Project Profile

Proposed Modifications to the Existing Ventilation Shafts of the MTRC Kowloon Station

Project Proponent: MTR Corporation Limited

Date: June 2004

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1 BASIC INFORMATION

1.1 Project Title

1.1.1 Proposed minor modifications to the existing ventilation shafts at the podium of the existing MTRC Kowloon Station.

1.2 Project Description

1.2.1 Due to operational requirement, two ventilation shafts (N1 and S1) located at the northern and southern side of the existing podium of the MTRC Kowloon Station shall be modified.

1.2.2 The purpose of the ventilation system is to supply and exhaust air for passenger safety and comfort. The fans connected to the vents are located under the ventilation shafts and connect to the trackway or platform. Ventilation shaft N1 and S1 are both exhaust air vent during normal operation. Under normal operation, there shall be no combustible products exhaust and intake through the ventilation shafts. During emergency situation, some of the ventilation shafts shall be used for smoke extraction under smoke extraction mode.

1.3 Name of Project Proponent

1.3.1 MTR Corporation Limited (MTRC) shall be responsible for the proposed modification of the existing ventilation shafts at the podium of the existing Kowloon Station. On completion of the proposed modification, MTRC shall be responsible for the operation of the ventilation shafts.

1.4 Location and Scale of Project

1.4.1 The existing location of the ventilation shafts are located at the podium of the MTRC Kowloon Station, the location of the ventilation shafts is shown in Figure 1-1.

1.4.2 The proposed modification involve reducing the heights of the ventilation shaft, and changing the direction of the discharge from sideways to upward.

1.5 Proposed Modification to be covered by the Project Profile

1.5.1 In accordance with Section 9(2)(g) of the Environmental Impact Assessment Ordinance (EIAO), the modification works (the Project) is an exempted designated project as the Kowloon Station had commenced construction before the EIAO came into effect on 1 April 1998. However, since the proposed modification works involve physical alternation to existing facilities associated with the operation of the Kowloon Station and may cause adverse impacts to the surrounding environment if mitigation measures are not in place, it shall be considered as a project constituting a material change to an exempted designated project under Schedule 2 of the EIAO. This project profile covers the proposed modifications to the existing ventilation shafts at the podium of the MTRC Kowloon Station. Details regarding the changes for ventilation shafts are presented in Table 1-1. Location of the ventilation shafts are shown in the circles of Figure 1-2.

Table 1-1 Proposed Modification for the Ventilation Shafts of the MTRC Kowloon Station

Ventilation Shaft	Existing vent top level (mPD)	Proposed vent top level (mPD)	Description of Changes
N1	22.90	14.30	• Reduce height by 8.6m • Direction of discharge changed from side to upward
S1	22.90	15.09	• Reduce height by 7.81m • Direction of discharge changed from side to upward

1.6 Name and Telephone Number of Contact Persons

Company	MTR Corporation
Contact person	Dr. Glenn Frommer
Address	MTR Tower, Telford Plaza, Kowloon Bay Hong Kong
Telephone	2993 3543
Facsimile	2993 7743

1.7 Project Time Table

1.7.1 The proposed modification works are expected to take 11 months. Table 1-2 shows the indicative construction time-table of the proposed modification for ventilation shaft S1 and N1.

Table 1-2 Indicative Time-table of the Proposed Ventilation Shafts Modification Works

Construction Activities	Month										
	1	2	3	4	5	6	7	8	9	10	11
S1											
N1											

1.8 Interactions with Other Projects

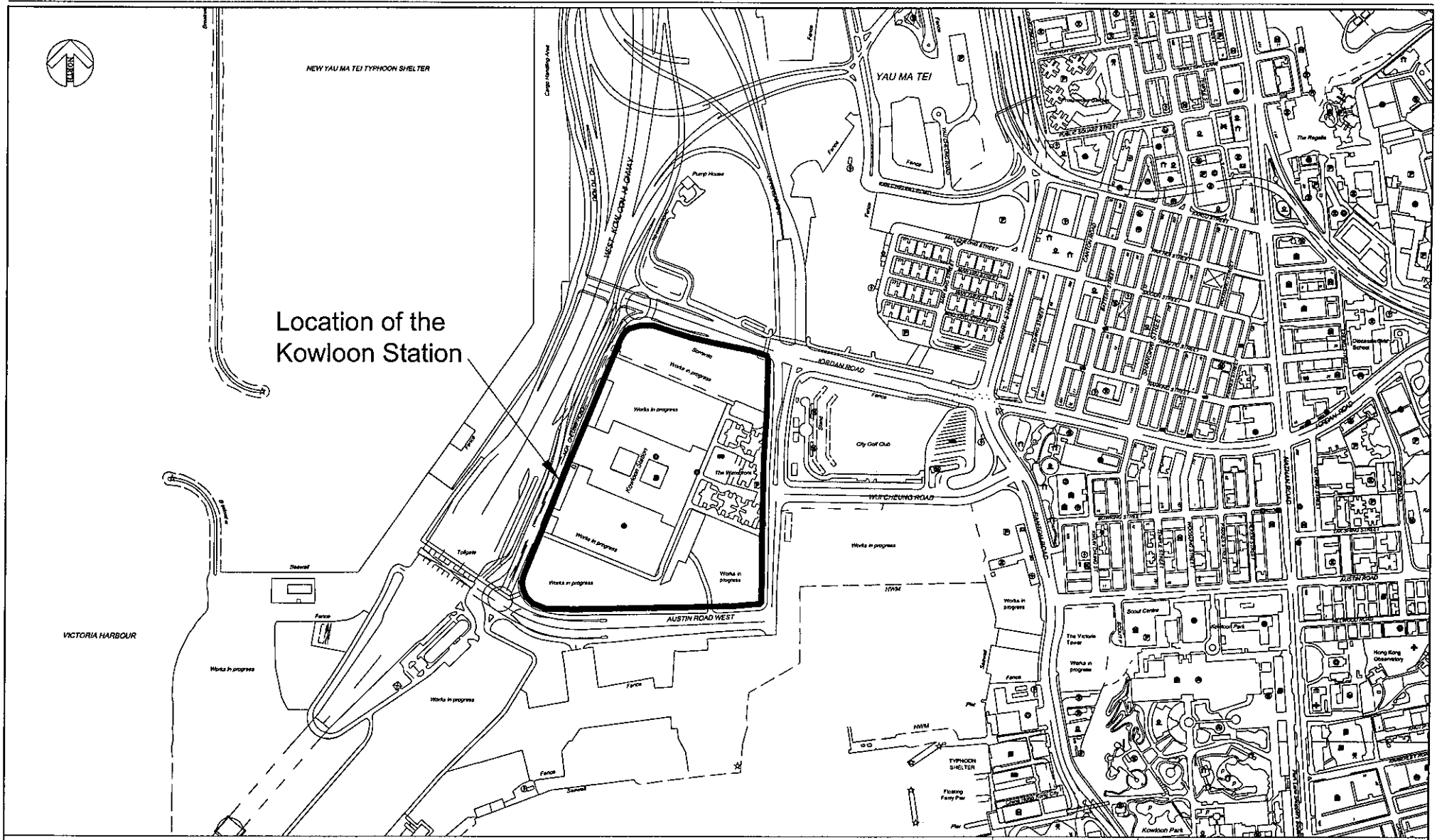
1.8.1 Based on the tentative programme, the proposed modification works should have no interaction with other designated project during the construction phase. Cumulative construction impacts due to other designed projects on the sensitive receivers are not envisaged.

1.9 Identification of Surrounding Sensitive Receivers

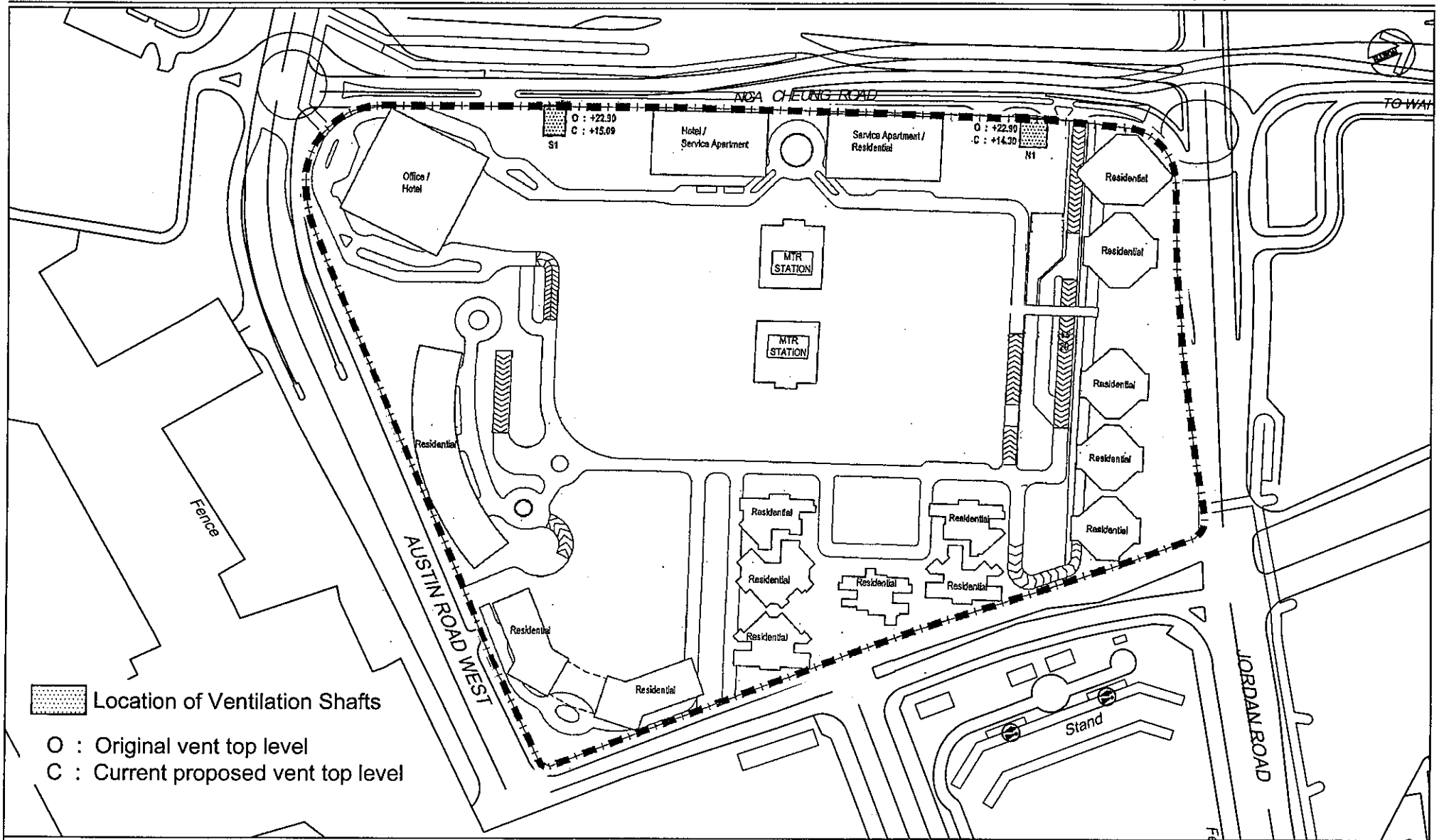
1.9.1 The Project site is located in urban area of Yau Ma Tei, on top of the podium of the existing MTRC Kowloon Station. The ventilation shafts subjected to the proposed modification were completed as part of the construction of the existing Kowloon Station Development.

1.9.2 The Project site is surrounded by residential high-rise along Jordan Road, Lin Cheung Road, and Austin Road West. To the immediate north of the Project site is a residential development, the Sorrento. To the immediate east of the Project site is a residential development, the Waterfront. To the south-west of the Project site is under construction as part of Kowloon Station Phase 3 Project. To the immediate south is also a residential development, the HarbourSide, which construction has been completed but has not yet been occupied. To the western bound of the Project site is Nga Cheung Road and the West Kowloon Highway.

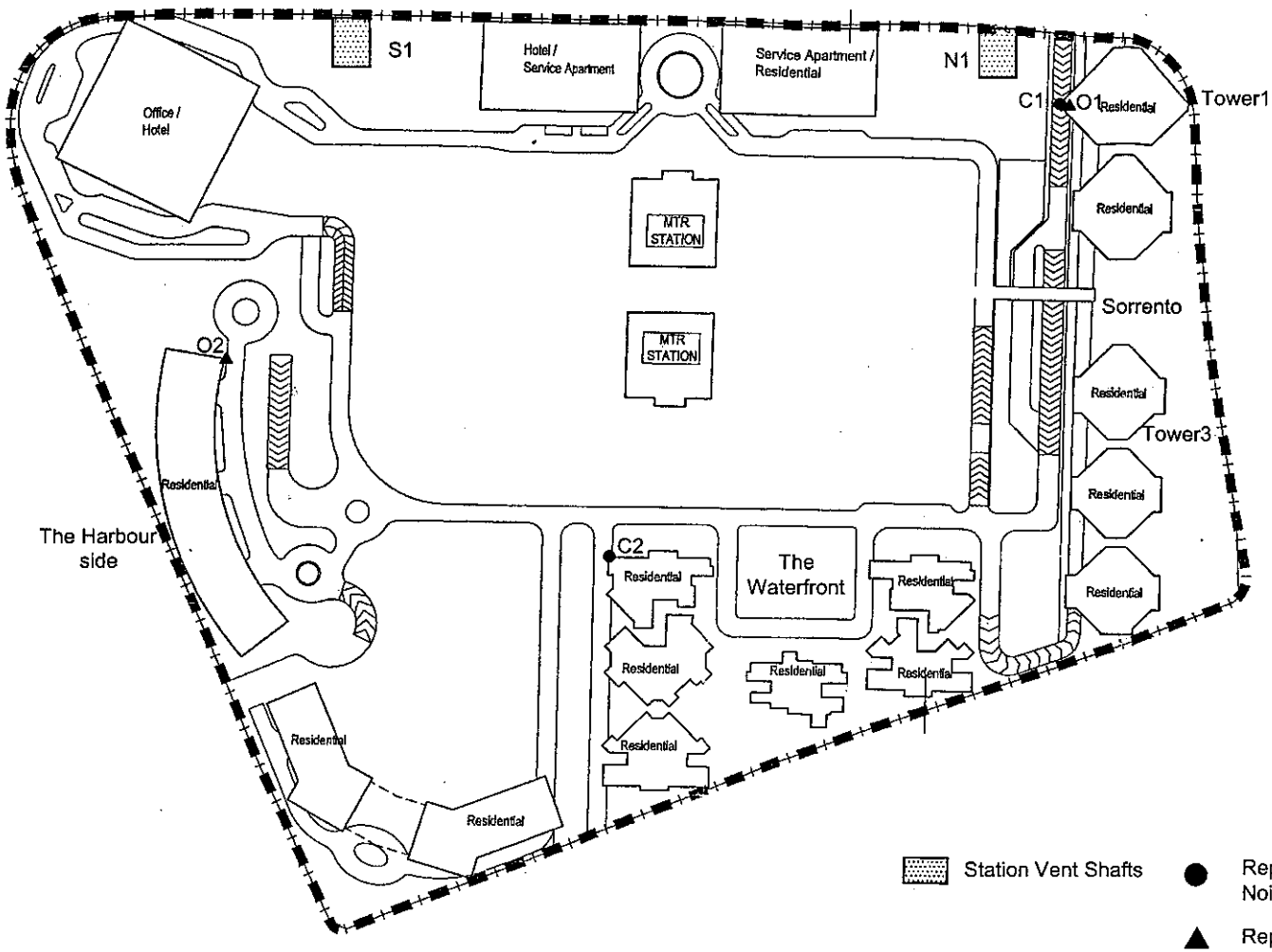
1.9.3 Most of the residential dwellings are located on top of the Kowloon Station that are considered as sensitive receivers are located to the north, east and south of the proposed Project site. It is not envisioned that there would be any direct impact outside the Kowloon Station area. Locations of the identified sensitive receivers are indicated in Figure 1-3 (C1, C2 and O2).



Title: Location of the MTRC Kowloon Station	**Figure:** 1-1	地鐵公司 MTR Corporation
Project: Project Profile - Proposed Modification to the Existing Ventilation Shafts of the MTRC Kowloon Station	**Scale:** NTS	



Title: Location of Ventilation Shafts	**Figure:** 1-2	地鐵公司 MTR Corporation
Project: Project Profile - Proposed Modification to the Existing Ventilation Shafts of the MTRC Kowloon Station	**Scale:** NTS	



Title: Location of the Sensitive Receivers	**Figure: 1-3**	地鐵公司 MTR Corporation
Project: Project Profile - Proposed Modification to the Existing Ventilation Shafts of the MTRC Kowloon Station	**Scale: NTS**	

2 POSSIBLE IMPACT ON THE ENVIRONMENT – CONSTRUCTION PHASE

2.1 General Summary on the Key Issues

2.1.1 The main construction activities to be carried out in the Project are minor modifications to the existing ventilation shafts, which involve reducing the height of ventilation shafts, changing the direction of exhaust from sideway to upward, and installation of silencers.

2.1.2 During the construction phase, the major impacts on the environment are fugitive dust emission and noise impact as a result of various construction activities.

2.1.3 Other environmental impacts, such as water quality impact from construction runoff, ecological and visual impact will be minor because of the limited scale of the Project. Details of the potential construction impacts on the environment are described in the following sections.

2.2 Gaseous Emissions from Construction Phase

2.2.1 Construction dust impact could arise during the construction phase of the Project. Saw-cutting is a major construction activity where possible fugitive dust emissions can be expected. However, given the limited scale of the Project and the short time scale, no significant air quality impact is anticipated. Besides, the Contractor should strictly follows the mitigation measures stipulated in the *Air Pollution Control (Construction Dust) Regulation of Air Pollution Control Ordinance* (APCO).

2.3 Construction Site Noisy Operations

2.3.1 Modification works for the ventilation shafts will involve various construction activities, such as demolition works, finishing works and installation of operational noise mitigation measures, where necessary. During the construction phase, all construction activities shall be carried out during non-restrictive hours from 0700 to 1900.

2.3.2 The modification of the ventilation shafts will involve mainly demolition of an excessive part of the ventilation shaft. After the demolition, minor finishing works and installation of acoustic measures would be conducted. Comparing the scale of minor finishing and installation works with that of demolition work, the demolition work is considered to be the most noisy construction activities. As a worst-case scenario, only demolition work is considered in the construction noise impact assessment.

2.3.3 From table 2-1, it is found that the worst-case scenario construction noise assessment is during the month 5 and 6, in which the construction activities for Ventilation Shaft S1 and N1 will be overlapped. Therefore, this period are used in this construction noise assessment only. Details of the construction noise impact assessment are shown in Appendix 2.

Table 2-1 Indicative Time-table of the Proposed Modification

Construction Activities	Month										
	1	2	3	4	5	6	7	8	9	10	11
S1	■	■	■	■	■	■					
N1					■	■	■	■	■	■	■

2.3.4 The equipment list in the Appendix 2 has been commented and agreed by MTRC. To reduce the potential construction noise impact upon the surrounding noise sensitive receivers, silence equipment, such as saw cutting and core drilling machine, will be used to remove the excessive part of the ventilation shaft. A platform will be provided for the workers to stand on and to demolish the excessive part. In addition, erection of a noise barrier on the platform to cover the cutting machine and core drilling machine, as well as proper schedule of the equipment will be employed in the demolition works to further reduce the potential construction noise impact.

2.3.5 It should be noted that the predicted noise level at the sensitive receiver due to construction activities should not exceed 75 dB(A) in accordance with EPD's ProPECC Note PN2/93. However, it is understood that there may be some other construction works, which are to be carried out at the podium of the MTRC Kowloon Station simultaneously. Therefore, the background noise level at the representative NSRs due to other concurrent construction works is assumed to be 75 dB(A) for calculating the cumulative construction noise assessment as a worst-case scenario.

2.3.6 Table 2-2 at below shows the predicted cumulative construction noise impact result at the representative noise sensitive receivers due to the Project and other possible concurrent construction projects on top of the podium. It was found that the sensitive receivers is expected to comply with the daytime construction noise level of 75 dB(A).

Table 2-2 Construction Noise Level at Selected NSRs for the Ventilation Shaft Modification

Representative Sensitive Receiver	Ventilation Shaft	Distance from the Ventilation Shaft (m)	Predicted Noise Level due to the construction work of the Ventilation Shaft only, dB(A)	Assumed Noise Level at NSR due to concurrent construction activities, dB(A)	Predicted Cumulative Noise Level at NSR, dB(A)
NSR C1	N1	35	64	75	75
	S1	292	45		
NSR C2	N1	252	47	75	75
	S1	228	47		

2.4 Other Impacts from Construction Activities

2.4.1 Site construction activities will inevitably have the potential to generate wastewater. Potential major sources of water quality impacts may arise from the discharge of construction wastewater and site run-off into stormwater drains during the construction phase of the Project. Surface run-off shall be handled through existing surface drain within the Kowloon Station. Mitigation measures had been implemented to control the construction site run-off, possible impacts on water quality are minimised. However, given the limited scale of the Project as well as the absence of water body in the vicinity of the MTRC Kowloon Station, significant water quality impact would not be anticipated.

2.4.2 The ventilation shafts are constructed as part of the development of the existing Kowloon Station in concrete paved urban area. The ecological value of the existing site in terms of terrestrial ecology is non-existent. The proposed modification works would have no impact on the ecological value.

2.4.3 The Contractor shall observe and comply with the Waste Disposal Ordinance (WDO) [Cap 354] and its subsidiary regulations, especially the Waste Disposal (Chemical Waste) (General) Regulation. The Contractor shall apply for registration as a chemical waste producer under the *Waste Disposal (Chemical Waste) (General) Regulation* if chemical waste is to be produced. All chemical waste shall be properly stored, labelled, packaged and collected in accordance with the Regulation.

2.4.4 The Contractor shall use best endeavours to minimise the generation of waste from his work. Avoidance and minimisation of waste generation can be achieved through changing or improving design and practices, careful planning and good site management. The reuse and recycling of waste shall be practised as far as possible. The recycled materials could include paper/cardboard, timber, metal, etc.

2.4.5 The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The public fill which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt can be reused in earth filling, reclamation or site formation works. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled where possible and, as the last resort, disposal of at landfills. The total estimated quantity of C&D waste generated from proposed modification works should be approximately 500m^3.

2.4.6 In order to avoid dust or odour impacts, any vehicles leaving a works area carrying construction waste or public fill should have their load covered.

2.4.7 As good practices, the Contractor shall avoid excessive use of wood. Reusable steel shutters should be used as a preferred alternative to formwork and falsework where possible.

2.4.8 Given the limited scale and time frame for the proposed modification work, it is expected that there is no mitigation measures required regarding the waste management issues. However, it is still advised for the Contractor to keep the works area tidy and ensure that construction wastes are properly stored and disposed of as a proactive measure.

2.4.9 Given the reduction in height of the proposed modifications, no particular unsightly visual appearance upon the sensitive receivers are envisaged.

3 POSSIBLE IMPACT ON THE ENVIRONMENT – OPERATIONAL PHASE

3.1 General Summary of the Key Issues

3.1.1 The major potential environmental impact from the operation of this Project are the operational air quality and operational noise impacts. Other environmental impacts, including water quality, waste generation and ecological issues, from the operation phase of the Project are considered to be minor.

3.2 Operational Air Quality

3.2.1 It is noted that the purpose of the ventilation system is to supply and exhaust air for passenger safety and comfort. There are ventilation shafts for both exhaust and intake of air from the trackway or platform. During normal operation, there shall be no combustible products being exhausted and intake through the ventilation shafts. The exhaust and intake through the ventilation shafts involves only ambient air.

3.2.2 During an emergency situation, some of the ventilation shafts shall be used for smoke extraction under smoke extraction mode. Maintenance and testing were carried out to ensure the reliability of the ventilation shafts under smoke extraction mode. As such maintenance and testing shall only last a very short time period at the frequency of twice a year, it is anticipated that the operational air impact to the surrounding environment should be minimal.

3.2.3 Modification of ventilation shaft N1 and S1 involves reducing the height of the ventilation shafts and a change in direction of airflow from sideway to upwards. The capacity of the ventilation equipment shall remain unchanged to the existing ventilation equipment. Since the relative dimensions of the ventilation shaft are large in comparison, the effect of air friction on the airflow shall be negligible. A reduction in the height of the ventilation shafts shall have insignificant impact to the airflow with respect to the existing design of the ventilation shafts. No mitigation measures shall be required.

3.3 Operational Phase Noise Impact

3.3.1 For assessment of operational noise impact, the recommended noise standards presented in Chapter 9, "Environment", of the Hong Kong Planning Standards and Guidelines (HKPSG) for planning against possible noise impact from fixed sources shall be used. According to the guidelines, the maximum noise level arising from fixed noise sources, measured in terms of $L_{eq\,(30\,min)}$ is required to be designed as 5 dB(A) below the Acceptable Noise Level (ANL) as specified in the "*Technical Memorandum (TM) for the Assessment of Noise From Places other than Domestic Premises, Public Places or Construction Sites*" or as the prevailing background noise level, whichever is lower, at all noise sensitive facades of new dwellings.

3.3.2 According to the *Technical Memorandum of Environmental Impact Assessment Ordinance* (TM-EIAO), the area sensitive rating of the Project site is graded "B". Therefore, for planning purposes, the assessment criteria (i.e. ANL-5) for area sensitive rating of "B" is therefore 60 dB(A) for daytime operation, and 50 dB(A) for nighttime operation respectively.

3.3.3 As the assessment standard for nighttime operation is a more stringent than that of daytime, assessment shall be carried out with the more stringent assessment standard of 50 dB(A) for nighttime operation, as the operational pattern for both daytime and nighttime are confirmed by MTRC to be the same. In this assessment, only residential buildings are considered to be sensitive receivers. Those buildings, like hotel and office, are very likely to be equipped with air-conditioning and fixed window. Therefore, these buildings are not considered to be noise sensitive and will not be consider in this assessment.

3.3.4 The proposed modifications involve lowering the heights of the ventilation shafts, which effectively reduces the void volume and internal surface of the ventilation shafts. Table 3-1 shows a comparison of the internal surface area and the associated room constant before and after the modification works.

3.3.5 From Table 3-1, it is indicated that the room constant of the ventilation shaft should be reduced after the modification works, hence the noise level emitted from these ventilation shafts should increase due to an increase in reverberation within a smaller enclosed area. The noise levels to be experienced by the nearest sensitive receivers are expected to be greater. Mitigation measures have been proposed to reduce the noise level emitted from the shafts down to an acceptable standard as stipulated in the Noise Control Ordinance.

Table 3-1 Surface Area and associated Room Constant of Ventilation Shaft

Ventilation Shaft	Before modification		After modification	
	Approximate Internal Surface area [1] (m^2)	Approximate Room Constant [2]	Approximate Internal Surface area [1] (m^2)	Approximate Room Constant [2]
N1	994	10	483	5
S1	1039	10	565	6

Note:
[1] Please see Appendix 2 for details
[2] Room Constant = $S\alpha / (1 - \alpha)$, where S is the total surface area of a room and α is the average absorption coefficient. For a simplified scenario, α is assumed to be 0.01, which is equal to that of concrete material.

3.3.6 In order to comply with the planning noise level standard of 50 dB(A), (ANL – 5) , maximum allowable noise levels emitted from the ventilation shafts can be set to prevent any excessive impact. Table 3-2 at below shows the predicted maximum allowable noise level upon the exhaust of the ventilation shafts at the NSRs of the Kowloon Station with the ANL-5 standard. Installation of silencer(s) has been proposed to mitigate the noise level emitted from the ventilation shafts.

Table 3-2 Maximum Allowable Noise Level at the Ventilation Shaft

Ventilation Shaft	NSR	Noise standard dB(A) (ANL – 5)	Slant Distance (m)	Distance Attenuation dB(A)	Façade Correction dB(A)	Maximum Allowable Noise Level at the exhaust of the ventilation shaft dB(A) [1]
N1	NSR O1	50	33	38	3	85
S1	NSR O2	50	133	50	3	97

Note:
[1] Maximum allowable noise level = Noise Standard + Distance Attenuation – Façade correction

3.4 Other Impacts of the Operation

3.4.1 Since the whole Project is to provide minor modification to the existing ventilation shaft of the MTRC Kowloon Station, no further impacts on ecological value, water quality and generation of waste are expected from operational phase.

4 USE OF PREVIOUSLY APPROVED EIA REPORTS

4.1 Past Environmental Impact Assessment Reports

4.1.1 The Lantau and Airport Railway (LAR) is an Exempted Designation Project under the EIAO. No detail descriptions of railway ventilation structures are supplied.

Appendix 1

Implementation Schedule

Implementation Schedule
Proposed Minor Modifications to the Existing Ventilation Shafts at the Union Square of the MTRC Kowloon Station

Project Profile Ref.:	Recommended Mitigation Measures	Location of the measure	Who to implement the measure	When to implement the measures	What requirements or standards for the measure to achieve*	Objectives of the Recommended Measure & Main Concern to address
	Air Quality Impact during the Construction Phase					
2.2.1	To follow all the requirements for dust control stipulated in the Air Pollution Control (Construction Dust) Regulation.	Site	Contractor	Construction Phase	TM-EIA, APC(CD)R & AQO in APCO	To control fugitive dust emissions in accordance with the requirements of Air Pollution Control (Construction Dust) Regulation in principle; Reduce fugitive emission wherever possible
	Noise Impact during the Construction Phase					
General	Ensure that all plant and equipment to be used on Site are properly maintained in good operating condition and noisy construction activities shall be effectively sound-reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means, to avoid disturbance to any nearby noise sensitive receivers	Site	Contractor	Construction Phase	TM-EIA, NCO	To control noisy activities during construction in accordance with the requirements of the Noise Control Ordinance in principle.
General	When necessary, apply for a construction noise permit in accordance with the Noise Control (General) Regulations prior to the commencement of the relevant part(s) of the works, display the permit as required and provide a copy to the Engineer.	Site	Contractor	Construction Phase	TM-EIA, NCO	To control noisy activities during construction in accordance with the requirements of the Noise Control Ordinance in principle.
2.3.8	Erection of solid structure noise barrier, and the use of silence equipment	Site	Contractor	Construction Phase	TM-EIA, NCO	To control noisy activities during construction in accordance with the requirements of the Noise Control Ordinance in principle.
	Construction Phase Water Quality Impact					
2.4.1	To carry out the Works in such a manner as to minimise adverse impacts on the water quality during execution of the works. In particular he shall arrange his method of working to minimise the effects on the water quality within and outside the Site, on the transport routes and at the loading, dredging and dumping areas.	Site	Contractor	Construction Phase	WPCO	To comply with the Water Pollution Control Ordinance and its subsidiary regulation.

Project Profile Ref.:	Recommended Mitigation Measures	Location of the measure	Who to implement the measure	When to implement the measures	What requirements or standards for the measure to achieve*	Objectives of the Recommended Measure & Main Concern to address
	To follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures as specified in the Professional Persons Environmental Consultative Committee Practice Note (ProPECC PN) 1/94 "Construction Site Drainage" issued by the Director of Environmental Protection. The design of the mitigation measures shall be submitted by the Contractor to the Engineer's Representative for approval.	Site	Contractor	Construction Phase	ProPECC PN1/94 & WPCO	To comply with the Water Pollution Control Ordinance and its subsidiary regulation.
	Waste Management during the Construction Phase					
2.4.3	To register as a chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation if chemical waste is to be produced and to properly store, label, package and collect all chemical waste in accordance with the Regulation.	Site	Contractor	Early Construction Phase	WD(CW)(G)R	To follow the Waste Disposal (Chemical Waste)(General) Regulation if chemical waste is to be produced.
	To minimize the production of construction waste through careful design, planning, good site management, and control of ordering procedures, segregation and reuse of materials	Site	Contractor	Construction Phase	WDO, ETWBTC No. 15/2003	To follow the relevant Waste Disposal Ordinance) and its subsidiary regulations and the ETWB Technical Circular No. 15/2003 "Waste Management on Construction Site" in all circumstances.
	Visual and Landscape Impacts during the Construction Phase					
2.4.8-9	To keep the works area tidy and ensure that construction wastes are properly stored and disposed of	Site	Contractor	Construction Phase	TM-EIA	To minimize the transient and localized visual intrusion of the works area.
	Noise Impact during the Operational Phase					
3.3.6	Installation of silencers for ventilation shafts under the proposed modification.	Site	Contractor	Construction / operational Phase	TM-EIA	To minimize the operational noise impact following the recommendation in the Project Profile.

*Abbreviation
TM-EIA – Technical Memorandum on Environmental Impact Assessment Process
AQO – Air Quality Objectives
APCO – Air Pollution Control Ordinance
APC(CD)R - Air Pollution Control (Construction Dust) Regulation
WPCO – Water Pollution Control Ordinance
WDO – Waste Disposal Ordinance
WD(CW)(G)R – Waste Disposal (Chemical Waste)(General) Regulation
ETWBTC No. 15/2003 – Environment, Transport and Works Bureau Technical Circular No. 15/2003 - Waste Management on Construction Sites

Appendix 2

Details of Construction Noise Assessment

Table A2.1 Calculation of Sound Power Level for the Sub-Procedure Construction Works

Equipment	No.	ID Code	Sound Power Level dB(A)	Utilization	Barrier Correction dB(A)
Cutting of excessive ventilation shaft part					
Blade Saw Cutting Machine	1	C.6 - 53	112	50%	-10
Core Drilling Machine	1	C6 - 54	104	50%	-10
Sub-Procedure Noise Level			100		
Removal of the Construction and Demolition material					
Hydraulic Mobile Crane	1	C.6 - 29	101	50%	N/A
Truck	1	C.7 - 81	96	50%	N/A
Sub-Procedure Noise Level			99		

Note: A mobile noise barrier with surface density at-least 20kg/m² or equivalent acoustic performance is erected on the platform to enclose the blade saw cutting machine and core drilling machine.

Table A2.2 Calculation of Predicted Construction Noise Level at the NSRs at Various Sub-Procedure Construction Activities

NSR	Ventilation Shaft (VS)	Shortest Slant Distance from the centre of the VS to NSR(m)	Dist. Corr. dB(A)	Façade Corr. dB(A)	Predicted Noise Level due to the construction work of the Ventilation Shaft only, dB(A)	Assumed Noise Level at NSR due to concurrent construction activities, dB(A)	Cumulative Noise Level at NSR, dB(A)	Standard, Leq, dB(A)
Cutting of excessive ventilation shaft part								
C1	N1	35	39	3	64	75	75	75
	S1	292	57	3	45			
C2	N1	252	56	3	47	75	75	75
	S1	228	55	3	47			
Removal of the Construction and Demolition material								
C1	N1	35	39	3	63	75	75	75
	S1	292	57	3	45			
C2	N1	252	56	3	46	75	75	75
	S1	228	55	3	47			

Appendix 3

Details of Operational Noise Assessment

Appendix 3 : Operational Noise Assessment

Ventilation Shaft	Nearest NSR	With CentralA /C (Y/N)?	Design Status (Original, O / Current Proposed, C)	NSR lowest unit level, (mPD), Z	Vent Shaft Top Level, (mPD), Z'	Diff Z (Z -Z')	base elevation of the Vent Shaft (mPD)	Width of Vent Shaft, (m), x	Length of Vent Shaft, (m) , y	Surface Area Each cell (m^2)	No. of Cell	Total Surface Area (m^2)	Room Constant	Diff. In Room Constant	Horizontal Distance from Vent Shaft to the Sensitive Use (X)	Slant Distance from Vent Shaft to nearest Sensitive Façade (m)	Distance Attenuation dB(A)	ANL - 5 dB(A)	Façade Corr. dB(A)	Maximum Allowable Noise Level at the exhaust of the ventilation shaft dB(A)
N1	O1	N	O	41.05	22.9	18.15	13.4	12.5	17.2	994	1	994	10							
N1	O1	N	C	41.05	14.3	26.75	13.4	12.5	17.2	483	1	483	5	-5	20	33	38	50	3	85
S1	O2	N	O	39.95	22.9	17.05	13.4	14.8	15.6	1039	1	1039	10							
S1	O2	N	C	39.95	15.09	24.86	13.4	14.8	15.6	565	1	565	6	-5	131	133	50	50	3	97

Note

Maximum allowable noise level = Noise Standard + Distance Attenuation – Façade correction