

Appendix F

Addendum to the Noise and
Vibration Assessment



24 June 2009

10-5050 Bus Interchange and Car Parking Facilities Detailed Assessment 20090624

Transport Infrastructure Development Corporation
Locked Bay 6501
ST LEONARDS, NSW 2065

Attention: Ms Belinda Scott

Dear Belinda

**Quakers Hill to Vineyard Duplication Project
Addendum to Heggies Report 10-5050-R3
Assessment of Schofields and Vineyard Commuter Car Park**

1 Introduction

Both Schofields and Vineyard Train Stations are to be relocated and upgraded as part of the Quakers Hill to Vineyard Duplication Project. The upgrade of each station will include new bus interchanges and commuter car parking facilities.

This letter report acts as an addendum to Heggies Report 10-5050-R3 '*Quakers Hill to Vineyard Duplication Noise and Vibration Assessment Construction and Operations*', dated 23 March 2009, and presents a more detailed assessment of the potential noise impacts from the operation of the bus interchanges and associated car parking facilities at both stations. Particular emphasis is given to vehicles accessing the car parking facilities to the west of the new Schofields Station via Bridge Street.

All information regarding the car parking facilities used within the scope of this assessment has been taken from the PB report '*Review of the Transport and Accessibility Impacts of the Quakers Hill to Vineyard Duplication Technical Paper*', dated April 2009.

1.1 New Schofields Station

The new Schofields Station will include a bus interchange, commuter car park and a kiss-and-ride and taxi zone on the western side of Railway Terrace. The facility will accommodate a 70 m bus kerb to support up to 3 buses at a time and a 55 m long kiss-and-ride kerb, providing sufficient space for up to 9 kiss-and-ride vehicles and/or taxis at any one time. The new commuter car parking facilities are to be located on both the eastern and western sides of Railway Terrace.

The extent of the proposed car parking facilities at the new Schofields Station is illustrated in **Figure 1** below.

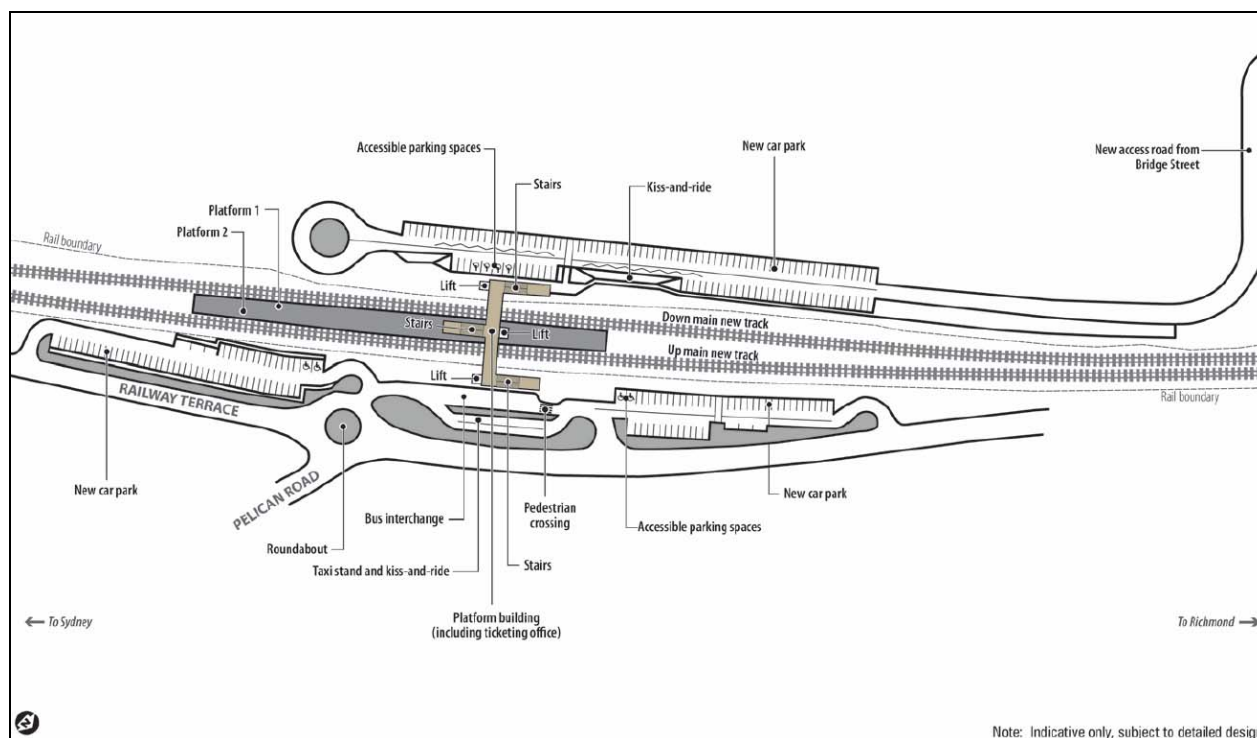
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Figure 1 Proposed Schofields Car Parking Facilities



Both car parks at Schofields Station will accommodate up to a maximum of approximately 230 vehicles. The western car park is proposed to have 120 parking spaces.

Access to the eastern car park would be gained from Railway Terrace - a road that is already subject to large volumes of traffic. Access to the western car park would be provided solely from Bridge Street until the Schofields Precinct is further developed.

It is noted that Bridge Street is currently a cul-de-sac and that it is only subject to vehicular movements when residents access their properties. The southern end of the road currently has virtually no traffic movements. Residential properties are situated approximately 13 m to 20 m away from the edge of the Bridge Street carriageway.

1.2 Vineyard Station

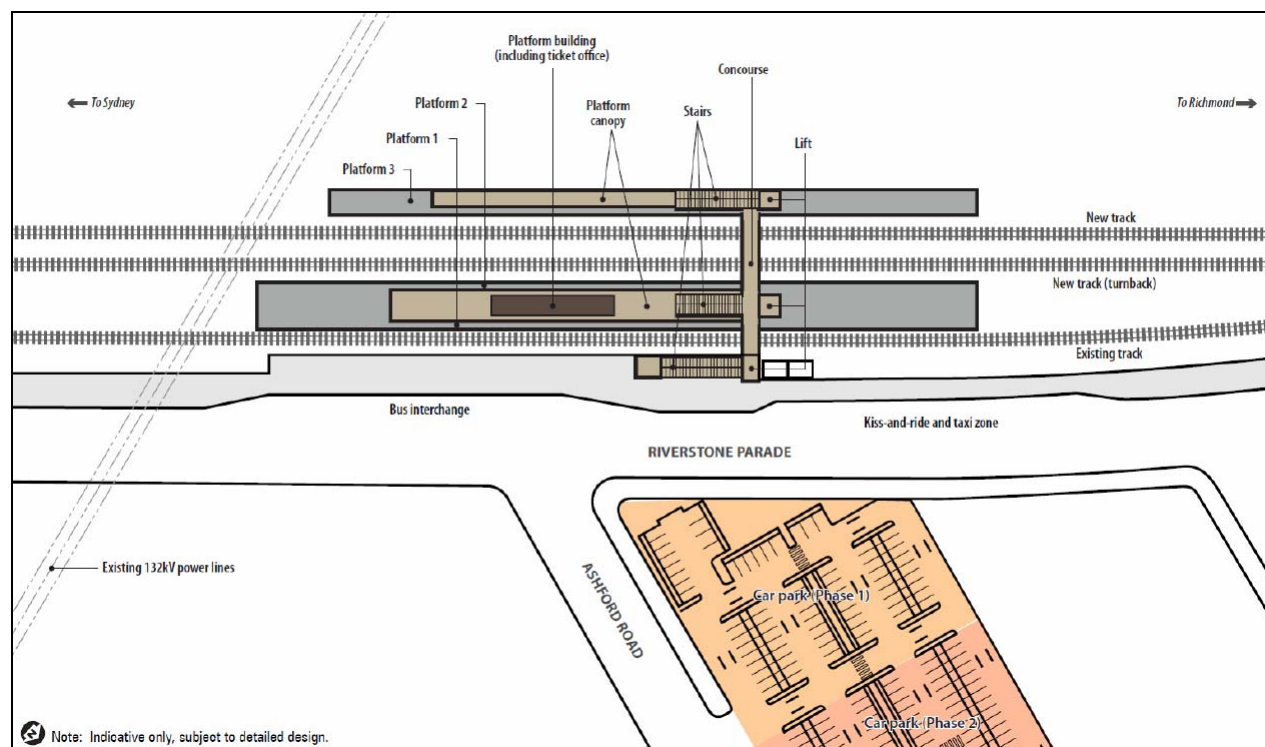
The new Vineyard Station will include a 69 m bus interchange, commuter car park and a 71 m kiss-and-ride and taxi zone on the western side of Railway Parade. The facility will accommodate up to 5 buses and 12 taxis and/or kiss-and-ride vehicles at any one time.

The new commuter car park will be located on the eastern side of Railway Parade with access being provided from Ashford Road. Phase 1 of the car park will accommodate up to approximately 70 vehicles.

The extent of the proposed car parking facilities at the new Vineyard Station is illustrated in **Figure 2**.



Figure 2 Proposed Vineyard Car Parking Facilities



The closest residential property to the Vineyard car parking facilities is situated approximately 30 m from Ashford Road.

2 Noise Criteria

2.1 Environmental Criteria for Road Traffic Noise

The Environmental Criteria for Road Traffic Noise (ECRTN) presents the DECC's guidelines for road traffic noise assessment. The policy document provides road traffic noise assessment guidelines for proposed roads or residential land use developments as well as assessment criteria for other sensitive land uses.

For the Quakers Hill to Vineyard Duplication Project, the ECRTN criteria would apply to noise from road traffic movements associated with the respective developments. The relevant development categories from the ECRTN are reproduced in **Table 1**.

It is noted that the noise criteria presented within the ECRTN noise policy document are guidelines and as such, are non-mandatory.



Table 1 Road Traffic Noise Criteria

Type of Development	Criteria		Where Criteria are Already Exceeded
	Day 7am - 10pm (dBA)	Night 10pm - 7am (dBA)	
Land use developments with potential to create additional traffic on local roads	LAeq(1hour) 55 dBA	LAeq(1hour) 50 dBA	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dBA. Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria. In some instances this may only be achievable through long-term strategies, such as improved planning, design and construction of adjoining land use developments; reduced vehicle emission levels through new vehicle standards and regulation of in-service vehicles; greater use of public transport; and alternative methods of freight haulage.
Land use developments with potential to create additional traffic on collector roads	LAeq(1hour) 60 dBA	LAeq(1hour) 55 dBA	

The assessment criteria as described within the ECRTN are stated as being applicable for a projected timeframe that extends to a period of 10 years immediately after the road opens. As such, an assessment year of 2023 (based on an opening year of 2013) has been used in the following assessment.

The upgrading of **Schofields Station** and the changes in use of Bridge Street, on the western side of the station, are regarded as land use developments with potential to create additional traffic on **local roads** in so far as ECRTN is concerned. The changes to the eastern side of the station, in the vicinity of Railway Terrace, are regarded as land use developments with potential to create additional traffic on **collector roads**.

The residences in the vicinity of the proposed car parking facilities at **Vineyard Station** would attract the **local roads** criteria.

Following the proposed upgrades, it is not expected that either of the car parking facilities would attract additional traffic movements during the night-time period. The predicted traffic increase will predominantly occur as a result of commuters accessing the parking facilities during the morning and early evening peak hours. The ECRTN assessment criteria for residential receivers in the vicinity of both stations are therefore the relevant daytime criteria.

3 Methodology

The future road traffic volumes for the busiest 1 hour period during the daytime in the vicinity of each new bus interchange and commuter car park are presented in **Table 2**.

In the absence of any more detailed information regarding the expected traffic volumes in the vicinity of the stations for the 2023 assessment year a worst-case assumption was made within Heggies Report 10-5050-R3 'Quakers Hill to Vineyard Duplication Noise and Vibration Assessment Construction and Operations', dated 23 March 2009, that during the busiest 1 hour period each car parking space will be used once. The use of this assumption is now considered to be overly stringent. A more realistic scenario would be that the car parks would be filled to capacity over a 2 hour period - resulting in half of the spaces being used in the worst-case 1 hour period (ie a 2 hour peak period).

**Table 2 Road Traffic Volumes**

Vehicle Type	Vehicles Per Hour (Busiest Daytime 1 Hour Peak)
	Future (2021)
Schofields Station (eastern and western car parks)	
Light Vehicles (Cars)	115 ¹
Heavy Vehicles (Buses)	18
Vineyard Station	
Light Vehicles (Cars)	35 ¹
Heavy Vehicles (Buses)	18

Note 1: Half of the capacity of the car park is assumed to be filled in the busiest 1 hour period.

The PB traffic report states that a 3 bay bus kerb is proposed at the Schofields Station bus interchange, with a capacity to serve up to 45 buses per hour when assuming a minimum of 4 minutes to load and unload passengers. The bus interchange at Vineyard Station provides space for 5 buses and has a maximum capacity of 75 buses per hour. It should be noted that no hourly traffic volumes were stated for the 2023 assessment year.

On the basis of the existing bus traffic information contained within the PB traffic report (ie approximately 9 daytime bus services are currently scheduled for Quakers Hill and approximately 7 for Riverstone during the peak daytime hour) it has been assumed that these figures would be replicated at both new Schofields and Vineyard Stations upon opening in 2013 as a worst-case scenario. For the 2023 assessment year, a conservative estimate that the opening year bus services would be seen to double in volume has been used. This results in the assumption that 18 services would be apparent during the worst case 1 hour period for both stations.

The road traffic noise assessment is based on the increase in road traffic due to the project. Heavy vehicle movements (apart from buses) will not increase due to the project, and have therefore not been assessed.

The following assumptions have also been used in the calculations:

- Bus speeds of 40 km/h on approach and departure routes.
- Non bus traffic speeds of 40 km/h during peak hour and 60 km/h at other times.
- The traffic volumes are assumed to be shared equally between the northbound and southbound lanes.
- All light vehicle movements to and from the car parks on local roads have been assumed to be at a speed of 50 km/h.
- Although buses would frequently service Schofields Station, they would not be required to access the western car park and would therefore not make use of Bridge Street. Buses would also not be required to access the car park at Vineyard Station.

The prediction of LA_{eq} noise levels at sensitive receiver locations are based on light vehicle source noise levels taken from the Heggies Noise Source Database. The levels contained within this database are derived from numerous field measurements of a wide range of vehicle types.



4 Traffic Noise Impact Assessment Results

4.1 Traffic Movements to/from the Car Parking Facilities

This part of the assessment addresses the impacts from noise generated by vehicles commuting to and from the car parking facilities at both the Schofields and Vineyard Stations.

4.1.1 Schofields Station

Schofields Station - Eastern Car Park

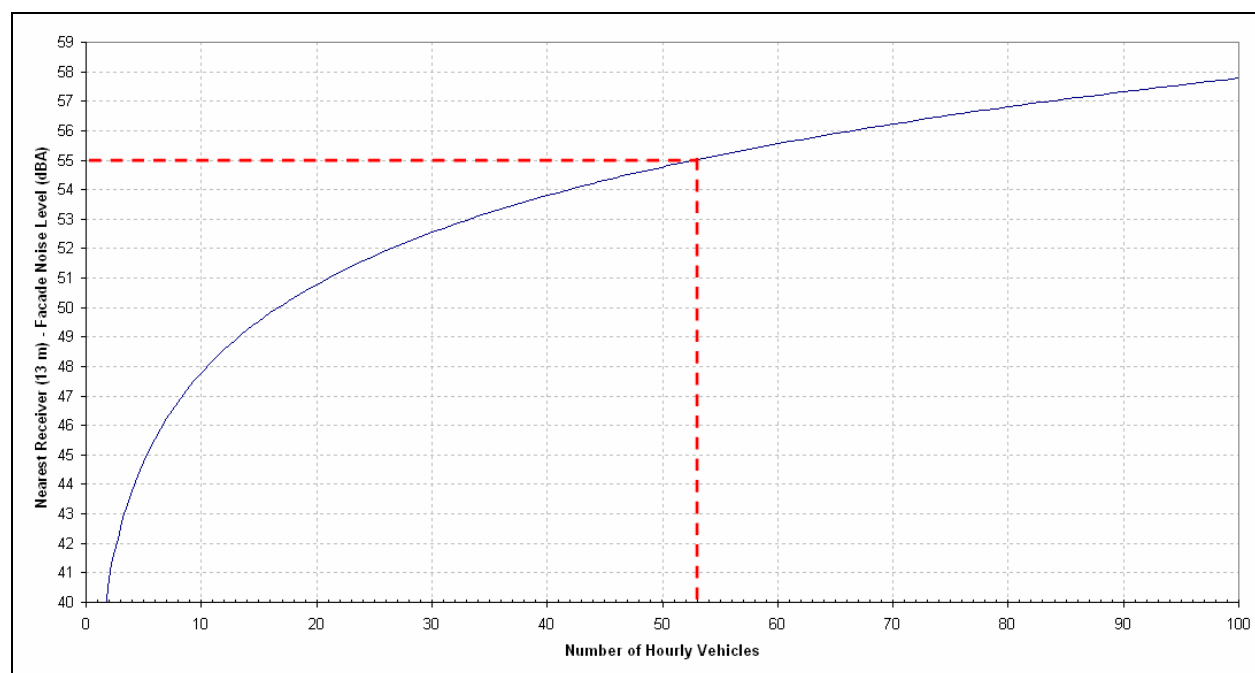
The eastern car park at Schofields Station would be accessed via Railway Terrace, which is already subject to large volumes of traffic. The increase in traffic numbers on this road as a result of vehicles accessing the car parking facilities would be minimal and as such, the noise level increase would be considered negligible.

Schofields Station - Western Car Park

Based upon the methodology and assumptions detailed in **Section 3**, **Figure 3** presents the predicted 2023 receiver noise levels due to vehicle passbys at the closest property situated on Bridge Street.

A sensitivity analysis has been performed in order to show how the noise level varies as the number of vehicles accessing the western car park via Bridge Street increases.

Figure 3 Façade Noise Levels at Nearest Residential Receiver (13 m from edge of carriageway) on Bridge Street vs Number of Hourly Vehicles



In **Figure 3**, the ECRTN 55 dBA $L_{Aeq}(1hour)$ local road criterion is shown by the red dashed line. At greater than 53 vehicle movements along Bridge Street in the worst-case 1 hour period, the criterion is exceeded.



The western car park at Schofields Station is noted as having capacity for 120 vehicles. It would not be considered unreasonable to assume that half of these spaces would be filled in the worst-case 1 hour period, resulting in, potentially, 60 hourly vehicle movements. The noise levels are therefore predicted to exceed the $L_{Aeq}(1\text{hour})$ 55 dBA criteria, however it should be noted that this exceedance is marginal (0.6 dBA).

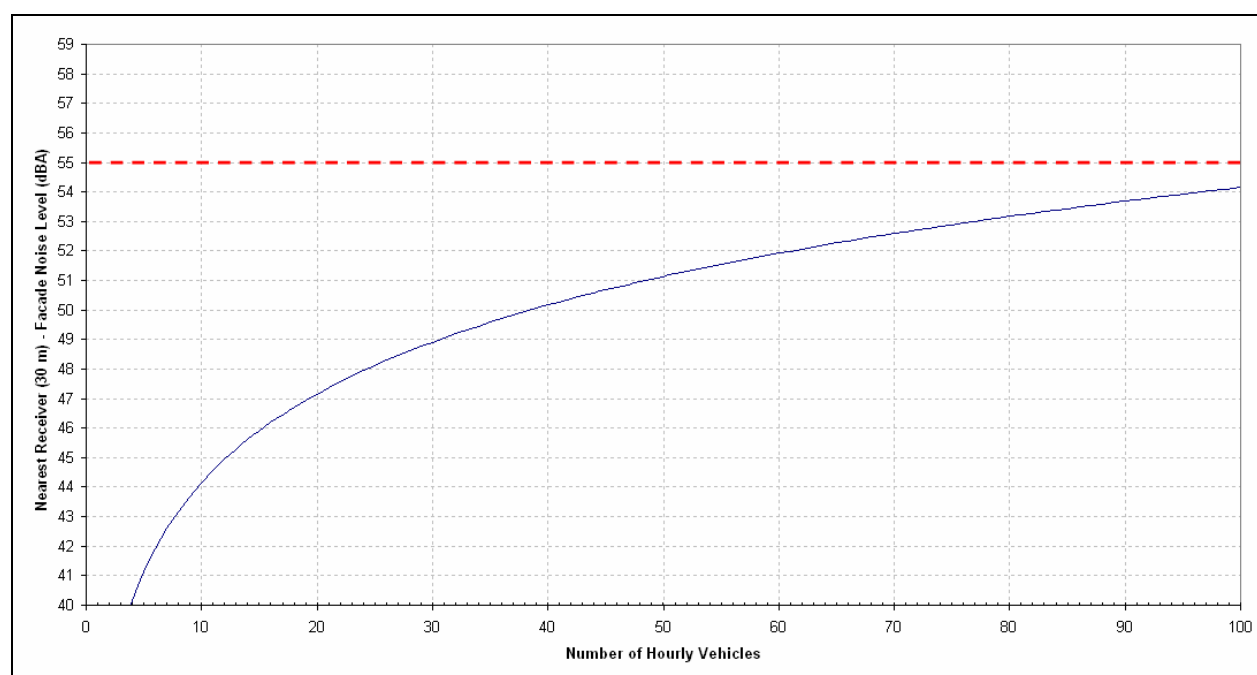
Furthermore, a change of 1 dBA or 2 dBA in the level of a sound is difficult, if not impossible, for people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. On this basis the 0.6 dBA exceedance of the ECRTN criteria is considered acceptable.

4.1.2 Vineyard Station

Based upon the methodology and assumptions detailed in **Section 3**, **Figure 4** presents the predicted 2023 receiver noise levels for the closest property on Ashford Road, in the vicinity of the car parking facilities at Vineyard Station.

Again, a sensitivity analysis has been performed for this station.

Figure 4 Façade Noise Levels at Nearest Residential Receiver (30 m from edge of carriageway) on Ashford Road vs Number of Hourly Vehicles



In **Figure 4**, the ECRTN 55 dBA $L_{Aeq}(1\text{hour})$ local roads criterion is shown by the red dashed line. The Phase 1 car park at Vineyard Station is noted as having capacity for 70 vehicles. Even in the unlikely event that every space is filled during the worst-case 1 hour period, the ECRTN criteria would not be exceeded.

4.2 Traffic Movements at the Bus Interchanges and Car Parking Facilities

There are a number of noise sources associated with vehicles operating within car parking facilities. Typically they include doors being slammed, engines being started, engine idling noise and noise from vehicle movements. The following assessment includes the contribution from these sources.



Based upon the methodology and assumptions detailed in **Section 3**, **Table 3** presents the predicted 2023 receiver noise levels for the closest properties to the car parking facilities at both the new Schofields and Vineyard Stations.

Table 3 Predicted Noise Levels Due to Vehicle Movements within Car Parking Facilities

Car Parking Facilities	Nearest Residential Receiver (m)	Traffic Movements in the Busiest 1 Hour Period (light vehicles/buses)	ECRTN Criterion LAeq(1hour) (dBA)	Predicted Daytime LAeq(1hour) (dBA)
Schofields – Western	175	115/18	55 (local road)	48
Schofields – Eastern	35	115/18	60 (collector road)	58
Vineyard	40	35/18	55 (local road)	52

The above table shows that all predicted noise levels at the closest residential properties to both the new Schofields and Vineyard Stations, due to vehicle operations at the bus interchanges and car parking facilities, meet the appropriate ECRTN criteria.

5 Conclusions

Noise predictions have been performed in accordance with the DECC's ECRTN for the operation of the proposed bus interchanges and car parking facilities at both Schofields and Vineyard Stations. The predictions include the assessment of noise from vehicle movements to and from the facilities, as well as noise from vehicles when they are within the facilities.

The assessments have shown that whilst the noise levels are predicted to marginally exceed the ECRTN criteria at Bridge Street, the 0.6 dBA exceedance is of a sufficiently small amount to be considered acceptable. It is however noted that when considering the very low existing ambient noise environments at both stations, it is likely that the operation of the proposed bus interchange and car parking facilities would be noticeable in the areas immediately surrounding both stations.

Due to there being several assumptions inherent within the calculations regarding the anticipated movements of traffic that are expected at both stations - and the fact that a marginal exceedance is predicted for the closest Bridge Street receiver - it is recommended that a period of post construction noise monitoring be undertaken upon opening of both stations. This process would be used to verify the calculations and assessments embodied within this document.

It is noted that both Schofields and Vineyard form part of the North West Growth Centre. As the North West Growth Centre develops, the anticipated volumes and distribution of traffic in the vicinity of both areas is likely to be affected. Residential receiver noise levels would also be expected to change as a result.

A bus interchange facility is not currently in operation at either Schofields Station or Vineyard Station, hence it is likely that the predicted increase in noise levels (particularly from bus operations) would be noticeable.

It is noted however that heavy vehicle road traffic is not new to this area. Other heavy vehicles such as large trucks regularly utilise nearby roads. On this basis it is unlikely that the LA_{max} noise levels for the future situation would be greatly affected by the commissioning of the proposed bus interchange.

It is recommended that consultation with the GCC and other relevant stakeholders is undertaken in order to reduce the potential noise related impacts through careful land use planning and operational measures. Land use planning measures may include options such as ensuring that commercial and industrial occupancies face onto the main operational zone of each precinct. Operational measures may include targeted selection of bus routes and the implementation of "quiet" buses into the area.