

**Appendix 15.1** Key Assessment Assumptions and Methodologies

Assessment Methodologies	Assessment Assumptions	Limitation of Assessment Methodologies / Assumptions	Prior Agreements with EPD / Other Authorities	
			EIA Study Brief Clause Reference	Relevant Documentation
<b><u>Cultural Heritage Impact</u></b>				
Evaluation and assessment of potential impacts to cultural heritage resources was conducted in accordance with the Study Brief No. ESB-233/2011. The study adhered to the requirements as listed in Annexes 10 and 19 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) and also the relevant guidelines for Cultural Heritage Impact Assessment issued by the AMO for Terrestrial Archaeological Impact Assessment and Built Heritage Impact Assessment.	The assessment was based on the existing information available from previous investigations in the study area and supplemented through built heritage surveys.	The archaeological potential of the study area was determined based on the findings of previous surveys and have been adequately examined in previous investigations.	Not required	Not applicable
<b><u>Ecological Impact</u></b>				
Evaluation and assessment of potential impact on ecological resources was conducted in accordance with the criteria and guidelines specified in Annex 8 and Annex 16 of the EIAO-TM, respectively.	The assessment and evaluation of ecological impact on habitats was undertaken based on the results of literature review and ecological field surveys.	Not Applicable	Not required	Not applicable
<b><u>Landscape and Visual Impact</u></b>				

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The landscape and visual assessment for the Project follows Annexes 10 and 18 of the TM and the EIAO Guidance Note No.8/2010.	The predicted landscape and visual conditions for Hung Hom, Kai Tak and Diamond Hill Study Areas in the operation years are based on the latest relevant OZPs and the best available information.	Assessment of sensitivity of receivers and the magnitude of changes of project works are inherently subjective. No detailed data exists for future planned projects or for the concurrent projects other than described in the Report. Changes to these may affect the evaluated impacts of the Project.	Not required	Not applicable
<b><u>Air Quality Impact</u></b>				
<p>Quantitative assessment was conducted following Annex 4 and Annex 12 of EIAO-TM for determination of construction dust impact due to the Project. Fugitive Dust Model (FDM) (1993 version) was adopted for the assessment. The 1-hour, 24-hour and annual average TSP concentrations at representative discrete ASRs were predicted either at 1.5m, 5m, 10m, 15m and 20m above ground.</p> <p>The emission rates for different construction activities considered in the model were based on the USEPA Compilation of Air Pollutant Emission Factors (AP-42), 5<sup>th</sup> edition.</p> <p>The concurrent works with SCL (TAW-HUH), SCL (MKK-HUH), SCL (HUH-ADM), Tsz Wan Shan Pedestrian Link,</p>	<p>Dusty construction activities and programme were based on information provided by the Engineer. The major potential sources of construction dust impact associated with the Project would include excavation, spoil removal, wind erosion and materials handling during cut-and-cover tunnel construction.</p> <p>As a conservative assessment approach, heavy construction emission rate was adopted for construction activities undertaken by cut &amp; cover method in the assessment.</p> <p>Due to the constrained size of the works sites and the tight construction programme, it will be necessary for active construction activities to be undertaken at multiple work faces spread across each site. A hypothetical</p>	<p>It is difficult to obtain the detailed information for estimation of emission rates for different dusty construction activities. Heavy construction emission rate which is the highest emission rate was therefore adopted in the model run as a conservative approach. The predicted dust concentrations at the ASRs may be higher than the actual situation.</p> <p>FDM does not allow emissions to be placed more than 20m above ground, but can output concentration accurately at all heights for emission placed within 20m above ground.</p> <p>Tier 1 screening test is a hypothetical one which is very conservative and does not occur in reality.</p> <p>Tier 2 assessment is also a very conservative approach as it assumed % daily maximum active works areas of the</p>	Not required	Not applicable

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KTE, Central Kowloon Route, Kai Tak Development and Trunk Road T2 were taken into account in assessing the cumulative dust impact.	<p>Tier 1 screening test assuming 100% active area of construction site of the Project with mitigation measures in place has been undertaken.</p> <p>Focused Tier 2 assessment was undertaken at the specific hot spot locations where TSP non-compliance is predicted under the Tier 1 screening test.</p> <p>Based on information from the Engineer, the working period at the construction site would be 12 hours (07:00 – 19:00).</p> <p>The below dust suppression measures were considered in the assessment:</p> <ul style="list-style-type: none"> <li>watering once every working hour on active construction areas to reduce dust emission by 91.7%. This dust suppression efficiency is derived from the calculation method indicated in Appendix 7.4 where the water intensity is assumed to be 1.8 L/m<sup>2</sup>. The water intensity is an assumption used for dust modelling purposes only. Any potential dust impact and watering mitigation would be subject to the actual site condition. For example, a construction activity that produces</li> </ul>	Project would be located closest to the potentially worst affected ASRs at any one time throughout the construction period which is unlikely to occur in reality. The predicted TSP levels may be higher than the actual situation.		

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	<p>inherently wet conditions or in cases under rainy weather, the above water application may not be necessary. While the above watering frequency is recommended in a general sense, the extent of watering should therefore be implemented such that the site would be reasonably wet in order to mitigate potential dust impacts under due consideration of the actual site condition. The dust levels would be monitored and managed under an EM&amp;A programme as specified in the EM&amp;A Manual.</p> <p>The above reduction of dust emissions were assumed in the model with the implementation of this dust suppression measure in accordance with USEPA guideline.</p> <p>Hourly meteorological data from Hong Kong Observatory for year 2008 were adopted to predict the hourly, daily and annual TSP concentration.</p> <p>Background TSP concentration is based on recent 5-year average monitoring data of 5 monitoring stations (Tsuen Wan, Kwai Chung, Sham Shui</p>			

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	Po, Kwun Tong and Central / Western) for urban development was adopted as an indication of the future TSP background concentration.			
<b><u>Airborne Noise Impact (Construction Phase)</u></b>				
<p>The noise impact assessment for the Project follows Annex 5 and Annex 13 of the EIAO-TM.</p> <p>To assess the potential noise impacts due to the Project, the noise sources were identified and the impacts were quantified. The assessment methodology follows Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM).</p>	<p>Construction noise impact assessment was carried out on a monthly basis and assessed on existing NSRs from the commencement of the Project. Cumulative noise impact was considered within 300m of the NSRs from the construction tasks of the Project taking place concurrently. Noise sources from the areas greater than this 300m distance were excluded from this assessment.</p> <p>In accordance with the EIAO, the methodology outlined in the GW-TM has been used for this construction noise assessment (excluding percussive piling). Sound power level (SWL) of the equipment was taken from Table 3 of GW-TM and BS5228 was referenced for those without information provided.</p> <p>It was assumed that all PME items required for a particular construction activity would be located at the notional</p>	<p>The prediction of construction noise impact was based on the methodology described in the GW-TM under the NCO. There are limitations of the methodology such as the accuracy of the predictive base data for future (e.g. plant inventory for proposed construction works). Quantitative uncertainties in this assessment of impacts should be considered when drawing conclusions from the assessment.</p> <p>In carrying out the assessment, realistic worst case assumptions have been made in order to provide a conservative assessment of noise impacts. The construction noise impact was assessed based on conservative estimates for the types and quantities of plant and construction methods. The predicted noise levels may be higher than the actual situation.</p>	<p>3.4.4.2 - Assessment Area</p> <p>Appendix C item (ii) (b) – Assessment Point</p>	<p>See Annex A</p>

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	<p>or probable source position of the segment where such activity is to be performed. The assessment was based on the cumulative SWL of PME likely to be used for each location, taking into account the construction period in the vicinity of the receiver location. To predict the noise level, PME was divided into groups required for each discrete construction task. The objective was to identify the worst case scenario representing those items of PME that would be in use concurrently at any given time. The sound pressure level of each construction task was calculated, depending on the number of plant and distance from receivers. The noise levels at NSRs were then predicted by adding up the SWLs of all concurrent construction tasks.</p> <p>A positive 3 dB(A) façade correction was added to the predicted noise levels in order to account for the façade effect at each NSR.</p>			
<b><u>Airborne Noise Impact (Operational Phase)</u></b>				
The noise impact assessment for the Project follows Annex 5 and Annex 13 of the EIAO-TM.	<p><u>Fixed Noise</u></p> <p>The fixed plant noise assessment has been carried out by determining the</p>	<p><u>Fixed Noise</u></p> <p>For determining the distance correction factors, the horizontal distances between</p>	3.4.4.2 - Assessment Area Appendix C item (ii)	See Annex A

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<p>The method used to predict operational airborne train noise is based on the U.K. Department of Transport "Calculation of Railway Noise 1995 (CRN)".</p>	<p>maximum permissible noise emission levels for future detailed design of the fixed plant in the absence of any detailed information and noise specification of the proposed fixed plant at the time of this EIA study.</p> <p><u>Rail Noise</u></p> <p>An in-house train noise model has been used to predict and assess the propagation of airborne train noise. The modelling methodology for propagation is based on the prediction procedures in Calculation of Railway Noise 1995 (CRN).</p> <p>The train noise (both rolling noise and A/C noise) source term would base upon the noise level measured during the commissioning of SP1900 train and is based on a disc braked Electric Multiple Unit (EMU).</p>	<p>the noise source positions and the NSRs were used for representing the worst level of the representative NSRs. The distance between NSRs and the noise sources (slant distance) could be larger and the maximum permissible noise emission levels could be higher than the predicted levels.</p> <p><u>Rail Noise</u></p> <p>The following parameters have been taken to account as limitation depends on site specific condition:</p> <ul style="list-style-type: none"> <li>• Façade effect;</li> <li>• Rail deterioration;</li> <li>• Speed correction;</li> <li>• Squeal noise correction;</li> <li>• Joint correction; and</li> <li>• Deck reflection</li> </ul> <p>These conservative approaches have applied for the above parameters may lead the predicted noise levels higher than the actual situation.</p>	(b) – Assessment Point	
<b><u>Groundborne Noise Impact (Construction Phase)</u></b>				

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<p>The noise impact assessment for the Project follows Annex 5 and Annex 13 of the EIAO-TM. The method used to predict construction groundborne noise is based on the U.S. Department of Transportation “High-Speed Ground Transportation Noise and Vibration Impact Assessment”. The methodology which had previously been applied in other EIA studies is generally accepted for use in assessing groundborne noise impacts against EIAO-TM and IND-TM noise criteria.</p>	<p>In carrying out the assessment, realistic worst case assumptions have been made in order to provide a conservative assessment of noise impacts. The construction ground-borne noise impact was assessed based on conservative estimates for the types of plant and methods of working.</p>	<p>There would be some limitations such as the accuracy of the predictive base data for future conditions e.g. soil mobility for future operation, limitation of reference in vibration source, soil damping loss and coupling loss. Uncertainties in the assessment of impacts have been considered when drawing conclusions from the assessment.</p>	<p>3.4.4.2 - Assessment Area  Appendix C item (ii) (b) – Assessment Point</p>	<p>See Annex A</p>
<p><b><u>Groundborne Noise Impact (Operational Phase)</u></b></p>				
<p>The noise impact assessment for the Project follows Annex 5 and Annex 13 of the EIAO-TM. The methodology is based on the U.S. Department of Transportation “High-Speed Ground Transportation Noise and Vibration Impact Assessment” and has been applied to a number of transit systems in Hong Kong over the years, including West Rail, East Rail Tsim Sha Tsui Extension, MTR Tseung Kwan O Line and Kowloon Southern Link.</p>	<p>The operation ground-borne noise levels from the Project were calculated based on direct fixation track and 8-car SP1900.</p> <p>The prediction of operational groundborne noise levels is determined by the following assumptions:</p> <ul style="list-style-type: none"> <li>• The vibration source strength level (Force Density Level) for train operations on the SCL (HHS) will be derived from wayside vibration measurements;</li> </ul>	<p>There are the following limitations in predicting operational groundborne noise:</p> <ul style="list-style-type: none"> <li>• Selection of borehole reference and the associated Line Source Response</li> <li>• Distance attenuation for planned receivers</li> <li>• Soil mobility for future operation</li> <li>• Where curved track occurs the track is considered to be straight and perpendicular to the closest setback point of the venue or receiver</li> </ul>	<p>3.4.4.2 - Noise impact assessment  Appendix C item (ii) – Assessment Point</p>	<p>See Annex A</p>



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	<ul style="list-style-type: none"> <li>The vibration propagation characteristic Line Source Response is assumed from the approved XRL EIA Report and WIL EIA Report;</li> <li>Direct fixation of Trackform Insertion Loss (TIL) is assumed;</li> <li>With reference to the FTA Manual, a -3dB and -5dB reduction in groundborne noise level is applied for tunnel coupling factor;</li> <li>No Building Coupling Factor is applied to the NSRs assessed;</li> <li>A -2dB attenuation per floor is adopted for the first 5 floors. The Building Vibration Response is in line with the FTA Manual; and</li> <li>A +2dB correction is assumed for conversion of vibration to noise.</li> </ul> <p>The Force Density Level is based on measurement on SP1900 train at Pat Heung Depot in 2003. And the level adopted is based on the wheel and rail being properly maintained such that they are free from wheel flat and rail corrugation.</p>	<ul style="list-style-type: none"> <li>Predictions are in most cases based on assuming the closest distance from the track centreline to the building foundation of the receiver</li> </ul> <p>To account for the above limitation, safety factor of 5 to 10 dB has been applied in the prediction so as to have a conservative assessment.</p>		

**Water Quality Impact**

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<p>The assessment of potential water quality impacts for the Project follows those presented in Annex 6 and Annex 14 of the EIAO-TM.</p> <p>To assess the potential water quality impacts due to the Project, the sources and natures of water pollution to be generated have been identified and their impacts have been described.</p>	<p>The scope of the assessment has been based on the review of the available desktop information within the study area to identify the key issues, review of the existing water quality, water sensitive receivers (WSRs) and pollution sources.</p>	<p>Any significant changes of the identified key issues, reviewed water quality data, conditions of WSRs, and pollution sources may affect the scope and extent of the assessment.</p>	Not required	Not applicable
<b><u>Waste Management Implications</u></b>				
<p>The method for assessing potential waste management impacts for the Project follow those presented in Annex 7 and Annex 15 of the EIAO-TM.</p> <p>Appropriate mitigation measures have been recommended to minimize any adverse waste impacts.</p>	<p>The waste quantities to be generated from the Project were estimated based on the engineering assessment and the information provided in the Construction and Demolition Material Management Plan (C&amp;DMMP) prepared for the Project.</p>	<p>The waste quantities estimated under this EIA are subject to further detailed site survey. However, further refinement of the estimated waste quantities would not affect the assessment conclusion provided that all the recommended mitigation measures are implemented properly.</p>	Not required	Not applicable
<b><u>Land Contamination</u></b>				
<p>The approach for land contamination assessment for the Project follows those presented in Guidance Note for Contaminated Land Assessment and Remediation and Annex 19 of the EIAO-TM</p>	<p>The strategy for sampling and laboratory testing, selection of the contaminants of concern (COCs) would be representative to the site specific characteristics for the past, present and future land uses.</p>	<p>Localised contamination hotspots may not have been identified and investigated due to site constraints.</p>	Appendix J Item 3 – Contamination Assessment Plan	See Appendix 12.1

## Annex A

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本署檔號 (29) in EP2/G/A/160 (pt.1)

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11 October 2011

MTR Corporation Limited  
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Kowloon, Hong Kong  
(Attn: Mr. Richard KWAN, Environmental Manager)

Dear Mr. Kwan,

**Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard**  
**EIA Study Brief (ESB-233/2011)**  
**Noise Impact Assessment**

I refer to your referenced letters dated 21.09.2011 and 03.10.2011, submitting a list of selected assessment points for airborne noise and ground-borne noise assessment during both construction and operational phases, noise assessment methodology for construction groundborne noise impact, noise assessment methodology for rail noise impact and noise assessment methodology for the operational groundborne noise impact of the captioned project for our agreement as per Section S.3.4.4.2, Appendix C (ii)(b), Appendix C (iv)(d), Appendix C (v)(c)(c2) and Appendix C (v)(c)(c3) of the EIA Study Brief No. ESB-233/2011, reproduced below for easy reference.

S.3.4.4.2 - *The study area for the noise impact assessment shall generally include areas within a distance of 300m from the boundary of the Project site or other Project locations as identified in the EIA. Subject to the agreement of the Director, the assessment area can be reduced accordingly if the first layer of noise sensitive receivers (NSRs), closer than 300m from the outer project limit, provides acoustic shielding to those receivers located further away from the Project. The assessment area shall be expanded to include NSRs at distances over 300m from the Project if those NSRs are also affected by the construction and operation of the Project.*

App C (ii)(b) - *The assessment points shall be agreed with the Director prior to the quantitative noise assessment and may be varied subject to the best and latest information*

available during the course of the EIA study...

App C (iv)(d) – If the equipment, such as a tunnel boring machine are used, ... the assessment methodology/model for ground borne noise shall be agreed with the Director, etc.

App C (v)(c2) – The assessment methodology including the railway / train design noise level shall be agreed with the Director prior to the commencement of the assessment.

App C (v)(c3) – For operation ground-borne noise impact, the criteria and assessment methodology shall be agreed with the Director with reference to Section 4.4.2(c) of the TM.

2. Please note that our views /comments on the proposed noise assessment points, noise assessment areas and noise assessment methodologies for the noise assessment of the Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard EIA are only provided for the partial fulfillment of the specific requirements for agreement stipulated in the above-mentioned EIA study brief clauses and shall not pre-empt our future decisions to the EIA report approval process under the EIA Ordinance. Our views below shall not absolve your responsibility to fulfill requirements in other statutory legislation.

3. Subject to the above caveats, I confirm that the proposed noise assessment points, noise assessment areas and noise assessment methodologies for the noise assessment of the Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard EIA are acceptable.



(Desmond CHAN)

Project Engineer (Metro Assessment)  
for Director of Environmental Protection

c.c. Internal S(AN)6