## Appendix 10.7 Calculation of Cumulative Construction Ground-borne Noise

From PME

**NSR No. HH9**
**Name Harbourfront Horizon**

**Calculation of construction ground-borne noise arising from SCL (HUH - ADM) works in Hung Hom area**

PME Hydraulic Breaker

| Item | Description | | | | | | | | Assumption |
|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Frequency | 16 | 31.5 | 63 | 125 | 250 | 500 | Hz | |
| | rms velocity | 0.06 | 0.07 | 0.06 | 0.05 | 0.062 | 0.12 | mm/s | Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement |
| 1 | Vibration Velocity, ref 10^ -6 mm/s | 95 | 97 | 96 | 94 | 96 | 102 | dB(V) | |
| 2 | Ro | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | m | Site measurement of breaker operation at distance = 5.5m |
| | R | 220 | 220 | 220 | 220 | 220 | 220 | m | Shortest distance from the site to the NSR |
| | Distance Attenuation | -32 | -32 | -32 | -32 | -32 | -32 | dB | |
| 3 | Soil / Rock Damping | 0 | 0 | 0 | 0 | 0 | 0 | dB | The whole transmission path is assumed to be rock and no damping applied |
| 4 | Building Coupling Loss | 0 | 0 | 0 | 0 | 0 | 0 | dB | |
| 5 | Floor to Floor Attenuation | -2 | -2 | -2 | -2 | -2 | -2 | dB | Assume -2 dB per floor<br>Assume the worst affected NSR is on 1/F. |
| 6 | Conversion from Vibration to Noise | -27 | -27 | -27 | -27 | -27 | -27 | dB | Adopted from KSL EIA Report Appendix 7-1 |
| 7 | Conversion to A-weighted Noise | -57 | -39 | -26 | -16 | -8.6 | -3.2 | dB(A) | Standard acoustic principal |
| | Individual Groundborne Noise | -22 | -4 | 9 | 17 | 26 | 37 | dB(A) | Standard acoustic principal |
| | Predicted Groundborne Noise for ONE Hydraulic Breaker Operation | | | | | | 38 | dB(A) | |

Note:
The modified rig is mainly used for excavation of soil during construction of diaphragm wall. However, it would also be used in minor rock chiselling in order to toe in the diaphragm wall into the the rock. In view of similar nature of rock chiseling by modified rig and rock breaking by hydraulic breaker, the rms veolcity for hydraulic breaker, that has been used in KSL EIA (Appendix 7-1), is adopted for assessment.

PME Drill Rig

| | | | | |
|---|---|---|---|---|
| | Using the calculated hydraulic breaker noise to correct to Rock Drill Noise | 5.1 | dB(A) | 20log(0.536/0.298) Site measurement in KSL EIA Appendix 7-1 |
| | Predicted Groundborne Noise for ONE drill rig operation | 43 | dB(A) | |

PME Hand-held Breaker

| | | | | |
|---|---|---|---|---|
| | Using the calculated hydraulic breaker noise to correct to Hand-held Breaker Noise | -0.6 | dB(A) | 20log(0.279/0.298) Site measurement in KSL EIA Appendix 7-1 |
| | Predicted Groundborne Noise for ONE Hand-held breaker operation | 37 | dB(A) | |

**Calculation of construction ground-borne noise arising from South Approach Tunnel & related works of SCL (MKK - HUH)**

PME Hydraulic Breaker

| Item | Description | | | | | | | | Assumption |
|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Frequency | 16 | 31.5 | 63 | 125 | 250 | 500 | Hz | |
| | rms velocity | 0.06 | 0.07 | 0.06 | 0.05 | 0.062 | 0.12 | mm/s | Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement |
| 1 | Vibration Velocity, ref 10^ -6 mm/s | 95 | 97 | 96 | 94 | 96 | 102 | dB(V) | |
| 2 | Ro | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | m | Site measurement of breaker operation at distance = 5.5m |
| | R | 220 | 220 | 220 | 220 | 220 | 220 | m | Shortest distance from the site to the NSR |
| | Distance Attenuation | -32 | -32 | -32 | -32 | -32 | -32 | dB | |
| 3 | Soil / Rock Damping | 0 | 0 | 0 | 0 | 0 | 0 | dB | The whole transmission path is assumed to be rock and no damping applied |
| 4 | Building Coupling Loss | 0 | 0 | 0 | 0 | 0 | 0 | dB | |
| 5 | Floor to Floor Attenuation | -2 | -2 | -2 | -2 | -2 | -2 | dB | Assume -2 dB per floor<br>Assume the worst affected NSR is on 1/F. |
| 6 | Conversion from Vibration to Noise | -27 | -27 | -27 | -27 | -27 | -27 | dB | Adopted from KSL EIA Report Appendix 7-1 |
| 7 | Conversion to A-weighted Noise | -57 | -39 | -26 | -16 | -8.6 | -3.2 | dB(A) | Standard acoustic principal |
| | Individual Groundborne Noise | -22 | -4 | 9 | 17 | 26 | 37 | dB(A) | Standard acoustic principal |
| | Predicted Groundborne Noise for ONE Hydraulic Breaker Operation | | | | | | 38 | dB(A) | |

Note:
The modified rig is mainly used for excavation of soil during construction of diaphragm wall. However, it would also be used in minor rock chiselling in order to toe in the diaphragm wall into the the rock. In view of similar nature of rock chiseling by modified rig and rock breaking by hydraulic breaker, the rms veolcity for hydraulic breaker, that has been used in KSL EIA (Appendix 7-1), is adopted for assessment.

PME Drill Rig

| | | | | |
|---|---|---|---|---|
| | Using the calculated hydraulic breaker noise to correct to Rock Drill Noise | 5.1 | dB(A) | 20log(0.536/0.298) Site measurement in KSL EIA Appendix 7-1 |
| | Predicted Groundborne Noise for ONE drill rig operation | 43 | dB(A) | |

PME Hand-held Breaker

| | | | | |
|---|---|---|---|---|
| | Using the calculated hydraulic breaker noise to correct to Hand-held Breaker Noise | -0.6 | dB(A) | 20log(0.279/0.298) Site measurement in KSL EIA Appendix 7-1 |
| | Predicted Groundborne Noise for ONE Hand-held breaker operation | 37 | dB(A) | |

PME Pile Rig

| | | | | |
|---|---|---|---|---|
| | Using the calculated hydraulic breaker noise to correct to pipepile noise | 6.6 | dB(A) | 20log(0.638/0.298) Site measurement in KSL EIA Appendix 7-1 |
| | Predicted Groundborne Noise for ONE pile rig operation | 44 | dB(A) | |

**Cumulative Constrcution Ground-borne Noise Level at HH9**

Period: Nov-2014

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Demolition of freight building | Hydraulic Breaker | 2 | 41 | 43 |
| SCL (MKK - HUH) | Demolition of existing columns at Area H2 | Hydraulic Breaker | 1 | 38 | |

Period: Jan-2015

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Demolition of freight building and construction of coffedam wall | Hydraulic Breaker | 2 | 45 | 49 |
| | | Drill Rig | 1 | | |
| SCL (MKK - HUH) | Construction of diaphgram wall at Area H1 and excavation works at Area H3 | Modified Rig | 2 | 46 | |
| | | Piling Rig | 1 | | |

Period: Feb - Aug 2015

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Construction of cofferdam wall for HUH Landfall | Drill Rig | 1 | 43 | 45 |
| SCL (MKK - HUH) | Construction of diaphgram wall at Area H1 | Modified Rig | 2 | 41 | |

Period: Sep-2015

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Construction of cofferdam wall for HUH Landfall | Drill Rig | 1 | 43 | 48 |
| SCL (MKK - HUH) | Demolition of IMC and construction of diaphgram wall | Hydraulic Breaker | 1 | 47 | |
| | | Drill Rig | 2 | | |

Period: Oct-2015

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Excavation at HUH Landfall | Hydraulic Breaker | 1 | 41 | 48 |
| | | Hand-held Breaker | 1 | | |
| SCL (MKK - HUH) | Demolition of IMC and construction of diaphgram wall | Hydraulic Breaker | 1 | 47 | |
| | | Drill Rig | 2 | | |

Period: Nov - Dec 2015

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Excavation at HUH Landfall | Hydraulic Breaker | 5 | 49 | 49 |
| | | Hand-held Breaker | 11 | | |
| SCL (MKK - HUH) | Demolition of IMC / Modification to existing EVA structures | Hydraulic Breaker | 1 | 38 | |

Period: Jan - Feb 2016

| Project | Construction activities | Type of PME | No. of PME | Predicted Ground-borne Noise Level | Cumulative Ground-borne Noise Level |
|---|---|---|---|---|---|
| SCL (HUH - ADM) | Excavation at HUH Landfall | Hydraulic Breaker | 4 | 49 | 49 |
| | | Hand-held Breaker | 10 | | |
| SCL (MKK - HUH) | Modification to existing EVA structures | Hydraulic Breaker | 1 | 38 | |