

Vineyard

The Vineyard Children's Early Learning Centre and the Tadpoles Swim School (refer Figure 3-16) are located approximately 250 and 500 metres from Vineyard Station respectively. These are the only businesses located within 500 metres of Vineyard Station.



Figure 3-16 Businesses located within the vicinity of Vineyard Station

3.3.6 Future economic environment

The development of the NWGC will result in significant changes to the current economic environment within the region. A number of areas within the growth centre would be zoned for industrial and commercial development, including the Riverstone West precinct (the former Riverstone Meatworks site). In addition, Rouse Hill is currently being developed as a regional commercial centre, and the Norwest Boulevard is a major business park. The completion these new commercial/industrial zones would result in significant economic changes within the region.

3.4 Noise and vibration

The existing noise environment adjacent to the Quakers Hill to Vineyard section of the Richmond Branch Line varies along the rail corridor with a range of commercial, industrial, suburban and rural land uses surrounding the Project area (refer Section 3.1.1). Transport-related noise (both road and rail) is the predominant noise source in the Project area, with the Richmond Branch Line located at the centre of the Quakers Hill, Schofields and Riverstone town centres, and a number of key roads (including Quakers Hill Parkway, Riverstone Parade, Railway Terrace and Garfield Road) traversing the Project area.

Residential and other sensitive noise receiver locations in areas adjacent to the existing rail corridor (refer Figure 3-17) are currently exposed to noise emissions and vibration from rail operations. The main residential noise-sensitive receivers (properties built adjacent to the rail corridor) include properties along Manorhouse Boulevard, Reycroft Avenue and Seldon Street in Quakers Hill, and along Lane Grove, Tain Place and Bridge Street in Schofields.

The closest non-residential noise-sensitive receivers are shown in Figure 3-17 and comprise:

- Quakers Hill Preschool, Quakers Hill — located 35 metres from the rail track
- Kerry Jones Child Care Centre, Quakers Hill — located 55 metres from the rail track
- Wyndham and Terra Sancta College, Quakers Hill — located 240 metres from the rail track
- Riverstone Childcare Centre — located 273 metres from the rail track
- Vineyard Early Learning Centre — located 126 metres from the rail track.

In addition, a number of roads run parallel to and/or intersect the existing rail corridor, including Railway Terrace, Riverstone Parade and Garfield Road. The noise and vibration emissions from these sources contribute to increased ambient noise levels at nearby residential and other sensitive receiver locations, particularly within the Riverstone town centre during the morning and afternoon peak hours.

Schofields Station is located within the Schofields village centre and is surrounded by residential development. The Vineyard centre, located to the north-east of Vineyard Station, is at a sufficient distance from the rail line not to be affected by existing rail noise.

A noise and vibration assessment was undertaken to identify noise-sensitive receivers in relation to the Project, determine the existing noise environment, and assess the potential noise and vibration impacts associated with the construction and operation of the Project. The study identified sensitive locations, and assessed potential noise and vibration impacts against applicable guidelines. The approach included quantifying the existing acoustic environment through noise monitoring and establishing project-specific noise trigger levels. An assessment of potential vibration during construction and operation was also undertaken to determine potential impacts on sensitive receivers and infrastructure.

This Section presents a summary of the key noise components associated with the Project. Details of the assessment methodology and outcomes of the noise modelling and analysis are provided in Section 8.4 and Technical Report 2 — *Noise and vibration assessment* (Volume 2).

3.4.1 Assessment approach

Unattended noise monitoring

Ambient (background) noise monitoring was undertaken at nine representative locations between Quakers Hill and Vineyard (refer Figure 3-17). The noise monitoring locations were all outdoors and were near proposed construction sites, proposed stations and adjacent to the existing rail corridor (refer Figure 3-17). Noise logging was undertaken for approximately 1 week using unattended noise loggers, which stored the results as statistical noise levels every 15 minutes. The primary noise parameters that were used to describe the ambient noise environment within the Project area during the noise survey included are described below:

- Rating background level (RBL) — the overall single figure background level representing quiet ambient conditions in each assessment period (daytime, evening and night-time).
- L_{Aeq} — the A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
- L_{A90} — the noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

In order to determine the RBL during the daytime, evening and night-time periods, the L_{A90} values were processed in accordance with the procedure in the *NSW Industrial Noise Policy* (EPA 2000). The existing L_{Aeq} noise levels for the daytime, evening and night-time periods were also processed in accordance with the *NSW Industrial Noise Policy* procedure. These values represent the typical energy-averaged noise levels during each assessment period.

Further detail on the unattended noise survey is provided in Technical Paper 2 (Volume 2).

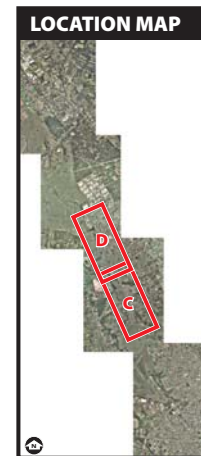


Legend:

- Non-residential sensitive receivers
- Attended noise measurement locations
- Attended vibration measurement locations
- Unattended noise monitoring locations

0 500
metres

Figure 3-17a Sensitive receivers and noise and vibration monitoring locations



- Legend:
- Non-residential sensitive receivers
 - Attended noise measurement locations
 - Attended vibration measurement locations
 - Unattended noise monitoring locations

0 500
metres

Figure 3-17b Sensitive receivers and noise and vibration monitoring locations



- Legend:**
- Non-residential sensitive receivers
 - Attended noise measurement locations
 - Unattended noise monitoring locations

Figure 3-17c Sensitive receivers and noise and vibration monitoring locations

Attended noise monitoring

Attended noise monitoring was undertaken at nine representative locations adjacent to the rail corridor between Quakers Hill and Vineyard (refer Figure 3-17) to determine noise levels from existing train operations on the Richmond Branch Line. Attended noise monitoring was undertaken for approximately 20 train pass-by events at each location (i.e. 10 trains travelling in either direction on the existing track), with the exception of one monitoring location on Bridge Street, Schofields (N8) at which 17 train pass-by events were monitored.

Three primary noise parameters were used to determine the railway noise emissions during train pass-by events, as follows:

- L_{Amax} — the 'maximum noise level' occurring during a train pass-by event.
- $L_{Aeq(24\text{ hour})}$ — the 'equivalent continuous noise level' sometimes also described as the 'energy-averaged noise level'.
- L_{AE} — the 'sound exposure level', which is used to indicate the total acoustic energy of an individual noise event (used in the calculation of $L_{Aeq(24\text{ hour})}$ values from individual noise events).

Further detail on attended noise survey is provided in Technical Paper 2 (Volume 2).

Attended vibration measuring

Attended vibration measurements were undertaken at five representative locations along the existing rail corridor to determine vibration levels from existing train operations on the Richmond Branch Line (refer Figure 3-17). Two measurements were undertaken at each monitoring location, approximately 5 metres apart, for 20 train pass-by events (i.e. 10 trains travelling in either direction on the existing track). Further detail on the vibration survey is provided in Technical Paper 2 (Volume 2).

3.4.2 Existing noise and vibration environment

The results of the noise and vibration monitoring are provided in appendices D to F of Technical Paper 2 (Volume 2); they are summarised in tables 3-18 to 3-20 and discussed below.

Unattended noise

Table 3-18 summarises the background noise levels at each monitoring location (shown in Figure 3-17). The summary results are derived from an entire week of noise logging. The data has been segregated into the relevant time of day (daytime, evening and night-time) to assist in setting noise trigger levels for the construction and operation phases of the Project.

Table 3-18 Summary of ambient noise levels at unattended noise monitoring locations

Monitoring location	Daytime noise level ¹ (dBA)		Evening noise level ¹ (dBA)		Night-time noise level ¹ (dBA)	
	RBL	L _{Aeq}	RBL	L _{Aeq}	RBL	L _{Aeq}
BG1 — Kerry Jones Child Care Centre, Quakers Hill	45	55	45	53	37	49
BG2 — Manorhouse Blvd, Quakers Hill	33	55	36	52	32	43
BG3 — Vacant field adjacent to Reycroft Ave, Quakers Hill	34	59	37	58	33	55
BG4 — Bridge St, Schofields	36	54	36	50	33	43
BG5 — Railway Tce, Schofields	44	58	40	56	38	55
BG6 — Hunter St, Riverstone	37	54	40	61	39	51
BG7 — Richards Ave, Riverstone	41	53	37	50	31	47
BG8 — Corner Otago St and Riverstone Pde	38	61	34	58	30	54
BG9 — Corner Dulwich Rd and Riverstone Pde	40	60	34	56	30	54

Note: 1: Department of Environment and Climate Change's preferred definition of daytime, evening and night-time hours. Daytime refers to standard daytime construction hours, namely 7 am to 6 pm Monday to Friday and 8 am to 1 pm on Saturday. Evening refers to the period 6 pm to 10 pm. Night-time refers to the period 10 pm to 7 am.

Attended noise

Table 3-19 summarises the attended noise measurements of train pass-by events on the existing Richmond Branch Line, expressed as L_{Amax}, L_{AE} and L_{Aeq}. The attended noise monitoring locations are shown in Figure 3-17.

Table 3-19 Summary of attended noise measurements (electric passenger trains)

Monitoring location	Number of trains	Average L _{AE} noise level (dBA)	Calculated L _{Aeq} noise level (dBA) ¹				L _{Amax} noise level	
			24-hour L _{Aeq}	15-hour day	9-hour night	1-hour peak ²	Average maximum	95 th percentile
N1 — Manorhouse Blvd, Quakers Hill	20	89	59	60	56	60	83	85
N2 — Reycroft Ave, Quakers Hill	20	89	59	60	56	60	83	86

Monitoring location	Number of trains	Average L_{AE} noise level (dBA)	Calculated L_{Aeq} noise level (dBA) ¹				L_{Amax} noise level	
			24-hour L_{Aeq}	15-hour day	9-hour night	1-hour peak ²	Average maximum	95 th percentile
N3 — Corner Pelican Rd and Railway Tce, Schofields	20	91	60	61	58	61	85	88
N4 — Bridge St, Schofields	20	77	46	47	44	47	70	72
N5 — Railway Tce, Riverstone	20	84	53	54	51	54	77	79
N6 — Railway Tce, Riverstone	20	81	50	51	48	51	73	82
N7 — Sydney St, Riverstone	20	83	52	53	50	54	76	79
N8 — Bridge St, Schofields	17	78	48	49	45	49	71	74
N9 — Clyde St, Vineyard	20	78	47	48	44	49	72	77

Notes: 1. The calculated L_{Aeq} noise levels are based on the measured L_{AE} noise levels and the number of train passby events in each assessment period (based on the current CityRail timetable dated 28 May 2006).

2. The 1-hour peak period occurs between 7am and 8am for the future scenarios. The existing timetable does not have a peak period.

Attended vibration

A summary of the measured vibration levels during a train pass-by event is provided in Table 3-20. The attended vibration monitoring locations are shown in Figure 3-17.

Table 3-20 Summary of attended vibration measurement results

Measurement location	Number of trains	Distance to track (m)	Vibration level ¹ (mm/s)	
			Average	95 th percentile
V1 — Manorhouse Blvd, Quakers Hill	20	12 (measurement 1)	0.22	0.50
		17 (measurement 2)	0.14	0.30
V2 — Manorhouse Blvd, Quakers Hill	20	11 (measurement 1)	0.20	0.36
		18 (measurement 2)	0.05	0.08
V3 — Reycroft Ave, Quakers Hill	20	14 (measurement 1)	0.09	0.11
		19 (measurement 2)	0.08	0.10
V4 — Bridge St, Schofields	17	14 (measurement 1)	0.08	0.10
		19 (measurement 2)	0.04	0.05
V5 — Bridge St, Schofields	20	10 (measurement 1)	0.09	0.13
		15 (measurement 2)	0.06	0.09

Note: 1: Vibration levels are the maximum 1-second root mean squared (RMS) vibration levels measured for individual train pass-by events.