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By email: Mitra.Prasad@at.govt.nz

**Attention: Mitra Prasad**

Dear Mitra,

**Upper Harbour Drive TMP Safety Assessment**

This safety assessment has been prepared by Beca Limited (Beca) for Auckland Transport (AT) in response to a request for an independent safety review of the cycle lanes on Upper Harbour Drive. We understand that there have been issues with vehicles colliding with concrete separators between cycle lanes and the traffic lanes on Upper Harbour Drive. We understand that temporary traffic measures have been currently put in place for an interim period, however there is concern as to whether the temporary traffic measures within the Traffic Management Plan (TMP) are sufficient and safe in the current environment.

**Scope**

This safety assessment includes the Upper Harbour Drive corridor as shown in **Figure 1**.

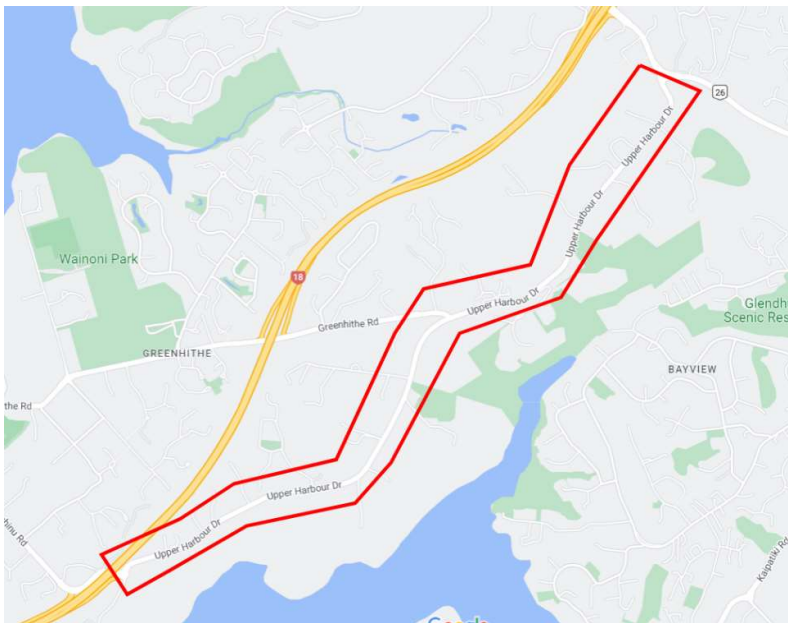


Figure 1. Upper Harbour Drive Corridor extents included in safety assessment.

The scope of this assessment consists of two parts:

1. A review of AT's temporary TMP that has been implemented until a longer term permanent solution has been through an engagement process with the public. This longer term solution will be ready to implement following this engagement process. The current temporary TMP is expected to remain in place for approximately 6 months from the date of this letter.
2. Recommendations for improvements to the TMP which could further reduce the risk of collisions.

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environments, and the opinions of the safety assessment team. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report.

## Background

### Existing Route

Upper Harbour Drive is located in Greenhithe, Auckland. It has an estimated ADT of approximately 6,900 vehicles according to Mobile Road. Upper Harbour Drive is classified as a Secondary Arterial route and has been assigned a Connector status within Auckland's cycle network, as shown in AT's Future Connect. Cycle lanes run along both sides of the road, with concrete separators protecting some lengths of the cycle lanes. The northern extent of the route from Albany Highway to Greenhithe Road is also a bus route, serviced by Route 120 which extends from Henderson to the Constellation Bus Station in Rosedale as shown in **Figure 2**.



Figure 2. Bus route along Upper Harbour Drive.

Upper Harbour Drive is primarily surrounded by Residential – Large Lot Zone, shown in the Auckland Unitary Plan: Operative in Part (AUP:OP) and in **Figure 3**.

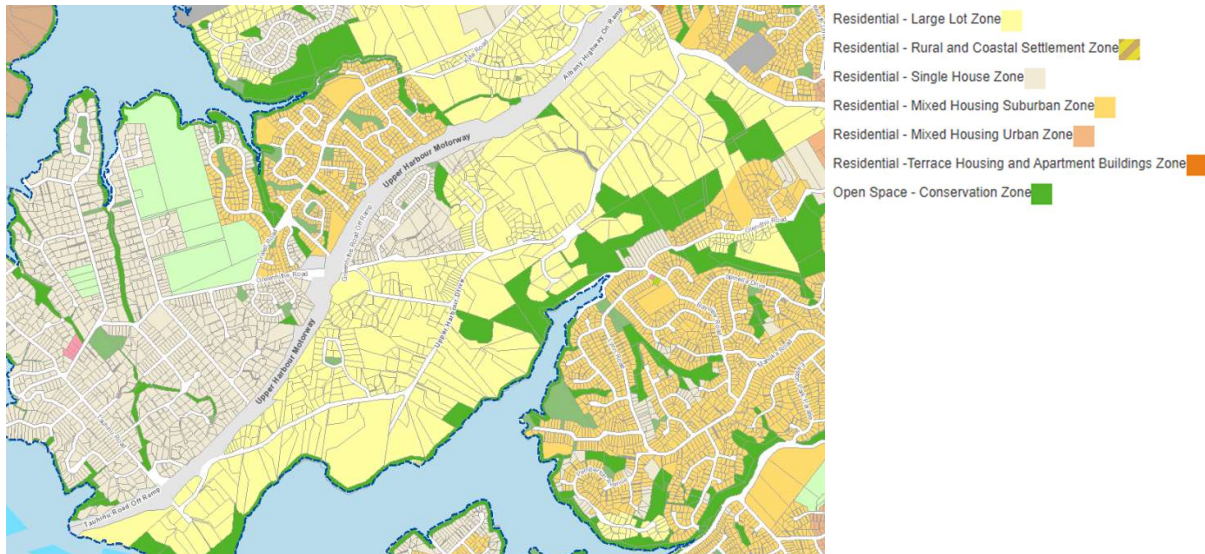


Figure 3. AUP:OP zoning surrounding Upper Harbour Drive.

The current posted speed limit along the route under the TMP is 50 km/h, which was implemented in late August 2022. This was reduced from a temporary limit of 60km/h, which was originally introduced as part of the Minor Cycling and Micromobility programme in June 2022. Before this, the permanent posted speed limit was 70km/h.

Also included within the TMP are measures to delineate the concrete separators and route including; bridge markers posts, traffic cones, red mono directional RRPMS, enhanced edge lines and tubular delineators.

#### Information Received from AT

The following information was received from AT and has been reviewed:

- A list of incidents recorded on Upper Harbour Drive
- Photos of recorded incidents
- FAQs that AT has answered for the public
- Speed data showing the change of speeds once traffic management was introduced
- The current TMP
- Workshop slides providing a breakdown of issues
- For Construction plans for the cycle lanes on Upper Harbour Drive
- Road Safety Audit (RSA) of the cycle route separators detailed design on Upper Harbour Drive

#### Assessment of Received Information

There have been a total of 24 crashes between March and September 2022 that has been recorded by AT. There has been a higher frequency of crashes occurring in the recent months - 16 being recorded in July and August 2022 collectively. From the crashes in the list of incidents where directional information was available, 69% of the vehicles that crashed were travelling northbound. All recorded crashes for vehicles travelling southbound were located in the northern end of Upper Harbour Drive, north of Greenhithe Road. Multiple crashes involved vehicles turning out of vehicle accesses.

The list of incidents did not provide commentary on crash severity however, based on the information supplied, it is understood that the crashes resulted primarily in vehicular damage, non-injury crashes. There

were multiple instances of vehicles crossing the centreline, with one of these being a head-on crash in March 2022 at the southern end of Upper Harbour Drive near the intersection with Tauhinu Road. This occurred shortly after works to implement the concrete separators commenced and before the introduction of the temporary TMP. One crash also resulted in a vehicle catching on fire. No other further trends were found; however the received crash information was limited in the scope of the included data.

Speed data indicated that the mean operating speed was 65km/h when the temporary posted speed limit through the corridor was 60km/h. Following a further temporary posted speed limit reduction to 50km/h the mean operating speed reduced to 60km/h.

Our desktop assessment of the route noted that the lane widths were narrow for the speed that vehicles are driving at. This is consistent with the RSA of the cycle route separator design, which highlighted inadequate lane widths throughout the northern length of Upper Harbour Drive as being a moderate concern.

### Site Visit Observations

Two site visits were undertaken. One was completed on the evening of Thursday 8<sup>th</sup> September during dark conditions, and another was completed in the early afternoon on Friday 9<sup>th</sup> September. Both site visits had fine weather conditions.

Key site observations are as follows:

- Lighting – the route was well-lit, with the traffic cones delineating the concrete separators being visible at night.
- Line marking – some line markings were faded near the northern section of Upper Harbour Drive.
- Lane width – The lanes felt very narrow when driving along Upper Harbour Drive. On-site measurements showed most lane widths were 3.0-3.1m, in some locations up to 3.2m. These measurements were taken from the edgeline to the centreline, or to the edge of the flush median where this was present. The location of measurements taken is shown in **Figure 4**.

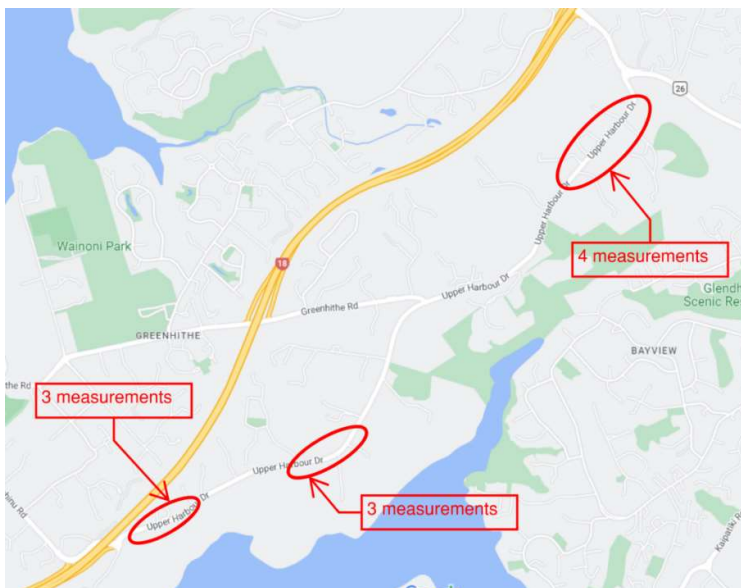


Figure 4. Lane width measurement locations on Upper Harbour Drive.

- Concrete separator position – it was perceived that concrete separators are located close to vehicle accesses along Upper Harbour Drive due to the operating speed thereby, limiting easy manoeuvring for vehicles to turn into and out of vehicle accesses.
- Concrete separator visibility – as the separators are only 0.16-0.18m above the pavement, it is difficult for drivers to see the position of the separators in relation to their vehicle.
- Operating speed – Drivers typically drove above the speed limit at approximately 60km/h.
- Traffic measure placement – most traffic cones were in their intended positions; however some had been displaced.
- Driver behaviour – When a flush median was present, drivers were observed straddling the flush median strip when travelling around curves in the road to avoid the concrete separators.



Figure 5. Faded line markings and narrow lane widths on northern section of Upper Harbour Drive.

## Key Issues

1. The operating speeds are high for the road environment with respect to road alignment and lane width. This is especially prominent in the northern section of Upper Harbour Drive between Albany Highway and Greenhithe Road, where some sections have narrow lane widths and no flush median with concrete separators on both sides of the road. This creates an environment which is unforgiving for vehicles, leaving little room for driver error and increased probability of drivers colliding with the concrete separators.
2. Multiple crashes involved vehicles entering the opposing traffic lane. The Safe System Assessment Framework<sup>1</sup> on speed and crash risks suggests that survivability in a head-on collision is improved in a crash with vehicle speeds less than 70km/h. However, with mean vehicle speeds along Upper Harbour Drive being approximately 60km/h, many vehicles will be operating near or above 70km/h. This introduces the potential for high severity crashes that could result in death or serious injury. The route also has an ADT of 6,900 vehicles, introducing a considerable probability of a vehicle

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<sup>1</sup> Austroads Safe System Assessment Framework

approaching in the oncoming direction should a vehicle crash and enter the oncoming traffic lane as the risk increases after 6,000.

3. Drivers are likely to be unaware of the position of the concrete separators when turning into and out of vehicle accesses. The position of concrete separators requires drivers make a tight turn. The concrete separators are also 0.16-0.18m high, which is outside of the visibility of a driver entering or leaving a vehicle access. When turning, the attention of a driver is likely to be on traffic on the road rather than the position of the concrete separators, introducing the risk of drivers striking the separators. As operating speeds along Upper Harbour Drive are high for the road environment, vehicles may also not slow to speeds that allow them to comfortably turn into a vehicle access.

## Conclusions and Recommendations

We recommend that AT consider persevering with the concrete separators as they are currently. While there is a present issue with vehicles colliding with these separators, the crashes exhibit a generally low risk of death or serious injury. The removal of concrete separators or exchanging them for mountable separators would result in reduced protection and a less safe environment for cyclists. With mean operating speeds along Upper Harbour Drive being approximately 60km/h and the survivability for vulnerable road users being significantly reduced in crash speeds exceeding 30km/h, a crash involving a cyclist is of high risk.

To address the key issues of excess speed and limited visibility of concrete separators, we recommend that AT consider introducing safe-hit delineator posts (in close proximity) next to the edgelines along Upper Harbour Drive and on the centrelines where a flush median is not present. In the event of a collision, these posts result in minimal damage to vehicles and are therefore forgiving of user error when driving. They are also semi-permanent, meaning they cannot be easily moved from their intended position.

The primary purpose of the safe-hit delineator posts is to provide drivers with a vertical “frame of reference” to improve awareness of where the edge of the lane is, which is especially important with the narrow lane widths. On the sections of Upper Harbour Drive where there is no flush median, the safe-hit delineator posts being both on the edgeline and centreline are expected to make drivers perceive their lane as being narrow, creating a shy effect. This is expected to reduce operating speeds and therefore the severity of crashes, bringing operating speeds further below 70km/h and reducing the risk of death or serious injury in head-on crashes. Furthermore, it is recommended that AT should consider implementing electronic driver feedback speed signs to increase drivers’ awareness of their speed.

We understand that the current TMP requires the placement of vertical devices to be between separators. Therefore, instead of placing safe-hit delineator posts along the edgeline, AT may consider placing these between concrete separators but lined up with the face of the concrete separators. This is still expected to achieve a narrowing effect, and reduces the probability of a driver colliding with a safe-hit delineator post. It is highly recommended that AT consider monitoring driver behaviour to observe the effectiveness of this measure, and modify if the desired outcome has not been achieved.

For vehicles turning into a vehicle access, safe-hit post delineators are expected to provide a vertical reference for the position of the concrete delineators if placed on either side of a vehicle access. Reduced operating speeds along Upper Harbour Drive would also encourage a reduced speed before turning. This is expected to reduce the likelihood of vehicles turning at speeds that are too high and colliding with concrete separators. We do not recommend that AT remove concrete separators, as the present issue relates primarily to driver behaviour and perception rather than separator placement.

We recommend, if AT implements these measures, that AT should consider monitoring the effectiveness of the measures in terms of speed, crash occurrence and severity.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report. While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety assessment team or their organisations.

We trust that this covers the scope requested by Auckland Transport. Please do not hesitate to contact us should you have any further queries.

Yours sincerely,



**Rojina Baisyet**

Manager – Transport Advisory

on behalf of

**Beca Limited**

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