enable one of the two right turn bays on Molesworth Drive to be removed,
- To minimise the likelihood of high severity conflicts between turning vehicles and users of the shared path a raised platform should be provided at both accesses,
- Paving and markings should be used to make the priority for shared path users clear,
- The shared path should be set back 3-5m so turning vehicles can wait for users of the shared path clear of the through lane of Molesworth Drive.

Regards



David Spoonley
Traffic and Safety Engineer