Appendix 14.1 – Key Assessment Assumptions and Limitations of Assessment Methodologies

Assessment Methodology	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD/Other Authorities		Proposed Alternative Assessment Tools / Assumptions (if applicable)
			EIA Study Brief Clause Reference	Relevant Documentation	
Air Quality Impact					
Construction Phase					
The air quality impact assessment follows: Annex 4 and Annex 12 of the EIAO-TM and requirement set out under Clause 3.4.4 of the EIA Study Brief (ESB-332/2020). Particulate emission will be the major air quality impact. Quantitative assessment of TSP, RSP and FSP emissions will be conducted for dusty construction activities of the Project. **Gaussian type model**: assess secondary contributions **PATH model**: estimate future background contributions **EMFAC-HK v4.3:** estimate the vehicular emission factors in	**Emission inventory** Primary Contributions • Major dusty construction activities to be concerned and considered in the modelling assessment include: - Site clearance, which involves removal of vegetation and surface soil, and ground levelling; demolition works; excavation, bored piling, material handlings, spoil removal and truck movements within the construction site, are modelled as heavy construction activities; and - Wind erosion of open active site during non-working hours. • The estimation of construction emission rate is based on the emission factors obtained from United States Environmental Protection Agency (USEPA) Compilation of Air Pollution Emission Factors, AP-42, 5th Edition Section 13.2.4 (Aggregate Handling Emission), and activity data from the engineer design. Activity data	The construction programme is indicative and subject to contractors' actual operation. A conservative approach, assuming 100% active area at all working sites and all works sites being active concurrently, was adopted in the model run. The actual situation may be better than that of the model prediction.	N/A	Air Quality Impact Assessment Methodology Paper, Technical Note agreed by TD	N/A

TSP, RSP and FSP in various travelling speed, ambient condition such as temperature and relative humidity. **AERMOD**: predict the air quality impacts due to emission from construction activities. **AERMET**: meteorological pre-process of wind speed and mixing height **CALINE4**: assess the secondary contribution due to vehicular emission from road networks within 500 m study area	considered in the calculation including, but not limited to, percentage active area, and number of construction trucks and truck speed. The latter two were used to determine the dust suppression efficiency applied to the emission factor with mitigation measures. Heavy construction activities (including excavation, materials handling, spoil removal, backfilling, piling works, demolition works and truck movements): E(TSP) = 2.69 Mg/hectare/month of activities; E(RSP) = 2.69 x 47.3% Mg/hectare/month; E(FSP) = 2.69 x 7.2% Mg/hectare/month Wind erosion: E(TSP) = 0.85 Mg/hectare/year; E(RSP) = 0.85 x 47.3% Mg/hectare/month; E(FSP) = 0.85 x 7.2% Mg/hectare/month • The construction period is assumed as 12-hour (07:00-19:00) per normal working day, 7 days a week, for the prediction of the highest hourly average TSP, the 10th highest daily average				

Nested table within the second column:

Heavy construction activities (including excavation, materials handling, spoil removal, backfilling, piling works, demolition works and truck movements)	E(TSP) = 2.69 Mg/hectare/month of activities E(RSP) = 2.69 x 47.3% Mg/hectare/month E(FSP) = 2.69 x 7.2% Mg/hectare/month
Wind erosion	E(TSP) = 0.85 Mg/hectare/year E(RSP) = 0.85 x 47.3% Mg/hectare/month E(FSP) = 0.85 x 7.2% Mg/hectare/month

	and annual average RSP, the 36th highest daily average and annual average FSP concentrations. • Wind erosion will only be assumed for non-working hours (19:00-07:00). • 100% active area at a construction site with mitigation measures in place has been undertaken is assumed. <u>Secondary Contributions</u> *Emission from Open Road Traffic* • The projected 24-hour traffic flows and vehicle compositions, including the dump trucks induced by the construction of the Project, will be adopted in traffic emission cumulative dust impact assessment. This approach was agreed with TD. • The vehicular emission factor at specific traveling speed will be extracted from EMFAC-HK v.4.3 in EMFAC mode with the lowest temperature and relative humidity in a year. *Start Emission* • The startup emissions of public traffic and the soak time to be applied during different hours will be estimated based on traffic survey data and traffic forecast. For the vehicle class other than public transport, startup emission will be applied on the roads with roadside parking, and their soak times will be assumed to be 120 min for general hours while soak time of 720 mins for morning hours (6am – 9am). *Marine Emission*				

	• Marine emission was estimated in activity-based approach. • The emission factors were derived in units of works (gram per kilowatt-hour) dependent on fractional load of the equipment during different vessel activity modes. The calculation is summarized as below: Emission = P x FL x T x EF where P is the installed power of equipment; FL is fractional load of equipment in a specific mode; T is operation time-in-mode; and EF is fractional load emission factor of equipment *Concurrent Project* • Heavy construction activities with typical dust mitigation measures, e.g. watering every 2 hours, were assumed in both Scenario 1 and 2. Background Contributions • The background concentrations from PATH model (PATHv2.1) will be adopted to estimate future concentrations during the construction years. Dataset of Year 2025 was adopted for Scenario 1 and 2. • TSP background concentration will be assumed to constitute of 100% of PM_{10} concentration. PM_{10} concentration from PATH will be directly adopted as TSP				

	background concentration for the assessment. **Dispersion Modelling & Modelling Approach** *Emissions from Construction Activities* • The height of the input data into the WRF is assumed to be 9 metres above ground for the first layer. The minimum wind speed is capped at 1 metre per second while that for mixing height is between 131 metres and 1,941 metres. *Emission from Open Road Emission* • Surface roughness to be adopted in CALINE4 is assumed to be 370 cm.				
Operational Phase					
The air quality impact assessment follows: Annex 4 and Annex 12 of the EIAO-TM and requirement from the EIA Study Brief (ESB-332/2020)	No air quality impact is expected from TME with emission free electrically powered trains and thus the exhaust air from railway operations would be insignificant.	N/A	N/A	Air Quality Impact Assessment Methodology Paper	N/A
Noise Impact					
Construction Phase					
The noise impact assessment for the project follows Annex 5 and Annex 13 of the EIAO-TM and requirement set out under Clause 3.4.5 of the EIA Study Brief (ESB-332/2020). In accordance with the EIAO, the methodology outlined in the GW-TM was used for construction noise assessment.	For the SWLs of the PME, reference is made to Table 3 of the GW-TM, "Sound power levels of other commonly used PME" published by EPD, the Quality Powered Mechanical Equipment (QPME) System available at EPD's website, and the previous approved EIA reports etc.	The prediction of construction noise impacts is based on GW-TM. The SWL of PME was based in GW-TM and QPME system. The actual situation may be better than that of the prediction.	N/A	Methodology Paper for Noise Impact Assessment	N/A
	It was assumed that all PME items required for a particular construction activity would be	In carrying out the assessment, worst case	N/A	EIAO-TM, GW-TM	N/A

	located at the notional position of work zones where such activity is to be performed. The PME items were organised into groups required for each discrete task of the construction works. The sound pressure level (SPL) of each construction task was calculated, depending on the number of plant items involved and the distance from the NSR. A positive 3 dB façade correction was added to the predicted noise levels to account for the façade effect at each assessment point. The noise levels at the NSRs were then predicted by adding up the SPLs of all concurrent construction tasks from the Project. Notional source positions that are at distances greater than 300m from the NSRs were excluded from the assessment.	assumptions have been assumed in order to provide conservative noise impact assessments such as locating all the items of PME at the notional source.			
Operational Phase (Fixed Plant Noise)					
The maximum permissible sound power levels (Max. SWLs) were determined for future detailed design of the fixed plant given that the noise specification of the proposed fixed plant may not be available during the EIA Study. For the assessment of noise from the fixed plant, the Max. SWLs of the identified fixed noise sources were determined by adopting standard acoustics principles. The following formula is used for calculating the Max. SWLs of the fixed plant: SPL = Max SWL – DC + FC – BC	It is assumed that all the fixed plant within the same location would be operated at the same time as worst-case scenario.	This worst-case scenario will act as a conservative approach in predicting fixed plant noise levels.	N/A	N/A	N/A
	Screening correction offered by buildings or other structures such as office and residential buildings was taken into account in calculating the predicted noise levels. Barrier correction of -10 dB(A) would be applied if the direct line of sight between the noise source and NSR is blocked by buildings or natural terrains. A positive 3 dB(A) was added to predicted noise levels at the NSRs due to the façade effect.	N/A	N/A	N/A	N/A
	Corrections of tonality, intermittency or impulsiveness were not be included owing to the lack of design/supplier information at this preliminary design stage.	N/A	N/A	N/A	N/A

where SPL: Sound Pressure Level, in dB(A); Max SWL: Maximum Permissible Sound Power Level, in dB(A); DC: Distance Attenuation, in dB(A) (i.e. 20 log D + 8 [where D is the distance in metres]); FC: Facade Correction, in dB(A) (i.e. 3 dB(A)); and BC: Barrier Correction, in dB(A)					
Operational Phase (Rail Noise)					
CadnaA (version 4.1), a computational model, was used to predict and assess the propagation of airborne train noise.	<u>Train type and no. of car</u> • Electric Multiple Unit train, train length 200m for 8-car train <u>Train Source Term for 8-car train at 130kph at 25m</u> • Rolling Noise: SEL = 81.4 dB(A) • Structure Re-radiated Noise: - Typical Viaduct, Plain Track – Leq, 30min = 40.6 dB(A) - Viaduct, turn out inside enclosure – Leq,30min = 47.1 dB(A) • Air-Conditioning Noise: - Lmax = 48.8 dB(A) (at viaduct for running train) - Lmax = 54.8 dB(A) (at station for running train) - SWL = 83.5 dB(A) (at station for each Air-conditioning unit of stationary train)	N/A	N/A	Methodology Paper for Noise Impact Assessment	N/A

	Train Frequency per hour per Direction Mainline: • 28 number during peak daytime period (0700 – 2300 hours) • 20 number during peak night-time period (2300 – 0700 hours) Sidings: 2 numbers during daytime and night-time periods Gap Size Correction • +10 log(G/250) Speed Correction • 20 log10 (V/Vref), where V = Train speed, Vref = Reference train speed Train Frequency Correction • +10 log10 (N), where N = Train frequency per 30 min per Direction Distance Correction • Cdist = – 10 log10 (dist/25), where dist is the perpendicular slant distance of track segment to NSR in meters Screen Correction • As per CRN Chart 6(a) Angle of View Correction				

	• Cangl = 10 log10 [$\pi\theta$/180 − cos 2αsinθ] − 5, where θ is angle subtended by the segment at NSR, and α is orientation of the segment along the trajectory of the track, Ref: CRN Chart 7 <u>Air Absorption Correction</u> • Cair = 0.2 – 0.008 x d' (where dist is slant distance from track to NSR), Ref: CRN Chart 4 <u>Reflection Correction</u> • Crefl = 1.5 (θ'/θ) dB(A) (θ' is the sum of the angles subtended by all reflecting facades on the opposite side of the railway facing the receiver point and θ is the total angle subtended by the source line at the receiver point, +1.5dB maximum correction for each reflection, Ref: CRN Clause 31.2) <u>Façade Correction</u> • +2.5dB(A) <u>Rail and Rolling Stock Condition Deterioration</u> • +3dB(A) <u>Joint/Turnout Correction</u> • +7.0dB(A)				
Water Quality Impact					
The water quality impact assessment followed: Annexes 6 and 14 of the EIAO-TM. The wastewater / water pollution	Surface runoff coefficient of 0.9 is adopted with reference to the Stormwater Drainage Manual by DSD. Sewage production rate for construction	N/A	N/A	Water Quality Impact Assessment Methodology	N/A

to be generated and their impacts during both construction and operational phase were identified and quantified, when possible.	workers was estimated at 0.35 m^3 per worker per day with reference to the Sewerage Manual by DSD.			Paper	
Waste Management Implication					
The waste management assessment followed: • Annex 7 and Annex 15 of the EIAO-TM Waste to be generated includes both inert and non-inert C&D materials, general refuse, chemical waste and land-based and river-based sediments. The types and quantities of the waste to be generated during construction and operation phases are estimated, together with their disposal options and potential environmental impacts evaluated. A SSTP stating the detailed methodology for sediment sampling and testing was submitted and approved by EPD on 29 Jan 2021.	N/A	N/A	N/A	Sediment Sampling and Testing Plan (SSTP)	N/A
Land Contamination					
The land contamination assessment followed: • Annex 19 of the EIAO-TM Guidelines for Assessment	N/A	• All the identified potentially contaminated areas within the Project Area	N/A	Contamination Assessment Plan (CAP)	N/A

of Impact on Sites of Cultural Heritage and Other Impacts (Section 3: Potential Contaminated Land Issues) • Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management • Guidance Note for Contaminated Land Assessment and Remediation • Practice Guide for Investigation and Remediation of Contaminated Land		are currently in operation, the SI works and the subsequent assessment / remediation works are therefore proposed to be carried out after decommissioning but prior to the construction works at the concerned areas. For these concerned areas, review of the initial contamination, possible remediation methods, potential insurmountable impacts, SI requirements as well as the tentative timeframe for subsequent submissions were presented in the CAP.			
Ecological Impact (Terrestrial)					
The ecological impact assessment (terrestrial) followed: Annexes 8 and 16 of the EIAO-TM and the EIAO Guidance Notes (No. 7/2010 and No. 10/2010). The methodology includes literature review and evaluation, conducting ecological surveys covering both dry and wet seasons, developing ecological	The assessment was undertaken based on the results of literature review and ecological field surveys.	N/A	N/A	Working paper on Methodology of Ecological Impact Assessment (Terrestrial)	N/A

profile, evaluating potential ecological impacts, providing appropriate mitigation measures and evaluation of residual ecological impacts (if any).					
Landscape and Visual Impact					
The landscape and visual impact assessment followed: Annexes 10 and 18 of the EIAO-TM and the EIAO Guidance Note No.8/2010 "Preparation of Landscape and Visual Impact Assessment under the EIAO". Landscape The methodologies include site visits and desktop studies, identification of potential landscape changes, mitigation measures and prediction of the significance of residual impact. Visual The methodologies include identification of visual sensitive receivers, potential sources of visual changes, mitigation measures and prediction of the significance of residual impact.	N/A	N/A	N/A	Methodology Paper of Landscape and Visual Impact Assessment	N/A
Cultural Heritage Impact					
The cultural heritage impact assessment followed: Annexes 10 and 19 of the EIAO-TM and Annex 18 of the EIAO-TM where	N/A	N/A	N/A	Cultural Heritage Impact Assessment Methodology	N/A

appropriate. The methodologies including desktop review and site visit.				Paper	
Hazard to Life					
The risk assessment for the Project follows Annex 4 of the EIAO-TM. ExxonMobil Liquefied Petroleum Gas (LPG) store at Tuen Mun Area 44 is identified as a potentially Hazardous Installation (PHI). The potential risk within the consultation zone (CZ) shall be determined. A Quantitative Risk Assessment (QRA) has been carried out. The methodologies include collecting relevant data and information, identification and evaluation of all hazardous scenarios, and identification of risk mitigation measures. **Fault Tree Analysis (FTA)**: estimation of hazardous scenario frequency. **PhastRisk 6.7**: consequence and impact analysis, and risk integration	• The LPG facilities and LPG annual deliveries adopted in the TME EIA Study were based on the Environmental Impact Assessment for Proposed Complex and Wholesale Fish Market at Area 44, Tuen Mun (Register No.: AEIAR-070/2003) (WFM EIA study). • It was assumed that the delivery of LPG to the LPG Store is taken during daytime only and a 35m length of pipework was assumed for the consideration of vaporisers' failure. • It was assumed that LPG road tankers are of 9-tonne. • It was assumed that the LPG throughput of the LPG Store is similar or less than those applied in the hazard to life assessment in the WFM EIA study. • The number of annual LPG deliveries was estimated to be 365 and the time spent on site by a road tanker to complete LPG unloading for each delivery is about 40 minutes. • The rates of LPG release to be adopted was quoted from the paper Quantitative Risk Assessment Methodology for LPG Installations (Reeves, Minah and Chow, 1997). • It was assumed in FTA that all failures in a system are binary in nature, a component or operator either performs successfully or	Generic frequencies are based on literature review. They have been reviewed and updated, wherever necessary.	N/A	Hazard to Life Assessment Methodology Paper	N/A

	fails completely. In addition, the system is assumed to be functioning if all sub-components are operating properly. • Immediate ignition probabilities of 0.9 and 0.05 were adopted for instantaneous release and continuous release of LPG respectively. • The fatality rates for indoor persons were assumed to be 10% and 50% of the outdoor fatality rate for flash fire and fireball respectively. • Jet fire events was assumed to only affect population below 10m elevation, and either horizontal or near-horizontal. As with flashfires, only population exposed (below 10m elevation) was considered in the risk summation for jet fire events, the rest being excluded by use of protection factor. • For building wholly within the fireball diameter, population at the back of the building were considered protected. • For building wholly outside the fireball diameter, population without direct line of sight of the LPG facilities were considered protected. • For building partly inside and partly outside of the fireball diameter, population outside the fireball diameter are considered shielded by the rest of the building.				