

14.3 Traffic Air Quality

14.3.1 Section 2 of this EIA Report indicated that the layout plan is acceptable in broad terms of air quality to achieve compliance of Air Quality Objectives at the future air quality sensitive receivers within SEKD. For the purpose of this section, additional assessment was carried out to examine the operational phase air quality impacts at those development areas with changes under the land use option. Locations of the air quality assessment points for the land use option are shown in **Drawing No. 22936/EN/341**. The modeling results of the predicted worst-case nitrogen dioxide, respirable suspended particulates, and sulphur dioxide concentrations at the assessment points are tabulated in **Appendix 14A**.

14.3.2 In the proximity to the Stadium Site 1L, the East Vent Building of the CKR tunnel is identified as the major air pollution source of concern. Assessment points at the boundary of the residential and school site in Area 4A were selected to predict the impacts. Given that the maximum height of schools would not be larger than 40m, the modeling results showed that exceedance of the AQO would not be expected at the residential site and school site in Area 4A.

14.3.3 Assessment was also carried out to determine the impacts at the school sites in Area 1E, Area 2B and Area 4P/Q. The modeling results showed that the impacts would be similar to those presented in Section 2 of this EIA Report and no exceedance of AQO at sensitive receivers would be expected.

14.4 Traffic Noise

14.4.1 In terms of traffic noise impact, considerations were given to following newly created noise sensitive areas among the option:

- School Village 2B comprised of two secondary schools and two primary schools;
- A primary school and the residential site at 4A;
- School Village 4P comprised of one secondary school and one primary school;
- School Village 4Q comprised of one secondary school and one primary school; and
- A secondary school site at 1E.

14.4.2 Assessments were carried to identify the potential traffic noise impact and the mitigation measures required based on the option layout. Site layouts, assessment points and proposed mitigation measures are shown in **Drawings Nos. 22936/EN/342 to 345**. Details of the results are given in **Appendix 14B**. Noise contour plots are presented in **Drawings Nos. 22936/EN/385 to 388**. Noise mitigation measures in addition to those listed in the original layout are presented in the following sections.

14.4.3 School Village 2B

14.4.3.1 School Village 2B is partially a replacement of the original School Village 1L. Site 2B is a better location than site 1L since the noisy distributor D5 is avoided. The main noise source is still from distributor D1 for both 2B and 1L sites. Local road L1 also affects School Village 2B to a significant extent. Only two schools were found slightly affected by traffic noise.

14.4.3.2 Direct measures at roads D1 and L4 are limited at local level by the presence of junctions and site entrance. Therefore, it is necessary to have proper orientation of the schools in order to achieve a better noise environment. The required mitigation measures (see **Drawing No. 22936/EN/343**) are as follows:

Direct Measures at Roads

- 80m long vertical barrier (1m high) on central divider of L4 as shown in **Drawing No. 22936/EN/343**

Measures Within School Site

- Change of school orientation to avoid sensitive facades facing D5 and D1
- Secondary school (AP7701-7705) is set at an orientation with the classroom block facing the ESS at site 2B, the large auxiliary block facing road D1, and the small auxiliary block facing the primary schools
- Secondary school (AP7710-7714) is set at an orientation with the classroom block facing the primary schools, the large auxiliary block facing road L4, and the small auxiliary block facing the other secondary school (AP7701-7705) of the site
- Primary school (AP7706-7709) is set at an orientation with the classroom block facing site 2C, and the auxiliary block facing the 2 residential blocks of site 2B
- Primary school (AP7715-7718) is set at an orientation with the classroom block facing site 2C, and the auxiliary block facing the other primary school (AP7706-7709)
- School boundary wall (3m high) on the boundary facing L4

14.4.3.3 With the mitigation measures, all schools could meet the traffic noise standard of 65 dB(A). There are neither residual impacts nor indirect technical remedies required.

14.4.4 School Village 4P/4Q

14.4.4.1 School Village 4P is constrained by distributor D5 while School Village 4Q is mostly affected by distributor D5 and D6 together with the existing KTBP. The school sites of 4Q are limited by the T2 tunnel for which there is not much room for better school orientation.

14.4.4.2 Two layout options were assessed for school site 4P. Option 1 (**Drawing No. 22936/EN/345A**) involves the application of cantilever barriers along D5, and option 2 (**Drawing No. 22936/EN/345B**) uses full enclosure on D5. The mitigation measures for the schools in site 4P are as follows:

Option 1

Direct Measures on Roads

- 105m long cantilever barrier D5-ST1 (5.5m+2.2m) along roadside of D5 next to site 4P
- 85m long vertical barrier D5-ST2 (5m high) along the central divider of D5
- 85m long cantilever barrier D5-ST3 (5.5m+2.2m) along roadside of D5
- 65m long vertical barrier D5-ST4 (3m) along the central reserve of D5
- 110 m long cantilever barrier D6-ST1 & D6-ST3 (5.5m+2.2m) on the pedestrian path of D6
- 30m long vertical barrier (3m high) D6-ST2 along the central divider of D6

Measures Within School Site

- change in school orientation with sensitive façades away from D5
- the 4P secondary school (AP7601-7605) is set at an orientation with the classroom block facing the primary school of the site, the large auxiliary block facing D5, and the small auxiliary block facing site 4R
- the 4P primary school (AP7606-7609) is set at an orientation with the classroom block facing the secondary school of the site, and the auxiliary block facing site 4R
- the 4Q primary school (AP7706-7709) is set at an orientation with the classroom block facing road D5 and the auxiliary block facing road D6
- the 4Q secondary school (AP7701-7705) is set at an orientation with the classroom block facing the primary school, the large auxiliary block facing site 4P, and the small auxiliary block facing road D6.

Remaining Noise Impact Required Indirect Measures

- 14.4.4.3 With the above mentioned mitigation measures in place, 72% of the 4P secondary school classrooms and 100% of the 4P primary school classrooms complied with the standard. The exceedances of the secondary school are at all floors (1-5dB(A)) of the auxiliary block. This is likely a result of the noise arising from the junction of D5/local road. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested for the remaining classrooms.
- 14.4.4.4 The 4Q site is highly constrained by road traffic noise from all sides. There are exceedances found at most façade due to noise from nearby D5 & D6 and also noise from medium distance KTB. All classrooms were found exceeding the 65dB(A) criteria. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested for the all classrooms.

Option 2

Direct Mitigation Measures on Roads

- 130m long full enclosure along the D5 next to site 4P and 4Q school sites
- 110m long vertical barrier D5-ST4 (3m) along the central reserve of D5
- 110m long cantilever barrier D6-ST1 & D6-ST3 (5.5m+2.2m) on the pedestrian path of D6
- 125m long vertical barrier (3m high) D6-ST2 along the central divider of D6

Mitigation Measures at School Site

- School orientations are the same as Option 1

Remaining Noise Impact Required Indirect Measures

- 14.4.4.5 With the above mentioned mitigation measures in place, 72% of the 4P secondary school classrooms and 100% of the 4P primary school classrooms complied with the standard. The exceedances of the secondary school are at all floors (1-2dB(A)) of the auxiliary block. This is likely a result of the noise arising from the junction of D5/local road. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested.
- 14.4.4.6 With the above mentioned mitigation measures in place, almost all of secondary school and primary school classrooms of the site 4Q are not complied with the standard. The exceedances are 1-7dB(A) for the secondary school and 2-5dB(A) for the primary school. Although the full enclosure along road D5 did not help in increasing the compliance rate of the schools, it had reduced the noise levels of the classroom block of the primary school next to road D5. In fact, the classroom façade facing road D5 complies with the 65dB(A) standard with the full enclosure mitigation. The non-compliance of the classroom block is at the corridor side that is affected by the existing Kwun Tong Bypass. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested for all classrooms.

Preferred Mitigation Option for 4P/4Q

- 14.4.4.7 Option 2 with full enclosure is preferred as this would reduce the impact to major classroom.

14.4.5 School at 1E (refer to Drawing No. 22936/EN/342)

- 14.4.5.1 The proposed school site at 1E is also likely to have similar problems as 4Q. The site is constrained by the junction between roads D3 and D1. The proposed additional school site is at the corner of site 1E next to the D1/D3 junction. It is suggested to have the following measures:

Direct Measures on Road

- A 70m long vertical barrier 1ED3-1 (3m) on the central divider of D3 as shown in **Drawing No. 22936/EN/342**.

Measures Within School Site

- The school is set at an orientation with the classroom block facing D1, the small auxiliary block facing residential blocks of site 1E, and the large auxiliary block (not sensitive) facing D3.
- 3m high boundary wall along the boundary road L5 and its roundabout as shown in **Drawing No. 22936/EN/342**.

Remaining Noise Impact Required Indirect Measures

14.4.5.2 With the above mentioned mitigation measures in place, 56% of the classrooms of the school complied with the standard. The exceedance are at 3/F-6/F (2-4dB(A)) of the classroom block. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested for affected classrooms.

14.4.6 Site 4A (refer to Drawing No. 22936/EN/344)

14.4.6.1 The mitigation measures in addition to the mitigated scenario of the original layout plan recommended for site 4A are as follows:

Measures Within School Site

- The school is set at an orientation with the classroom block facing the residential blocks of site 4A, and the auxiliary block facing the CKR
- 3m school boundary wall on the boundary facing the CKR and the roundabout of L14

Direct Measures on Road

- 85m long vertical barrier CKR-3 (5m high) near the slip road to CKR
- 70m long vertical barrier CKR-4 (3m high) along the slip road to CKR
- 165m long vertical barrier CKR-5 (3m high) along Wb CKR
- 130m long cantilever barrier CKR-6 (5.5m+2.2m) at central divider of CKR

Remaining Noise Impact Required Indirect Measures

14.4.6.2 With the above mentioned mitigation measures in place, 76% of the classrooms of the school complies with the standard. The exceedances are only found at top floors (1dB) of the classroom block (corridor side), and top floor (5dB) of the auxiliary block. Indirect measures in form of acoustic insulation and air conditioning for affected classrooms are suggested.

14.4.6.3 With the above mitigation measure, only the CKR facing façade of the residential block immediately behind the school exceeded the standard of 70dB(A) between 20/F to 37/F (1dB(A) exceedance). This would require measures by proper building design or orientation e.g. avoiding openable windows with large angle of view for these facades. A full compliance could be achieved.

Table 14.1 Summary of Traffic Noise Assessment Results for School Sites of the Proposed Land Use Option

School Site	Compliance Rate for Sensitive Classrooms with EIAO-TM Standard				Summary of Recommended Mitigation Measures Within School Site	Drawing Reference (Section 14)	Additional Measures Outside School Site to be Part of the Road Projects
	Without Measures	With direct measures	With direct and indirect measures	Classroom required indirect measures			
1E SS	28%	56%	100%	Classroom block classroom side 3/F-6/F (2-4dB)	<ul style="list-style-type: none"> The school building is set at an orientation with the classroom block facing road D1, the small auxiliary block facing residential blocks of 1E, and the large auxiliary block facing road D3 Indirect measures in the form of acoustic insulation and air conditioning for affected classrooms 	22936/TP/104 22936/EN/342	3m high vertical barrier (1ED3-1) at central divider of D3
2B SS	28%	100%	N/A	NIL	<ul style="list-style-type: none"> The school building is set in an orientation with classroom block facing the primary school at the direction of site 2C, the large auxiliary block facing road L4, and the small auxiliary block facing the other secondary school at site 2B. 3m school boundary wall along the boundary facing road L4 	22936/TP/107 22936/EN/343	1m vertical barrier at central divider of L4
2B SS	100%	100%	N/A	NIL	<ul style="list-style-type: none"> The school building is set in an orientation with classroom block facing the ESS at site 2B, the large auxiliary block facing road D1, and the small auxiliary block facing site 2C. 3m school boundary wall along the boundary facing road L4 		
2B PS	100%	100%	N/A	NIL	<ul style="list-style-type: none"> The school is set at an orientation with the classroom block facing site 2C, and the auxiliary block facing the other primary school at the direction of site 1L school village 3m school boundary wall along the boundary facing road L4 		
2B PS	52%	100%	N/A	NIL	<ul style="list-style-type: none"> The school building is set at an orientation with the classroom block facing site 2C, and the auxiliary block facing site 1L school village. 3m school boundary wall along the boundary facing road L4 		
4A	0%	76%	100%	Classroom block corridor side top floor (1dB) Auxiliary block top floor (5dB)	<ul style="list-style-type: none"> The school building is set at an orientation with the classroom block facing the residential blocks of site 4A, the auxiliary block facing direction of site 2D 3m school boundary wall on the boundary facing CKR Indirect measures in the form of acoustic insulation and air conditioning for affected classrooms 	22936/TP/111 22936/EN/344	5m vertical barrier CKR-3 (two segments) 3m vertical barrier at CKR-4 3m vertical barrier at CKR-5 5.5m + 2.2m cantilever barrier at CKR 6
4P PS	72%	100%	N/A	NIL	<ul style="list-style-type: none"> The school is set at an orientation with the classroom block facing the secondary school at site 4P, and the auxiliary block facing site 4R. 	22936/TP/115 & 116 22936/EN/345	Full enclosure at D5
4P SS	12%	72%	100%	Auxiliary block all floors (1-2dB)	<ul style="list-style-type: none"> The school is set at an orientation with the classroom block facing the primary school at site 4P, the large auxiliary block facing road D5, and the small auxiliary block facing site 4R. Indirect measures in the form of acoustic insulation and air conditioning for affected classrooms 	22936/TP/115 & 116 22936/EN/345	

School Site	Compliance Rate for Sensitive Classrooms with EIAO-TM Standard				Summary of Recommended Mitigation Measures Within School Site	Drawing Reference (Section 14)	Additional Measures Outside School Site to be Part of the Road Projects
	Without Measures	With direct measures	With direct and indirect measures	Classroom required indirect measures			
4Q PS	0%	0%	100%	Classroom block corridor side (2-4dB) Auxiliary block 3/F (3dB)	<ul style="list-style-type: none"> The school is set at an orientation with the classroom block facing road D5, and the auxiliary block facing road D5. Indirect measures in the form of acoustic insulation and air conditioning for affected classrooms 	22936/TP/115 & 116 22936/EN/345	Full enclosure at D5 5.5m + 2.2m cantilever barrier D6-ST1 and D6-ST3 3m vertical barrier at central reserve D6-ST2
4Q SS	0%	28%	100%	Classroom block 3/F-6/F (1-4dB) Auxiliary block all floors (1-7dB)	<ul style="list-style-type: none"> The school is set at an orientation with the classroom block facing the primary secondary at site 4Q, the large auxiliary block facing northwest, and the small auxiliary block facing site 5K. Indirect measures in the form of acoustic insulation and air conditioning for affected classrooms 	22936/TP/115 & 116 22936/EN/345	3m vertical barrier D5-ST4 at central reserve on road D5