- The project proponent should also note that the separation distance of 25m under HKPSG for light rail development will not be provided by the development sites since the form of the environmental friendly feeder system was not firmed up in this Study; and
- There would be operational constraints particularly during the late hour's operation at night subject to further demonstration by the separate EIA study.

3.9.3.5 Noise impacts from maintenance could be alleviated assuming the depot at Site 1K for the shuttle system would be located underground or decked to enclose noisy activities as measures in the detailed design stage.

3.10 Impact from Fixed Noise Sources

3.10.0.1 Fixed noise sources in the SEKD area have been allocated for specific sites within SEKD and each of the fixed plant facility and its associated potential noise impact is discussed in the following sections below.

3.10.1 *Public Transport Interchange (PTI)*

3.10.1.1 The proposed PTI would be situated underneath the podium at Site 1D1, a public housing site north of the stadium and bordering the KTA Station, and another directly adjacent to the western boundary of the SEKD area where the urban renewal strategy recommends a commercial site with pedestrian links to the TKW Station. The other two PTIs would be located at Sites 3T1 and 6A9. These PTIs are suggested to have complete podium decking to reduce noise emission. The podium would provide a screening effect and thus the noise impact due to the PTI would be minimal and acceptable.

3.10.1.2 In addition, the ingress and egress (I/E) of PTIs are arranged with frontage to open space to mitigate their impact on NSRs. For Site 1D1, the I/E is revised to Road D2 which is at the southwestern boundary of the PTI in view of the above. While the I/E at Sites 3T1 and 6A9 should be located at northeastern and southeastern boundary of the PTI in order to reduce the noise impacts on the nearby NSRs. Further considerations should be taken to alleviate the potential impact as follows:

- Locate the facilities so that there is no line-of-sight of noise sources at the NSRs;
- Consider adopting a complete podium decking over noisy facilities;
- Exhaust of the ventilation system should be located away from facing any NSRs;
- Installation of sound absorbent material on the roof and the walls of PTI to avoid reverberation noise within the PTI, adequate noise reduction treatment should be applied; and
- During the detailed design stage, ancillary structure within the PTI namely escalator, lift and stairways should be carefully located to act as natural barrier.

3.10.2 *Sewage Pumping Stations*

3.10.2.1 A number of sites have been reserved for sewage pumping stations (SPS). **Table 3.21** shows the proposed locations of the SPSs and the required sound power level to achieve noise compliance.

Table 3.21 Noise from Sewage Pumping Stations (SPSs)

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
1E4	1E1 - Res	B	6m	81	71
	1E9 - Sch	B	28m	94	84
1M8	1P2 - Sch	B	170m	110	100

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
2A4	2A1 – Res	B	44m	98	88
	2A1 - Sch	B	28m	94	84
2G3	2F1 - Res	B	66m	101	91
3N2	3N1 - Res	B	13m	87	77
	3M2 - Sch	B	82m	103	93
3K4	3M2 - Sch	B	100m	105	95
	3K3 - Res	B	78m	103	93
4E4	4E3 - Sch	B	6m	81	71
	4E1 - Res	B	54m	100	90
5L4	5L1 - Hospital	B	48m	99	89
6A2	5G1 - Res	B	140m	108	98

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.

3.10.2.2 The main sources of noise are from pumps and ventilation system. With reference to Drainage Services Department's standard design on latest SPS, all pumps will be located underground and will be enclosed within a structure or building. The design standard also requires that the design of SPS should avoid creating any environmental nuisances (which include noise nuisance) to the surrounding sensitive receivers. Typically, pumping stations will be fully enclosed with installation of ventilation system. Measures to mitigate noise impacts are suggested as follows:

- The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs;
- Louver or other acoustic reduction system could also be applied to the exhaust exit of the building; and
- Pumps and mechanical ventilation are either underground or enclosed within a structure or building.

3.10.2.3 Given the fully enclosed design with louver at the exhaust system and compliance with the sound power level suggested in **Table 3.17**, operational noise from SPSs is not expect to cause any adverse impact to surrounding NSRs.

3.10.3 *Upgrade of Tai Wan Salt Water Pumping Station*

3.10.3.1 The proposed upgrade of existing Tai Wan Salt Water Pumping Station aims to cater for the 32.7 MLD flushing demand due to SEKD. The pump size is expected to increase from 500kW to 600kW. Noise levels generated from pumps will be increased but the level of increase would very much depend on the selection of equipment during the detailed design stage. Considering that the noise level of the motors will conform to WSD Standard Specification E-55-01. The maximum sound pressure level of the pump and motor measured at 1 m from the source shall not exceed 94-dB (A). This would imply a sound power level of around 102 dB(A). It is noted that the noise generated by an electric pump at source would have a sound power level in the region of 88 dB(A).

3.10.3.2 The existing Tai Wan Salt Water Pumping Station is located at Tak Hong Street near Whampoa Garden. The nearest noise sensitive receivers are Cotton Tree Mansions located in the opposite side of the street. The area could be assigned as Area Sensitive Rating (ASR) "B" under the *Technical Memorandum for the Assessment of Noise From Places Other than Domestic Premises, Public Places or Construction Sites*. The EIAO-TM would require a further reduction of 5 dB(A) from the Acceptable Noise Levels (ANLs). The noise limits for daytime/evening (0700-2300) and nighttime (2300-0700) are therefore 60 dB(A) and 50 dB(A) respectively.

3.10.3.3 The existing Tai Wan Salt Water Pumping Station has been incorporated an enclosed design. The motor hall is enclosed in the concrete building and also being shield by the electrical rooms and offices. The upgrading only requires replacing the pumps and slight relocation of equipment.

3.10.3.4 In order to protect noise sensitive receivers, the following mitigation measures are recommended:

- use of quiet pumps and motors as far as possible;
- enclose all plant and equipment in the pump hall/machine room;
- locate all openings, e.g. ventilation intake/exhaust and door, away from sensitive receivers;
- use acoustic lourves as standard ventilation lourves at pump hall/machine room; and
- keep pump hall/machine room door closed at all time.

3.10.3.5 The above should aim at achieving the maximum sound power level for the pumping station less than or equal to 111 dB(A) at source together with a noise reduction of 29 dB(A) by mitigation measures, or equivalent. Details of prediction are given in **Appendix 3C**.

3.10.4 *Electric Substation*

3.10.4.1 A few electric substations (ESS) would be located over the area of SEKD. **Table 3.22** shows the proposed locations of the ESSs and the required sound power level to achieve noise compliance.

Table 3.22 Noise from Electric Substations (ESSs)

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
1G1	1E11 – Sch	B	86m	104	94
	1E1 – Res	B	122m	107	97
1M4***	1P2 – Sch	B	112m	107	97
1N6	1P2 – Sch	B	70m	102	92
2B5	2B4 – Sch	B	4m	77	67
	2B1 – Res	B	44m	98	88
3X4	3X1 – Sch	B	6m	81	71
	3V1 – Res	B	74m	102	92
3Y4	Oblate Father's Primary School	B	5m	79	69
	Holy Carpenter Primary School	B	22m	92	82
4B4	4B1 – Res	B	130m	107	97
	4E2 – Sch	B	118m	106	96

Note:

ASRs: Area Sensitivity Rating as in the TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.

* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.

** criteria as stipulated in TM. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency. It is noted that there will be a tonality correction for ESS and RSS subject to the acceptance by the Authority.

*** It is a 400kv electric substation and classified as DP.

3.10.4.2 Main sources of fixed noise of the ESS are from the transformer and ventilation system. Adverse noise impact would not be expected on the nearby NSRs provided that the maximum allowable sound power levels are strictly adhered to in the detailed design.

3.10.4.3 Under normal practice, the ESS would be fully enclosed. All the mechanical parts should be enclosed within the building premise and noisy equipment should be noise-insulated in

enclosed plant rooms, especially for those situated adjacent to NSRs (Site 2B4, 3X1 and the existing Oblate Father's Primary School). Since other ESSs (1G1, 1M4 and 4B4) are far away from NSRs, noise impact due to the ESS with full enclosure would be minimal and acceptable. In case ventilation system or chiller would be required, this fixed noise can be readily reduced by locating it as far from the NSRs as possible and by orientating the noise source away from the NSRs.

3.10.5 *Rectifier Substation*

3.10.5.1 Two rectifier substations (RSS) would be located over the area of SEKD shared similar properties with ESS. **Table 3.23** shows the proposed locations of the RSSs and the required sound power level to achieve noise compliance.

Table 3.23 Noise from Electric Substations (RSSs)

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
3K1	3K3 - Res	B	30m	95	85
	6A9 - Hotel	B	86m	104	94
6A4	5C1 - Res	B	337m	116	106

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency. It is noted that there will be a tonality correction for ESS and RSS subject to the acceptance by the Authority.

3.10.5.2 Main sources of fixed noise of the RSS are from the transformer and ventilation system. Adverse noise impact would not be expected on the nearby NSRs provided that the maximum allowable sound power levels are strictly adhered to in the detailed design.

3.10.5.3 Under normal practice, the RSS would be fully enclosed. All the mechanical parts should be enclosed within the building premise and noisy equipment should be noise-insulated in enclosed plant rooms, especially for those situated adjacent to NSRs (Site 3K3). Since the other RSSs in Site 6A4 are far away from NSRs, noise impact due to the RSS with full enclosure would be minimal and acceptable. In case ventilation system or chiller would be required, this fixed noise can be readily reduced by locating it as far from the NSRs as possible and by orientating the noise source away from the NSRs.

3.10.6 *Gas Pigging/ Uptake Station*

3.10.6.1 The proposed gas pigging/offtake station (GPS) would be located at 3Y1. **Table 3.24** shows the locations of likely affected NSR and the required sound power level to achieve noise compliance.

Table 3.24 Noise from Gas Pigging/Uptake Station (GPSs)

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) at source in order to meet the criteria**	
				Daytime	Nighttime
3Y1	Holy Carpenter Primary School	B	12m	87	77
	3X3 - Sch	B	88m	104	94
	3N1 - Res	B	132m	107	97

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.

** criteria as stipulated in TM. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.6.2 The potential source of fixed noise from the GPS is likely from the compressor and its associated system. With the future sewage pumping station located between the GPS and amenity area and Site 3N, shielding effect could be provided to protect the residential area at Site 3N. Adverse noise impacts on nearby NSRs would not be expected provided that the maximum allowable sound power levels are strictly adhered to in the detailed design. Barrier in the form of boundary wall could be applied at the northern site boundary to protect the nearby NSRs in Site 3N.

3.10.7 *PTW Expansion Area*

3.10.7.1 The potential impact would depend on the scale of expansion and various technical details at the detail design stage. **Table 3.25** shows the proposed location of the PTW Expansion Area and the predicted sound power level at the likely affected NSRs.

Table 3.25 Noise from PTW Expansion Area

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
3K6	3M2 - Sch	B	90m	104	94
	3M1 - Res	B	92m	104	94

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.7.2 Adverse noise impacts on nearby NSRs would not be expected provided that the maximum allowable sound power levels are strictly adhered to in the detailed design.

3.10.8 *GLA for DSD and KTPTW Extension*

3.10.8.1 Potential noise impact from GLA for DSD and KTPTW Extension would affect the nearest NSR at Laguna City, which is about 74 m away from the site boundary. The predicted sound power level at source in order to meet the noise criteria during daytime and nighttime is 102 dB (A) and 92 dB(A) respectively. The potential impact would depend on the scale of expansion and various technical details at the detail design stage. Adverse noise impacts on nearby NSRs would not be expected provided that the maximum allowable sound power levels are strictly adhered to in the detailed design.

3.10.9 *Ventilation Shafts for Underground Roads*

3.10.9.1 Ventilation shaft is normally required at each end of the underground tunnels. Potential noise sources are from the fan systems. **Table 3.26** shows the proposed locations of the ventilation shafts and the sound power levels required to achieve noise compliance.

Table 3.26 Noise from Ventilation Shafts

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
1L5	1C1 - Res	B	202m	111	101
3X5	3X1 – Sch	B	58m	100	90
	3V1 – Res	B	97m	105	95
3Z2	3B1 - Res	B	104m	105	95
3Z3	4A1 – Res	B	100m	105	95

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) required at source in order to meet the criteria**	
				Daytime	Nighttime
4K3	4H1 – Res	B	30m	95	85
4K4	4K1 – Res	B	26m	93	83
6B2	5L1 – Hospital	B	366m	116	106

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.9.2 Buffer distances have been allowed in the current layout plan between the vent shafts and the nearby sensitive uses. These shafts would be located at 26 m to 366 m from NSRs. Noise from the portals and vents should be made in reference to *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites*. Acceptable Noise Levels (ANLs) are defined within this memorandum and that the design process should aim for 5dB(A) less than the ANLs. Noise emanating from the exhaust system of ventilation shafts could be reduced by incorporating with silencer and acoustic louver. Noise levels at NSRs should be within acceptable levels with suitable mitigation measures incorporated.

3.10.10 *EMSD HQ*

3.10.10.1 The proposed EMSD HQ is located at Site 1Q1. The nearest NSR is Sites 1C1 and 1C3 is approximately 150 m and 100 m away from the site boundary respectively. The predicted sound power level at source in order to meet the noise criteria during daytime and nighttime at Site 1C1 is 109 dB(A) and 99 dB(A) respectively, whereas at Site 1C3 the predicted noise level is 105 dB(A) and 95 dB(A).

3.10.10.2 It is expected that the facility is fully enclosed and adverse noise impacts on nearby NSRs would not be expected provided that the maximum allowable sound power levels are strictly adhered to in the detailed design.

3.10.11 *Highways Department Depot and DSD Maintenance Depot*

3.10.11.1 In Site 1M1, a Highways Department (HyD) depot and a DSD maintenance depot have been reserved for storage of vehicles and equipment for maintenance of the trunk and storm water drainage systems in the SEKD area. The proposed location of the HyD and DSD maintenance depot and the likely affected NSRs are shown in **Table 3.27**.

Table 3.27 Noise from HyD and DSD Maintenance Depot

Location	Nearby NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR
1M1	1C1 - Res	B	104m
	1P2 - Sch	B	210m

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.11.2 Noise generating from the storage activities would be minimal. Operational noise during entrance or equipment movement should not affect other sites. The location is far away from NSRs (104m to Site 1C1).

3.10.12 *Fire Station and Ambulance Depot*

3.10.12.1 The proposed locations of the fire station and ambulance depot and the nearby NSRs are shown in **Table 3.28**.

Table 3.28 Noise from Fire Station and Ambulance Depot

Location	Nearby NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR
2A2	2A1 – Res	B	30m
	2A1 – Sch	B	66m
4Q4	5K1 – Res	B	32m

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.12.2 Noise sources associated with these stations would be related to the emergency response of the stations and would include the station loudspeakers, siren and the vehicle sirens. Noise from fire stations may sometimes be disturbing particularly during emergency duties. Yet such occurrences are of short duration and infrequent, and could not be avoided when emergencies occur. The sirens are intended to warn surrounding emergency, so that priority may be given to them. Emergency vehicles could also be assisted in their response by installation of "hurry call" or other signalisations at intersections along the route.

3.10.12.3 Potential noise impacts from the proposed fire station in Area 2A2 would be reduced by the recommended noise mitigation measures for Prince Edward Road within Area 2A1 namely elevated podium and single-aspect building design. Considering the already high traffic noise level along PER, noise from fire station at Area 2A2 could also be masked to a certain extent by the background noise. The siting would not worsen the development constraints of site 2A.

3.10.12.4 Other forms of mitigation to reduce the annoyance level of the sirens should be adopted including special systems like green-wave system or hurry call system. It is noted that the location of the fire station is largely based on the access and coverage of fire fighting function.

3.10.13 *Stadium*

3.10.13.1 A site of some 15 ha has been reserved for the development of a stadium and a warm up track. The stadium is to be located at Site 1L1 along the eastern edge of the Lion Rock View Corridor. Considerations have been given to the siting of stadium in the planning stage including protection of view corridor, availability of railway transport nearby, harmony with the principal urban design concepts and provision of buffer distance to surrounding sensitive receivers. In terms of noise aspect, the proposed location is sited as far as possible from residences.

3.10.13.2 **Table 3.29** shows the proposed location of the stadium and the predicted sound power level at the likely affected NSRs.

Table 3.29 Noise from Stadium

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Predicted Sound Power Level (SWL) (dB(A)) at source in order to meet the criteria**	
				Daytime	Nighttime
1L1	1C1 – Res	B	220m	112	102
	1D1 - Res	B	210m	111	101
	1L3 – Sch	B	76m	103	93
	2C1 – Res	B	140m	108	98

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.13.3 Noise generated from stadium can be divided into noise from crowd and noise from the use of loud speakers. Noise from concerts or similar activities with the intensive use of amplifiers and loud speakers would be the major concern.

3.10.13.4 The nearest sensitive development is the school village at Site 1L3, which is about 80 metres northwest of the Stadium. However, the height of the proposed Stadium would be approximately 50 m or higher and is not likely to affect the nearby school villages, which is likely to have a height of approximately 35 m. Also, the schools are likely in the future to have air-conditioning, which would allow further noise reduction. Noisy activities during non-school hours (e.g. at night or on weekends) would also not affect the school villages.

3.10.13.5 It is noted that the nearest residents would be Site 2C1 which are about 140 m away from the stadium boundary. The site has an Area Sensitive Rating of B and has an Acceptable Noise Level (BNL) of 60B (65dB – 5dB).

3.10.13.6 The noise criteria for the stadium when there is an entertainment event between 0700-2300 hours is 5 dB(A) above background noise level. It should be inaudible between 2300-0700 hours and assumed that the stadium would have no other events/activities or cease operation after 2300 hour. This would be a constraint for a stadium at this location.

3.10.13.7 Based on EPD's information, noise measurements from concerts in Hong Kong Stadium previously showed that the typical noise levels in $L_{eq(15min)}$ of about 170 m away from Hong Kong Stadium was 73-75 dB(A). It is likely that noise from the proposed stadium would affect nearby NSRs if mitigation measures such as a retractable roof or enclosure were not adopted.

3.10.13.8 As detailed plan or design for the stadium is not available at this stage, it is not able to quantitatively assess the noise impact which depends on detailed building and structural design. A special acoustic modeling is typically required.

3.10.13.9 A qualitative review was therefore carried out with reference to the experience from stadia around world. It is recommended that the conceptual design should take into account the following mitigation measures:

1. Retractable Roof and Fixed Roof

The latest design of a stadium elsewhere often adopts a retractable roof to allow for all weather activities. Examples include the planned Wembley National Stadium in UK, the planned Kingdome in US Washington State, the Fukuoka Dome and the Yuniba Stadium in Japan.

There are typically two kinds of materials used for the retractable roof: metal and membrane respectively. The stadium design general consists of a fixed roof portion and a retractable roof portion. The fixed roof is applied to the top of the spectator areas and is typically made of solid supporting material like metal or concrete which can provide high level of noise screening for these noisy areas. The retractable roof is used to cover the open sport field. Both metal type and membrane type have been used respectively for the two stadia in Japan. Data from Yuniba Stadium with membrane type retractable roof were found to achieve about 25dB reduction. For metal type retractable roof, it is expected to have higher noise reduction performance.

In case of more stringent noise criteria, it is also noted the fixed roof could be extended to the centre to achieve higher noise screening effects. Promising results could be achieved by fixed

roof if the stadium could be build to a high vertical level with reference to similar design in point no.3 below.

2. Acoustic engineering for the sound system
The design and installation of a good distributed sound system can help much in noise reduction at sources. The speakers could be distributed throughout the spectator area rather than being clustered at one end of the stadium or pointing to the outside. This would allow the speaker levels to be tuned down by as much as 20dB because they are placed closer to the audience. The type of system should also direct the sightline of the speakers away from the NSRs. These two factors, lower speaker levels and a redirected speaker sightline, will results in significantly lower noise level at NSRs. The system can be further evaluated as design development progresses so that acceptable noise levels can be achieved at NSRs.

3. Structural and building design
The stadium bowl could be depressed into the ground, so that the seats could be placed below grade. The noise screening effect could be provided by higher building structure. For example, the New Wembley Stadium has incorporated a commercial and hotel accommodation complex which can sustain a higher structure of 89m on the eastern and western side to a maximum of 102m in the centre.

The stadium could have a fixed roof design as a last resort for which all noisy activities are enclosed within the stadium.

3.10.13.10 Field measurement has also been conducted at the Fukuoka Dome, Japan, in order to assess the noise performance associated with a stadium with retractable roof design. **Table 3.30** compares the Fukuoka Dome and the proposed stadium site. Details of the noise assessment of the stadium are given in **Appendix 3D**.

Table 3.30 Comparison of Fukuoka Dome and the Proposed Stadium Site

	Fukuoka	SEKD	
	M1	Area 2C	Area 1D
Area of Stadium	4.41ha	Approx. 6ha	
Number of Seats	52,000	Approx. 50,000	
Distance to the centre of stadium (horizontal distance)	263m	~231m	~357m
Distance to the boundary of the stadium (horizontal distance)	144m	~98m	~210m

3.10.13.11 The monitoring results showed that the noise levels measured outside the Dome were similar to the background noise levels and there was no significant increase during the concert. This is further supported by the observation that noise from the concert inside the Dome was barely noticeable at both monitoring locations and around the Dome at entrance level.

3.10.13.12 Technical information supplied by Mitsubishi/Takenaka indicated that a fairly high transmission loss could be achieved by the retractable roof. The noise from similar Michael Jackson Concert was also found not affecting the surrounding receivers.

3.10.13.13 Based on the measured background noise levels, the noise levels recorded during the concert period were far less than [background + 5dB(A)], which would meet EPD's criteria on entertainment noise for period 07:00 - 23:00. Considering the similar design could be applicable to the proposed stadium in SEKD, insurmountable impact would not be expected at this planning and feasibility study stage, while the later detailed design could explore the details of noise reduction measures.

3.10.13.14 For the level of noise reduction required, it is expected that noise levels at receivers could be mitigated to acceptable levels with adoption of suggested measures. Moreover, a competitive stadium design process could introduce, through competition, suitable and sufficient noise attenuation features.

3.10.13.15 If retractable roof is used for the stadium, noise from the necessary ventilation systems should be addressed. However, there are locations available for siting of these ventilation systems such as the relatively not sensitive area in the east or southeast. Measure in the form of acoustical shielding could be provided to mitigate the noise generated.

3.10.13.16 Due to the more stringent night-time noise limits, there would be likely that the operational time for the stadium is limited to cease before 11:00pm.

3.10.13.17 A separate EIA study for the proposed stadium will be carried out at the detailed design stage of the stadium. The EIA study should take all currently proposed development sites as constraints and provides necessary mitigation measures in order to achieve EIAO requirements. Unless further assessments available to show environmental acceptance, the stadium is assumed to have a retractable roof.

3.10.13.18 It should be noted that the housing developments in Sites 1C and 1D would be completed earlier than the stadium according to the current programme, the stadium project proponent should take the housing developments as a constraint and provision of measures at those sites to mitigating noise impacts from the stadium would not be possible.

3.10.13.19 It is also noted that a stadium with a fixed roof could always be regarded as a fall back option. The first fixed roof stadium in the world was built in Houston, Texas in the USA in the mid-1960's and has been in operation for over 30 years. It is therefore not considered stadium noise to be an insurmountable issue and the feasibility of the residential high-rise in the vicinity of the proposed stadium should not be in doubt.

3.10.14 *Warm-up Track*

3.10.14.1 A warm-up track will be located south to the stadium. **Table 3.31** shows the proposed locations and nearby NSRs.

Table 3.31 Noise from Warm-up Track

Location	Nearby NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR
2A2	2A1 – Res	B	30m
	2A1 – Sch	B	66m
4Q4	5K1 – Res	B	32m

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.

3.10.14.2 The current planning intention for the warm-up track does not cater for any noise generating activities like concerts. The number of seats provided would be less than 10,000 and would not be a designated project under the EIAO. Night-time operation after 11:00pm should be restricted from the noise point of view. Depending on the scale of the spectator area, noise from warm-up track may include both the crowd noise and amplified announcements using loud speakers. The loud speaker announcement may tend to have higher noise impacts because it occurs more frequently than loud crowd noise and is considered more annoying than the non-intelligible character of crowd noise. Precautionary measures such as proper sound distributed system and proper loud speaker directivity are suggested in order to prevent the possible impacts.

3.10.14.3 Summary of constraints and requirements:

- Noisy entertainment activities like concerts should be restricted unless appropriate noise assessment demonstrated acceptability;

- Nighttime operation after 11:00pm should be restricted unless appropriate noise assessment demonstrated acceptability; and
- Sound distribution system should have proper acoustical measures.

3.10.15 *Swimming Pool Complex*

3.10.15.1 Swimming pool complex would be located at Site 4P1. The distance from swimming pool complex to the nearest NSRs at a school site at Site 4N4 and a residential area at Site 4R1 is approximately 45 m and 26 m away from the site boundary respectively.

3.10.15.2 The number of seats provided would be less than 10,000 and would not be a designated project under the EIAO. Depending on the scale of the spectator area, noise from swimming pool complex may include both from the crowd and the amplified announcements using loud speakers. The loud speaker announcement may tend to have higher noise impacts because it occurs more frequently than loud crowd noise and is considered more annoying than the non-intelligible character of crowd noise. Precautionary measures such as proper sound distributed system and proper loud speaker directivity are suggested to prevent the possible impacts. Night-time operation after 11:00pm should be restricted from the noise point of view.

3.10.15.3 Summary of constraints and requirements:

- Noisy entertainment activities like concerts should be restricted unless appropriate noise assessment demonstrated acceptability;
- Nighttime operation after 11:00pm should be restricted unless appropriate noise assessment demonstrated acceptability; and
- Sound distribution system should have proper acoustical measures.

3.10.16 *Quarantine and Dog Kennel*

3.10.16.1 A site for AFCD Quarantine and Dog Kennel has been reserved in Site 1M7. The nearest NSR is the proposed school at Site 1P2 with an approximate distance of 84 m away from the site boundary. Noise from the quarantine and dog kennel may vary considerably at different times and for different sites. Nuisance is mainly come from the noise from animals. Yet, quantitative prediction of impact may not be reliable due to the high variability. Preventive measures are therefore suggested:

- Entrance should be avoided facing nearby NSRs;
- Area keeping animals should be a sheltered place screened by the building structure itself and avoid any openings directly facing NSRs; and
- A solid boundary wall should be provided.

3.10.17 *Centralised Cooling System*

3.10.17.1 The proposed centralised cooling system (CSCP) will be located at Sites 1A2 and 5A1 and the proposed centralised cooling system pumping stations (CSPS) will be located immediately below the podium of Site 5A2. **Table 3.32** summarizes the proposed locations of CSCP and CSPS and the nearby NSRs.

Table 3.32 Noise from Centralised Cooling System (CSCP) and Centralised Cooling System Pumping Stations

Location	Nearby NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) at source in order to meet the criteria**	
				Daytime	Nighttime
CSCP - 1A2	1A11 – Res	B	98m	105	95
CSCP - 5A1	5A1 – Res	B	Immediately above	N/A	N/A

Location	Nearby NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) at source in order to meet the criteria**	
				Daytime	Nighttime
CSPS - 5A2 (below ground)	4J1 – Res	B	22m	92	82

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.17.2 It is expected that the CSPS should be fully enclosed in order to reduce noise impact and the CSCP should also adopt noise mitigation measures such as fully/partial enclosure of noise equipment/parts to reduce the noise impact.

3.10.17.3 It is recommended that the exhaust of the CSCP and CSPS and any opening of the building should be located facing away from any NSRs. Louver or other acoustic reduction system could also be applied to the exhaust exit of the building. Given the fully enclosed design with louver at the exhaust system, operational noise from CSCP and CSPS is not expect to cause any adverse impact to surrounding NSRs. There is a separate feasibility study of the centralised cooling system underway at this stage where specific details and assessments would be available.

3.10.18 *Refuse Transfer Station*

3.10.18.1 The refuse transfer station (RTS) would be located southeast to Typhoon Shelter, which is adjacent to PFBP. As the RTS will allow containerised wastes to be delivered to landfill by barges, additional traffic burden to the SEK road network is thus avoided. The major features of the RTS will include weighbridges, a transfer building, a wastewater treatment plant, container storage area, a wash bay, an administrative office and a maintenance workshop.

3.10.18.2 Noise impacts would arise from the compaction of the refuse and the operation noise from the refuse collection vehicle, which involves vehicle movements on site, container handling, and activities in the transfer building including pushpit, compactor and ventilation plant. Since service equipment such as blowers/compressors in the wastewater treatment plant, electrical transformers and fire service pumping units are generally located inside designated equipment rooms and therefore is unlikely to generate noise impacts.

3.10.18.3 Service equipment (e.g. blowers/compressor in the wastewater treatment plant, electrical transformers, and fire service pumping units) is generally located inside designated equipment rooms and therefore is unlikely to result in noise impacts. A previous impact assessment for a RTS in the territory has made the assumptions on the activities and equipment and listed in **Table 3.33**.

Table 3.33 Assumed Equipment Requirements for RTS

Equipment	Assumed equipment requirements and sound power levels (SWL)[1]		
	Unit SWL (dB(A))	Number Active	Assumed Total SWL dB(A)
Tugboats	110	2	113
Portal cranes[2]	107	2	110
Fans	90	6	98
Compactors	101	9	111
Pushpits	99	4	105
Container forklift[3]	110	1	110
Street sweeper	109	1	109
RCVs/Lorries	107	2	110

Note:
1 Based on Table 4.3c ('Inventory of Major Operation Noise Sources') in *West Kowloon Refuse Transfer Station Study: Initial Environmental Impact Assessment* (May 1994).
2 Portal crane assumed to be similar to container port yard cranes (RTG). Sound power level from fax dated 8 October 1993 from HIT to Maunsell Consultants, stating achievable noise level for this piece of equipment.

3 SWL obtained from manufacturer's measured SWL of Boss Empty Container Handler.

3.10.18.4 Operations in RTS are expected to generate noise levels and the predicted noise level Leq(30mins) at the nearest NSR at Laguna City is 63 dB(A). For daytime and evening operations, the calculated noise levels exceeded the EIAO-TM noise standard of 60 dB(A) at the selected nearest NSRs. Hence, it is recommended that the RTS should be fully enclosed in order to reduce the noise impacts. Based on the current practice of the existing RTS, no nighttime operation (i.e. 2300-0700 hours) is anticipated and therefore the nighttime criterion of 50 dB(A) is not applicable in this assessment.

3.10.18.5 The noise impacts arising from the movements of refuse collection vehicles outside the site of RTS have also been evaluated. The predicted noise level L_{eq} (1hour) is 57 dB(A) at the nearest NSR in Laguna City, using the following equation as stated in *BS5228:Part1:1997, Annex D3.5.2*. Noise levels at this NSR would be dominated by traffic noise from Kwun Tong Bypass, and thereby adverse noise impacts from the refuse collection vehicles are not expected.

L_{Aeq} (1hour) = SWL – 33 + 10 log Q – 10 log V – 10 log d + 3 (façade)

where	Q (number of vehicle per hour)	= 150
	V (average vehicle speed)	= 50 km/hr
	SWL of RCV/lorry	= 107 dB(A)
	Distance from site boundary to the nearest NSR	= 333 m

3.10.19 *Public Filling Barging Point (PFBP)*

3.10.19.1 A barging point for collection of inert construction and demolition materials destined for reclamation areas would be located adjacent to RTS, southeast of Typhoon Shelter. Suitable material would be brought in by dump trucks and tipped into a waiting barge. Public fill may be mixed with large sized rock or concrete, which will need to be broken down to smaller size before transferring to the barge by bulldozer. Hence the provision of a stockpiling area may be necessary. The stockpiling area can also be used in case of emergency for storage of material cleared from landslide areas.

3.10.19.2 The proposed PFBP is located at distances >700m and >300m respectively from site 5J and Laguna City. Provided that the drying bin activities would be screened by a canopy-type structure, open on the side facing the existing industrial area and a boundary wall of suitable height is provided for noise shielding, adverse impact would not be expected.

3.10.19.3 At the previous Public Filling Barging Point at the Aldrich Bay Reclamation, material is brought in by dump trucks and tipped directly into a waiting barge. When tipping, the dump trick is positioned on a ramp about 10 m above the barge. The ramp can accommodate two dump trucks at the same time. Each dump truck requires about 1 min to position itself on the ramp, tip its load, and exit the ramp. Actual tipping requires about 5 seconds.

3.10.19.4 A similar operation loading aggregates into barges from dump trucks was monitored at Lamma Quarry in March 1995[1]. The SWL of the barge loading activity was measured at 122 dB(A). As this noise level is intermittent, occurring for approximately 10 seconds every minute (5 seconds per dump truck, for two unloading dump trucks), it is reduced using the "plant sound power method" (BS 5228, Section A.3.3). The noise associated with tipping is within 3 dB(A) of its maximum for about 16.6% of the time over several tipping cycles, resulting in a reduction of 8 dB(A) to give an assumed SWL of 114 dB(A) for tipping.

3.10.19.5 The expected daily lorry load handled by the permanent barging point in SEKD in about 800 trucks per day. Noise mitigation measures will be incorporated into the design of the PFBP to

[1] Reported in *Route 3 Country Park Section: Gemini Beach Stockpiling Site Noise Impact Assessment Study (Final Report)* by Arup Acoustics

minimize nuisance to nearby sensitive receivers. The noise assessment is based on the assumption that at a given moment, 30 dump trucks queue in a fully enclosed area with engine idling. Two active dump trucks, off loading material onto the barge, would be fully covered by an enclosure. Two dump trucks are assumed to arrive at or depart from the PFBP at a given moment. The unloading of wet material into drying bins is assumed to be carried out by a single dump truck at any one time, with shoveling of the off loaded wet material performed by one bulldozer.

3.10.19.6 **Table 3.34** summarized the assumed sound power level for the equipment used during operations at PFBP. A 4 m high barrier would be erected around a drying bin, so that the receivers would be fully shielded from drying bin. In addition, a 6 m high boundary wall would provide additional noise protection for the receivers.

Table 3.34 Assumed Sound Power Levels (SWL) for PFBP Operations

Equipment	Assumed No. of Equipment	Assumed SWL (dB(A)) and source	
Dump trucks (active)[1]	5	117	CNP 117
Dump trucks (idling)[2]	30	99	BS 5228
Tipping into barge	-	114	Other[3]
Bulldozer[4]	1	115	CNP 030
Excavated mounted breaker	1	122	CNP 027

Note:
1 Two dump trucks tipping into barge, one unloading into drying bin, two arriving at\leave the PFBP. Two active dump trucks off loading material into the barge are assumed to be fully enclosed for the purposes of assessment, and are therefore excluded from the calculations. The single dump truck unloading into the drying bin, and the two dump trucks arriving/leaving the PFBP, are assumed to be fully shielded from the receivers.
2 Idling dump trucks queue in an enclosed area, and are therefore excluded from the calculation.
3 SWL of tipping reported in Route 3 Country Park Section: Gemini Beach Stockpiling Site Noise Impact Assessment Study (Final Report) by Arup Acoustics.
4 Assumed to be fully shielded from the receivers.

3.10.19.7 Operations in the PFBP are expected to generate noise levels and the predicted noise level Leq(30min) at the nearest NSR at Laguna City is 66 dB(A). The predicted noise level with boundary wall is 61 dB(A). For daytime and evening operations, the calculated noise levels exceeded the EIAO-TM noise standard of 60 dB(A) at the selected nearest NSRs. Hence, the following recommendations are suggested in order to reduce the noise impacts:

- Partially screening of the loading facility from NSR's line of sight; and
- Boundary wall along the northeastern site boundary of PFBP.

3.10.19.8 Based on the practice of the previous PFBP at the Aldrich Bay Reclamation, no nighttime operation (i.e. 2300-0700 hours) is anticipated and therefore the nighttime criterion of 50 dB(A) is not applicable in this assessment.

3.10.19.9 The noise impacts arising from the movements of dump trucks outside the site of PFBP have also been evaluated. The predicted noise level L_{eq} (1hour) is 65 dB(A) at the nearest NSR in Laguna City, using the following equation as stated in *BS5228:Part1:1997, Annex D3.5.2*. With boundary wall implemented, the predicted noise level L_{eq} (1hour) is 55-60 dB(A). Noise levels at this NSR would be dominated by traffic noise from Kwun Tong Bypass, and thereby adverse noise impacts from the dump trucks are not expected.

$$L_{Aeq}(1hour) = SWL - 33 + 10 \log Q - 10 \log V - 10 \log d + 3 \text{ (façade)}$$

where
Q (number of vehicle per hour) = 164
V (average vehicle speed) = 50 km/hr
SWL of lorry = 117 dB(A)
Distance from site boundary to the nearest NSR = 464 m

3.10.20 *Heliport*

3.10.20.1 Two locations of heliports are identified within the proposed development at Sites 5L1, and 6A6. A helicopter landing site for Government Flying Services (GFS) would be located at Site 5L1 (Hospital), which would be primarily used for medical and evacuation purposes. Yet,

the exact location is not yet determined according to the latest layout but it should be noted that the distance from the helipad to the nearest NSR should be more than 150 m away in order to meet the noise criteria.

3.10.20.2 The other heliport would be located at further south of Site 6A6, in which it is above the cruise terminal and the potential noise impact at this site is discussed in **Section 3.10.25**.

3.10.20.3 Previous monitoring at the Tamar Basin helipads had been conducted and it is envisaged that Sikorsky S76 and Black Hawk S70 helicopters would be generally used by GFS. Results showed that the maximum noise levels (L_{max}) during take-off (measured at 25 m) were 100 dB(A). The highest recorded levels were noted to occur during take-off.

3.10.20.4 The NSRs nearby the proposed helicopter landing site at Site 6A6 would be the residential area at Site 5C1, which is about 540 m away. Using the basic distance attenuation calculation for a point source and addition of the 3 dB(A) façade effect, the predicted helicopter noise level at Site 5C1 has been calculated to peak at approximately 76 dB(A) for the NSRs at the proposed residential blocks. This would not exceed the HKPSG noise standard of 85 dB(A) L_{max} for helicopter noise. Thus, further mitigation would not be required.

3.10.20.5 For hospital site 5L1, since the helicopter operation would be primarily a medical emergency service, restrictions that would reduce the operational efficiency of the helicopter service (such as limiting its hours of operation or designating an indirect flight path) are not considered appropriate. Flight events are dictated by emergency requirements, and possible approach and departure paths are restricted by the presence of surroundings buildings. The existing and proposed layout of surrounding buildings are such that the initial departure and approach paths will always be away from the buildings, and so mitigation of the immediate take-off landing events is the key criteria.

3.10.20.6 In order to meet the HKPSG noise standard of 85 dB(A) L_{max}, a setback of 200 m from the nearest NSR is required. One possible approach is to locate the landing site to the eastern corner of the site boundary near the SPS at Site 5L4 which would be 200 m away from any sensitive receiver in Sites 5K1, 5L2 and 5J1. The availability of helipad at the hospital site would be subject to the confirmation by the project proponent of the hospital.

3.10.21 *Typhoon Shelter*

3.10.21.1 Typhoon shelter is proposed at south of Sites 5J and 5L. It is a U-shaped typhoon shelter where the ships mainly anchored at the entrance. The nearest NSR is the residential area at Site 5J1.

3.10.21.2 Adequate buffer distance is necessary to minimize any potential noise impacts on noise sensitive receivers. Based on the available information, a qualitative assessment based on a comparison of different typhoon shelters in Hong Kong is presented **Table 3.35**.

Table 3.35 A Comparison of Typhoon Shelters (TS) in Relation to NSRs in Hong Kong

Proposed Typhoon Shelter Site		
Nearest NSR	***Boundary of TS***	***Centre of TS***
Site 5J1	132m	272m
Existing Typhoon Shelters		
Typhoon Shelter	***Distance from nearby NSRs***	
	Boundary of TS	***Centre of TS***
Yau Ma Tei Typhoon Shelter	140m	860m
Sam Ka Tsuen Typhoon Shelter	200m	320m
Shek Tong Mei Typhoon Shelter	100m	170m
Causeway Bay Typhoon Shelter	140m	500m
Aberdeen Typhoon Shelter	150m	250m

3.10.21.3 Site measurement at the existing typhoon shelter at Kwun Tong revealed that the noise level was 68.8 dB(A) L_{eq}(30mins). Potential noise impact from the typhoon shelter on the nearest NSRs at Site 5J1 could reduce by restriction of the loading/unloading activities in typhoon shelter where they are considered to be noisy activities. Yet, with a buffer distance of about 130 m in terms of Leq(30mins), the potential noise impacts are expected to be minimal.

3.10.21.4 Noise impacts from different existing typhoon shelters may vary with the composition and usage of vessels. Noise nuisance is likely come from individual noisy vessel rather than quantitative cumulative impact of 30 minutes duration. Comparison with existing typhoon shelter could only indicate whether it is better or worse but gives no indication of future acceptability by residents. The noise nuisance is considered partially subjective in nature. Since typhoon shelters are public places, vessels are free to move around. The current typhoon shelter location has adopted a preventive approach that its entrance is more than 700 m away from residents in Site 5J1. Vessel traffic is far away from NSRs.

3.10.22 *Dangerous Goods Vehicle Ferry Pier*

3.10.22.1 Dangerous goods vehicle ferry pier is proposed at Site 6C10. The source of noise would be from the movements of ferries and the general activities of the pier. Observations from existing vehicle ferry pier in Kwun Tong revealed that the activities were generally low. The current daily usage of the ferry pier is less than 90 vehicles (two-way) ranging from a single vehicle to a full ferry load of 10 vehicles per ferry trip. **Table 3.36** summarizes the proposed location of dangerous goods vehicle ferry pier (separated into two portions: vehicle waiting area and ferry berthing area) and the predicted sound power level at the likely affected NSRs.

Table 3.36 Noise from Dangerous Goods Vehicle Ferry Pier

Location	Likely Affected NSR	Area Sensitivity Ratings (ASRs)*	Approx. Distance to NSR	Sound Power Level (SWL) (dB(A)) at source in order to meet the criteria**	
				Daytime	Nighttime
Vehicle Waiting Area	Cha Kwo Ling village	B	80m	103	93
Berthing Area	Cha Kwo Ling village	B	146m	108	98

Note:
ASRs: Area Sensitivity Rating as in TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites, use for the purpose of assessment in this study.
* Acceptable Noise Levels (ANLs) during daytime is 65 dB(A) and nighttime is 55 dB(A) respectively.
** criteria as stipulated in TM.. The SWL should be derived with reference to the TM for the Assessment of Noise from Places other than Domestic Premise for which there should be corrections for tonality, impulsiveness and intermittency.

3.10.22.2 The proposed vehicle ferry pier is a like-to-like reprovisioning of the existing DG vehicle ferry pier in Kwun Tong. Vehicles using the pier were mostly dangerous goods vehicles which the number of vehicles were small for each ferry.

3.10.22.3 The proposed vehicle ferry pier is also separated from nearby noise sensitive receivers by open space and heavily trafficked Cha Kwo Ling Road, adverse noise impact from the operation of the proposed vehicle ferry is not expected. Thus, potential noise impact resulted from vehicle movements would be minimal.

3.10.23 *Piers and Naphtha Berth*

3.10.23.1 Piers namely tourist excursion pier and public/FSD/Berth/Pier would be located at Sites 6A8 and 5C5 respectively. The nearest NSR is the residential area at Site 5C1 which is approximately 150 m and 60 m away from the site boundary respectively. The predicted sound power level at source (pier at Site 6A8) in order to meet the noise criteria during daytime and nighttime is 108 dB(A) and 98 dB(A) respectively, while for pier at Site 5C5 is 101 dB(A) and 99 dB(A).

3.10.23.2 The proposed naphtha berth is located at Site 3G2. The distance of the nearest NSR at Site 3G1 from the berth is about 160 m. The predicted sound power level at source in order to meet the noise criteria during daytime and nighttime is 109 dB(A) and 99 dB(A) respectively.

3.10.24 *Cruise Terminal*

3.10.24.1 Cruise Terminal would be located at Sites 6A6 and 6A7. Site measurements at existing cruise terminal, the Ocean Terminal, revealed that noise level from mooring cruise in the vicinity was around Leq(30min) 64dB(A). Considering the distance from nearest NSRs of >300 m, adverse impact would not be expected.

3.10.25 *Automatic Refuse Collection System*

3.10.25.1 Automatic Refuse Collection System is a government's initiative for refuse collection in SEKD sites. The adoption of the system would rely on individual site design. The ARCS may vary from different manufacturers/suppliers and site design. Technical details of ARCS have been given in Section 7.5 of this Report. Major noise sources generally are related to air blowers, refuse compactor, refuse separator and the collection point, which are highly site-specific in nature and highly depend on the layout plan. Subject to further study of the ARCS, preventive measures have to be adopted in the first place e.g. careful siting of noisy equipment like air blowers, refuse compactor, de-odorising facilities and exhaust. Further mitigation measures e.g. silencers, acoustic enclosure and shielding should be considered if necessary in order to comply with noise standards. Most of the system could be underground or located in shielded areas and associated impacts could be controlled. Adverse impacts are not expected.

3.10.26 *Noise from Marine Traffic*

3.10.26.1 Noise from marine traffic refers to the movement of vessels and their activities which generate noise. As the SEKD would have noise sensitive development along the shoreline, NSRs are more or less affected by the noise from marine traffic. Marine traffic is similar to noise from public place which implementation control measures are not possible. It is not even possible to quantify accurately or compare to existing standard. It is observed that noise sensitive developments are proposed around the bay area which are away from any active marine transport route.

3.10.26.2 As a reference for evaluation, a site noise measurement was carried out at Hung Hom waterfront immediately in front of Harbour Plaza Hotel. The location was considered comparable to future development sites of SEKD. The measurement noted that there were several kinds of vessel travelling and generating noise, namely speed boats, cargo ships, ferries, tug boats, etc. The noise level for Leq(30min) was recorded as 59.9dB(A). The noise level was low. Although there may be concern over the possible night-time impact, the traffic during night-time would likely be much lower. Noise from individual vessel may sometimes be intrusive due to the low background noise level. However, time-averaged noise impact would not likely be adverse.

3.11 Impacts Summary

3.11.1.1 Landuse and transport planning has provided a proactive approach in minimizing the likely noise impacts from road traffic and other sources. The approach included environmentally friendly public transportation, environmental friendly shuttle service, discourage through traffic movements, reducing noise at local levels, reducing demand for through traffic, underground and depressed road design, and planning design. The amount of vehicular traffic in SEKD has been much reduced with traffic flow on most of the planned distributor roads being less than 1000 vehicles per hour. However, high traffic volume existing roads, namely Prince Edward Road East and Kwun Tong Bypass, would still bound SEKD.