Kowloon-Canton Railway Corporation

West Rail

ERM

KCRC

Final Assessment Report
Technical Annexes
Contract No. TS-900
Environmental Impact Assessment

KCRC-WEST RAIL
DCC#: TS0900-0046-1
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West Rail

West Kowloon to Tuen Mun Centre
Final Assessment Report

Technical Annexes

For and on behalf of ERM-Hong Kong, Ltd

Approved by: S.M. LAISTER

Signed:

Position: EXECUTIVE DIRECTOR

Date: 11th February 1998

1. PREFACE

1.1 Study Background

The Kowloon-Canton Railway Corporation (KCRC) has commissioned Environmental Resources Management Hong Kong Limited (ERM-Hong Kong) to undertake an Environmental Impact Assessment (EIA) of the proposed new Western Corridor Railway; more commonly known as "West Rail".

The West Rail EIA Study has been undertaken by a multi-disciplinary team led by ERM-Hong Kong and supported by the following specialist subconsultants: British Rail Research (providing noise source term information and advice on rail and track technology issues); Urbis Limited (providing input to the landscaping strategy and on strategic planning issues); Ecosystems Limited (providing ecological input); Hydraulics and Water Research (water modelling); the Museum of London Archaeological Service (archaeological mitigation input) and Wilson Ihrig and Associates (specialist advice on operational noise issues).

1.2 The Final Assessment Report and Technical Annexes

The Final Assessment Report, as its name suggests, is the penultimate document in the series of environmental reports being produced for the KCRC in order to fulfill the requirements of the EIA process; the last report being the EM&A Manual which will be submitted separately following finalisation of the FAR.

Similar to the IAR, the FAR has been prepared in two volumes. The first, the main report, includes details of the assessment such as baseline conditions, the methodology and criteria used, the results of the assessment and a discussion of their significance including appropriate mitigation measures as required.

The second volume, this document, the Technical Annexes, contains supporting technical information related to the assessments conducted in the FAR but which is not directly relevant to the findings therein. For the disciplines of air quality and operational noise, for example, it contains information crucial to the prediction and outlines the extent of mitigation measures required respectively, as summarised in the main report. For ecology, it presents information which document the baseline conditions adjacent to West Rail and which are pertinent to the evaluation and assessment of baseline conditions. While the Technical Annexes are issued as a stand alone document, they should be read in parallel with the information and discussion in the Final Assessment Report.

Annex A

Listing and Location of Identified Air and Noise Sensitive Receivers

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Southern Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Tai Kok Tsui (TKT)	1	2	Sharon Lutheran School	E	x	x			C
	2	2	Ming Kei Secondary School	E	x	x			C
	3	2	Cherry Building	R	x	x			C
	4	2	Kam Mong Building	R	x	x			C
	5	2	Fu Tor Loy Sun Cheun Stage I	R	x	x			C
	6	2	Library in Cherry Street	O	x	x			C
	7	2	Hoi Ming Court	R	x	x			C
	8	2	Tai Kok Tsui Site A	O	x	x			C
	9	2	Fook Kwan Building	R	x	x			C
	10	2	Tai Kok Tsui Centre	O	x	x			C
	11	2	Tai Chi Factory Building	I	x				-
	12	2	Tai Lee Building	R	x	x		x	C
	13	2	Tai Yick Building	R	x	x			C
	14	2	Tai Ying Building	R	x	x			C
	15	2	Tai Wah Bulding	R	x	x			C
	16	2	Chung Sing Building	R	x	x			C
	17	2	Chung Yew Building	R	x	x	x	x	C
	18	2	Chung Kin Building	R	x	x			C
	19	2	Industrial Blocks along Lok Kwan Street	R	x				-
	20	2	Hyfoo Industrial Building	I	x				-
	21	2	Residential Blocks along Tung Chau St. (between Boundary St. and Tai Kok Tsui Road)	R	x	x			C
	22	2	Residential Blocks along Tung Chau St. (between Nam Cheong St. and Pei Ho St.)	R	x	x			C
	23	2	Tung Chau Street Park	Rec	x				-
	24	2	Nam Cheong Estate	R	x	x	x	x	C
	25	2	Residential Blocks along Tung Chau St. (between Yen Chow St. and Kiu Kiang St.)	R	x	x			C
	26	2	Kam Hoi Mansion	R	x	x			C
	27	2	Lok Kwan Street Park	Rec	x				-
	C1[2]	2	MTRC CDA Site D	R	x	x	x	x	C
	C2[2]	2	Schools/Indoor Recreation Centre	E	x	x			C
	C3[2]	2	MTRC CDA Site C	R	x	x			C
	C4[2]	2	MTRC CDA Site B	R	x	x			C
Cheung Sha Wan	1	3	Yen Chow Street Temporary Housing Association	R	x	x			C
(CSW)	2	3	Territory Development Department Kowloon Development Office	O	x	x			C
	3	3	Sham Shui Po Park & Swimming Pool	Rec	x				-
	4	3	Fat Tsueng Street Temporary Housing Association	R	x	x	x	x	C
	5	3	Yun Fat Godown	I	x				-
	6	3	Ka Lee Hung Kei Godown	I	x				-
	7	3	Chiao Chi Building	I	x				-
	8	3	Haking Wong Technical Institute Workfront Annexe	E	x	x	x	x	C
	9	3	Hong Kong Telecom Sports Complex	Rec	x		x		-
	10	3	Hong Kong Telecom Exchange	O	x	x			C
	11	3	Wholesale Market	O	x	x	x		C
	C1[2]	3	CDA	R	x	x	x		C
	C2[2]	3	Public Rental Housing/PSPS Housing	R	x	x			C
	C3[1, 2]	3	Schools/GIC	E	x	x	x	x	C
	C4[2]	3	Industrial/Office by New Kowloon Marine	I/O	x	x			C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Southern Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Mei Foo (MEF)	1	4	Lai Chi Kok Park to the east of Mei Foo Sun Chuen	Rec	x		x		-
	2	4	Kowloon Motor Bus Depot	O	x	x			C
	3	4	Community Centre in Mei Foo Sun Chuen	Rec/O	x	x	x	x	C
	4	4	Mei Foo Sun Chuen Blk 8	R	x	x	x	x	C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Central Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Mei Foo (MEF)	5	4	Lai Chi Kok Park adjacent to swimming pool	Rec	x		x		-
	6	4	Lai Chi Kok Swimming Pool	Rec	x		x		-
	7	4	Lai Chi Kok Urban Council and Urban Services Department Training School	E	x	x			C
	8	4	Lai Chi Kok Indoor Games Hall	Rec	x				-
	9	4	Mei Foo sun Chuen Block 16	R	x	x	x	x	C
	10	4	Mount Streling Mall	Rec	x	x	x	x	C
Lai King (LAK)	1	5	Ching Lai Commercial Centre	O	x	x	x		C
	2	5	Ching Lai Court	R	x	x	x	x	C
	3	5	Princess Margaret Hospital	H	x	x	x	x	C
	4	5	Lai King Terrace	R	x	x			C
	5	5	Lai Chi Kok Bay Garden	R	x	x	x		C
	6	5	Wah Fung Garden	R	x	x	x		C
	7	5	Kwai Chung Hospital	H	x	x			B
	8	5	Kau Wah Keng San Tsuen	R	x	x		x	B
	9	5	Football Field	Rec	x				-
	10	5	Lai King Training Centre	O	x	x			B
	11	5	Yan Chai Hospital Chinachem Care and Attention Home	A	x	x			B
	12	5	Yan Chai Hospital Mrs Kwok Yuk Cheung Care and Attention Home	A	x	x			B
	13	5	Lai King Fire Station	O	x	x			B
	14	5	Tsui Yiu Court	R	x	x			B
	15	5	Kwai Chung Methodist College	E	x	x		x	B
	16	5	Lai Yiu Estate	R	x	x			B
	17	5	Buddhist Ho Lai Fung Primary School	E	x	x			B
	18	5	Tung Wah Group of Hospital Ko Ho Ning Memorial Primary School	E	x	x	x		B
	19	5	Ha Kwai Chung Polyclinic and Special Education Centre	E	x	x			B
	20	5	Lai King Estate	R	x	x			B
	21	5	Lingnam Dr Chung Wing Kwong Memorial Middle School	E	x	x	x	x	B
	22	5	Lai King Catholic Primary School	E	x	x			B
	C1[2]	5	Residential Development, HKHA	R	x	x	x	x	B
	C2[2]	5	Residential Development at Kau Wah Keng	R	x	x			B
Kwai Fong (KWF)	1	6	Kwai Yi Road Playground	Rec	x		x		-
	2	6	Kwai Fong Terrace	R	x	x	x		C
	3	6	New Kwai Fong Gardens	R	x	x			C
	4[3]	6	Kwai Tsing Theatre (WIP)	Rec	x	x	x	x	C
	5	6	Metroplaza	O	x	x			C
	6	6	Kwai Chung Plaza	R	x	x			C
	7	6	Fook Yip Building	I	x				-
	8	6	On Fook Industrial Building	I	x				-
	9	6	Wah Fung Industrial Building	I	x				-
	10	6	Prosperity Centre	I	x				-
	11	6	Marvel Industrial Building (Block A)	I	x				-
	12	6	Join In Hang Sing Centre	I	x				-
	13	6	Profit Industrial Centre	I	x				-
	14	6	Kwai Chung Sports Ground	Rec	x		x		-
	15	6	Lung Tong Building	R	x	x			C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Central Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
	16	6	S. Megga Industrial Building	I	x				-
	17	6	Wing Hang Industrial Building	I	x				-
	18	6	Foon Tak Building	R	x	x			C
	19	6	Ko Fong Building	R	x	x			C
	20	6	Yuet Long Building	R	x	x			C
	21	6	Victory Court	R	x	x			C
	22	6	Kwai Cheung Building	R	x	x			C
	23	6	Yee Lim Godown	I	x				-
	24	6	Lutheran School for the Deaf	E	x	x			C
	25 [3]	6	Hong Kong Housing Society Sandwich Class Housing Scheme at Hing Shing (WIP)	R	x	x			C
	26	6	Kwai Fuk Road Playground	Rec	x		x		-
	27	6	Yee Lim Industrial Centre (Blocks A & B)	I	x				-
	28	6	Hing Shing Road Playground	Rec	x				-
	29	6	Lions Prevocational School	E	x	x		x	C
	30	6	Kwai Shing Swimming Pool	Rec	x				-
	31	6	Kingford Industrial Building Block 2	I	x				-
	32	6	Oil Depot at Kwai Hei Street	I	x				-
	33	6	Kwai Shing West Estate	R	x	x			C
	34	6	Lee I Yao Memorial Secondary School	E	x	x		x	C
	35	6	Columbia International Removal	O	To be demolished prior to construction of West Rail & therefore is not considered a sensitive receiver				
	36	6	Kwai Shing Telephone Exchange	O	x	x			C
	37	6	Gold Way Industrial Centre	I	x				-
	38 [3]	6	CITIC Pacific Site (WIP)	R	x	x			C
	39	6	Godown (next to Gold Way Industrial Centre)	I	x				-
	40	6	S K H Chu Yan Primary School	E	x	x			C
	41	6	Wing Shing Industrial Building	I	x				-
	42 [3]	6	Industrial/Office development next to Wing Kei Road 5-a-side Soccer Pitch (WIP)	I/O	x	x			C
	43	6	Wing Kei Road 5-a-side Soccer Pitch	Rec	x				-
	44	6	Chun Shing Factory Estate	I	x				-
	45	6	Industrial/Office development at Shing Yiu Street	I/O	x	x			C
	46	6	Shun Hing Centre	I	x				-
	47	6	Sunley Centre	O	x	x	x		C
	48	6	Tak Fung Industrial Centre	I	x				-
	49	6	Sandoz Centre	I	x				-
	50	6	Lin Fung Centre	I	x				-
	51	6	Leader Industrial Centre	I	x				-
	52	6	Watson Building	I	x				-
	53	6	Riviera Gardens	R	x	x	x	x	C
	C1[2]	6	Composite Industrial/Office at Kwai Hei Street	O	x	x	x		C
Tsuen Wan West (TWN)	1	7	Metropolitan Industrial & Warehouse Building No.2	I	x				-
	2	7	Tsuen Wan Industrial Centre	I	x				-
	3	7	Water Side Plaza	R	x	x	x	x	C
	4	7	Peninsula Factory Building	I	x				-
	5	7	Texaco Road Industrial Centre (Block A)	I	x				-
	6	7	Factory (next to Texaco Industrial Centre Block A)	I	x				-
	7	7	Driving Test Centre	O	x	x			C
	8	7	Tsuen Wan Sport Ground	Rec	x				-

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Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
	9	7	Regional Council Yeung Uk Rd Complex	Rec	x				-
	10	7	Residential premises along Yeung Uk Rd	R	x	x			C
	11[3]	8	Tsuen Wan Transport Building (WIP)	O	x	x			C
	12	8	Wah Lai Building/Proposed HKHA Residential Development	R	x	x			C
	13	8	Tsuen Wan Transport Complex	O	x	x			C
	14	8	Skyline Plaza	R	x	x			C
	15	8	Tsuen Wan Plaza	R	x	x			C
	16	8	Clague Garden Estate Playground	Rec	x		x		-
	17	8	Clague Garden Estate	R	x	x		x	C
	18	8	Po On Commercial Association Wong Siu Ching Secondary School	E	x	x			C
	19	8	Chai Wan Kok Street Rest Garden	Rec	x				-
	20	8	Wah Chun Industrial Centre	I	x				-
	21	8	Wing Hing Industrial Centre	I	x				-
	22	8	Shield Industrial Centre	I	x		x		-
	23	8	Hing Shing Temporary Housing Area	R	x	x	x	x	C
	24	8	Golden Beer Industrial Centre	I	x				-
	25	8	Godown (next to New Tech Centre)	I	x				-
	26	8	New Tech Centre	I	x				-
	27	8	Tsuen Tung Factory Building	I	x				-
	28	8	Million Fortune Industrial Centre	I	x				-
	29	8	Metropolitan Factory and Warehouse Building	I	x				-
	30	8	Lok Shun Factory Building (Phase III)	I	x				-
	31	8	Chai Wan Kok Cooked Food Market	O	x	x			C
	32	8	Kong Nam Industrial Building	I	x				-
	33	8	South-east Industrial Building	I	x				-
	34[3]	8	Wheelock Site (WIP)	R	x	x		x	C
	35[3]	8	The Panorama Site (WIP)	R	x	x		x	C
	36	8	Belvedere Garden	R	x	x			C
	37	8	Tsuen Wan Buddhist Secondary School	E	x	x			C
	38	8	Tsuen Tak Gardens	R	x	x			C
	39	8	Nam Fung Textile Factory/Proposed Re-development/Residential Uses	I/R	x	x			C
	40	8	Joyful Building	R	x	x			C
	41	8	Sheerny Terrace	R	x	x			C
	42	8	Tsuen Wan Adventist Hospital	O	x	x			C
	43	8	Allway Gardens Blocks A-C	R	x	x			C
	44	8	Allway Gardens Blocks D-E	R	x	x			C
	45	8	Wu Chung Public Swimming Pool	Rec	x				-
	46	8	Allway Gardens Blocks F-R	R	x	x		x	C
	47	8	Offices on Pier Building	O	x	x	x	x	C Sensitive receiver during reclamation
	C1[2]	7	Proposed Recreational uses	Rec	x		x		-
	C2[2]	8	Proposed Tseun Wan Town Park	Rec	x				-
	C3[2]	8	Proposed District Open Space 2	Rec	x				-
	C4[2]	8	Proposed District Open Space 3	Rec	x				-

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Northern Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Kam Tin	1	9	Cheung Po (Church & Playground)	R/C/Rec	x	x	x	x	B
(KAT)	2	9	Tai Kek Tsuen	R	x	x	x	x	B
	3	9	Village houses to the south of Cheung Po	R	x	x	x	x	B
	4	9	Village houses to the north of Tai Kek Tsuen	R	x	x	x	x	B
	5	9	Kam Cheq Garden	R	x	x		x	B
	6	9	Village houses to the south of Kam Cheq Garden	R	x	x	x	x	B
	7	9	Village house to the north of Tin Sam (Kau Tsuen)	R	x	x	x	x	B
	8	10	Village houses to the south of Shek Wu Tong	R	x	x	x	x	B
	9	10	Shek Wu Tong	R	x	x		x	B
	10	10	Village houses along Kam Sheung Road	R	x	x	x	x	B
	11	10	Village houses to the south of the proposed Kam Tin station	R	x	x	x	x	B
	12	10	Village houses to the west of the proposed Kam Tin station	R	x	x			C
	13	10	Low-rise Residential Area to the east of Kam Tin station	R	x	x			B
	14	10	Kat Hing Garden	R	x	x	x	x	B
	15	10	Kat Hing Wai (Playground & Church)	R/Rec/C	x	x			B
	16	10	Village houses to the east of Ko Po San Tsuen	R	x	x	x	x	C
	17	10	Man Oi and Sze Che Home for the Aged	A	x	x			B
	18	10	Village Houses along Kam Sheung Road (Kam Tin)	R	x	x			B
	19	10	Kam Tin Shi	R	x	x			B
	20	10	Kam Ting Mung Yeung Public School	E	x	x		x	B
	21	11	Kam Hing Wai	R	x	x			B
	22	11	Ko Po Tsuen	R	x	x	x	x	B
	23	11	Cheung Chun San Tsuen	R	x	x			B
	24	11	Village houses between Cheung Chun San Tsuen & Ha Ko Po Tsuen	R	x	x	x	x	B
	25	11	Ha Ko Po Tsuen	R	x	x			C
	26	11	Village houses to the north of Au Tau	R	x	x		x	C
	27	11	Village houses in Tung Shing Lei	R	x	x	x	x	B
	28	11	Church	C	x	x			C
	29	9	Kwan Tai Temple	C	x	x		x	B
	30	9	Sites for which building licences have been approved	R	x	x		x	B
	C1[2]	11	Retail Complex in DD 107, Sha Po	C	x	x			C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Western Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Yuen Long (YUL)	1	12	Residential Blocks along Castle Peak Road - Yuen Long	R	x	x			C
	2	12	Small Traders New Village Public School	E	x	x	x	x	C
	3	12	Pok Oi Hospital	H	x	x	x	x	B
	4	12	Pok Oi Hospital Jockey Club Care & Attention Home	A	x	x			C
	5	12	Sz Tsz Uk	C	x	x			C
	6	12	Small Traders New Village	R	x	x	x	x	C
	7	12	Tung Sun Wong Uk Village	R	x	x			C
	8	12	Tai Wai Tsuen	R	x	x		x	C
	9	12	Ying Lung Wai	R	x	x	x	x	C
	10	12	Tsoi UK Tsuen	R	x	x			C
	11	12	Tung Tau Tsuen	R	x	x			C
	12	12	Tin Hau Temple/Kwun Yam Temple	C	x	x			C
	13	12	Sun Yuen Long Centre	R	x	x	x	x	C
	14	12	Yuen Long Kau Hui	R	x	x			C
	15	12	Shung Tak School	E	x	x	x	x	C
	16	12	Nam Pin Wai	R	x	x	x	x	C
	17	12	Sai Pin Wai	R	x	x			C
	18	12	Kwan Lok San Tsuen	R	x	x	x	x	C
	19	12	Cheong Shing Building	R	x	x			C
	20	12	Wai Fai Building	R	x	x			C
	21	12	Far East Consortium Yuen Long Building (Yau Oi Home of the Aged)	R/A	x	x			C
	22	12	Lee Kwan Building	R	x	x			C
	23	12	Wing Hing Building	R	x	x			C
	24	12	Wing Fat Building	R	x	x			C
	25	12	Tung Fai Court	R	x	x			C
	26	12	Tai Cheong Building	R	x	x			C
	27	12	Kin On Building	R	x	x			C
	28	12	Victory Building	R	x	x			C
	29	12	Rainbow Mansion	R	x	x		x	C
	30	12	Rest Garden	Rec	x				-
	31	12	Tai Hing Building	R	x	x	x	x	C
	32	12	Wing Wah Centre	I	x				-
	33	12	On Lok Industrial Building	I	x				-
	34	12	Man Kei Factory Building	I	x				-
	35	12	Lai Sun Yuen Long Centre	I	x				-
	36	12	Park at Wing Yip Street South	Rec	x				-
	37	12	Bechin Centre	R	x	x			C
	38	12	Fish Wholesale Market	O	x	x			C
	39	12	Christian Hong Kong Shun Yee Woo Yuen Long Youth Service Centre	O	x	x			C
	40	12	Yuen Long Estate	R	x	x		x	C
	41	12	Yuen Long Morninglight School	E	x	x	x	x	C
	42	12	Po Fung Building	R	x	x			C
	43	12	Tung Cheong Building	R	x	x			C
	44	12	Yue Fung Mansion (Carmen Kindergarten)	R/E	x	x			C
	45	12	Sun Wing Building	R	x	x			C
	46	12	Fook On Building	R	x	x			C
	47	12	Tai Kiu Tsuen	R	x	x			C
	48	12	Hong Tai Home for the Aged	A		To be resumed & therefore is not considered a sensitive receiver			

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Western Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
	49	13	Sewage Treatment Works	O	x	x			C
	50	13	Chun Kwong Primary School	E	x	x		x	C
	51	13	The Church of Christ in China - Yuen Long True Light Kindergarten	E	x	x			C
	52	13	Wai Chow Primary School	E	x	x			C
	53	13	Pok Oi Hospital Leung Sing Tak Primary School	E	x	x			C
	54	13	Wai Ji Christian Service Sheltered Workshop at Hor Ping House	O	x	x			C
	55	13	Pok Oi Hospital Chan Poon Pui Memorial Day Nursey at Hor Ping House	R	x	x			C
	56	13	Yan Oi Tong Tin Ka Ping Social Centre at Hor Ping House	O	x	x			C
	57	13	Long Ping Estate	R	x	x			C
	58	13	Fu Loy Garden	R	x	x	x	x	C
	59	13	Hang Wan House	R	x	x			C
	60	13	Luen Fat House	R	x	x		x	C
	61	13	Fook Cheong Building	R	x	x			C
	62	13	Tung Wah Group of Hospitals Lo Kan Ting Memorial College	E	x	x			B
	63	13	Pok Oi Hospital Tang Pui King Memorial College	E	x	x		x	B
	64	13	Shui Tin Tsuen	R	x	x			B
	65	13	Temple	C	x	x		x	B
	66	13	Hing Fook Building (Phase 1)	R	x	x			B
	67	13	Shui Pin Wai Estate	R	x	x			B
	68	13	Fung Chi Tsuen	R	x	x	x	x	B
	69	13	Chun Hing San Tsuen	R	x	x			B
	70	13	Wing Ning Tsuen	R	x	x	x	x	B
	71	13	Shing Tak School	E	x	x	x	x	B
	72	13	Ha Mei San Tsuen	R	x	x	x	x	B
	C1[2]	12	Proposed Residential Uses in DD 115-116	R	x	x			C
	C2[2]	12	Proposed CDA Development in Yuen Long Area 15	R	x	x			C
Tin Shui Wai (TIS)	1	14	Housing Authority Development Tin Shui Wai Area 13 Phase I	R	x	x			B
	2	14	Tin Yiu Court	R	x	x		x	B
	3	14	Pagoda (Sheung Cheung Wai)	R	x	x	x	x	B
	4	14	Tin Yiu Estate Playground	Rec/O	x				B
	5	14	Tin Yiu Estate	R	x	x	x	x	B
	6	14	T.W.G.H.'s Kowk Yat Wai Prevocational School	E	x	x		x	B
	7	14	QE School Old Student's Association Primary School	E	x	x	x	x	B
	8	14	Industrial uses along Hung Tin Road	I	x				
	9	14	Caritas Hospital Yeung Chun Pui Home for the Aged	A	x	x			C
	10	14	Home for the Aged behind Caritas Hospital Yueng Chun Pui Home for the Aged	A	x	x		x	C
	11	14	Sha Chau Lei Tsuen	R	x	x			C
	12	14	Village houses to the south of Sha Chau Lei Tsuen	R	x	x	x		C
	C1[2]	14	HOS Development Phase I in Tin Shui Wai Area 3	R	x	x		x	C
	C2[2]	14	Proposed primary school in Tin Shui Wai Area 3	E	x	x		x	C
	C3[2]	14	Proposed secondary school in Tin Shui Wai Area 3	E	x	x			C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Western Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
Tuen Mun North (TMN)	1	15	Shek Po Tsuen	R	x	x	x		B
	2	15	Village houses to the west of Shek Po Tsuen	R	x	x			B
	3	15	San Sang Tsuen	R	x	x			B
	4	15	Galore Garden	R	x	x	x		B
	5	15	Village houses to the east of Tin Sam Tsuen	R	x	x	x	x	B
	6	15	San Lee Uk Tsuen	R	x	x			B
	7	15	Tin Sam Tsuen	R	x	x		x	B
	8	15	Low-rise Residential Area, south of Tin Sam Tsuen	R	x	x	x		B
	9	16	Siu Kwong Yuen	R	x	x	x	x	B
	10	16	Yick Yuen Tsuen	R	x	x			B
	11	16	Chinese Evangelist Church	C	x	x		x	B
	12	16	Chong Tsing Home for the Aged	A	x	x			B
	13	16	Pak Hong Home for the Aged	A	x	x			B
	14	16	Ken Yuen/Yee Kee Yan/Man Hing Yuen Residential Area south of Yick Yuen Tsuen	R	x	x			B
	15	16	Village houses north to Tsing Chuen Wai	R	x	x			B
	16	16	Hing Tak Public School	E	x	x	x	x	C
	17	16	Lin Yuen	R	x	x	x	x	C
	18	16	Tsing Chuen Wai	R	x	x		x	B
	19	16	Residential uses to the south-west of Tsing Chuen Wai	R	x	x			C
	20	16	Miu Fat Buddhist Secondary School	E	x	x		x	C
	21	16	Tuen Tsz Wai	R	x	x			B
	22	16	Nei Ming Institute Miu Fat Buddhist Monastery	C	x	x	x	x	C
	23	16	Lee Ka Yuen and Residential Use in Surrounding Area	R	x	x	x	x	C
	24	16	Bank next to Fu Hong Home for the Aged	A	x	x	x	x	C
Tuen Mun Centre (TMC)	1	17	Chik Yuen Garden	R	x	x	x	x	C
	2	17	Vegetable Wholesale Market (Lam Tei station)	O	x	x			C
	3	17	Residential uses at To Yuen Wai	R	x	x			C
	4	17	San Hing Tsuen	R	x	x			C
	5	17	Residential Block west of To Yuen Wai	R	x	x		x	C
	6	17	Kei Yan Home for the Aged	A	x	x			C
	7	17	Residential use along Tsing Lun Rd	R	x	x	x	x	C
	8	17	Home for the Aged adjacent to King Lo Lok Yuen Home for the Aged	A	x	x			C
	9	17	King Lo Lok Yuen Home for the Aged	A	x	x			C
	10	17	St. Francis Home for the Aged	A	x	x			C
	11	17	Highways Department Office	O	x	x			C
	12	17	Yan Tze Tin Memorial College	E	x	x		x	C
	13	17	Low-rise Residential Area adjacent to Bowring Camp	R	x	x			C
	14	17	Bowring Camp/Proposed Residential uses for Lingnam College	R	x	x			C
	15	17	WSD Staff Quarters	R	x	x	x	x	C
	16	17	The Scout Association Diamond Jubilee Building	Rec	x				-
	17	17	Po Leung Kuk Tin Ka Bing Siu Hong Kindergarten in Commercial Complex	E	x	x		x	C
	18	17	Siu Hong Court	R	x	x	x	x	C
	19	17	Ching Leung Nunnery	C	x	x			C

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Western Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
	20	17	Tsing Sham Tea Museum	Rec	x				-
	21	17	Buddhist place of worship	C	x	x			C
	22	17	Residential Area along Tuen Fu Road	R	x	x		x	C
	23	17	CLP Staff Quarter	R	x	x			C
	24	17	Residential adjacent to CLP	R	x	x			C
	25	17	Tuen Mun Government Primary School	E	x	x		x	C
	26	17	Brilliant Garden	R	x	x			C
	27	17	Tuen Mun Hospital	O	x	x		x	C
	28	18	Lakeshore Building (Fai Toi Home for the Aged)	R/A	x	x			C
	29	18	Kam Fat Building	R	x	x			C
	30	18	Yan Oi Building (Hong Kong Church Club)	R	x	x			C
	31	18	Nam Kwong Building	R	x	x			C
	32	18	Tuen Mun Hospital Staff Quarter	R	x	x	x	x	C
	33	18	Affluence Garden	R	x	x	x	x	C
	34	18	The Church of Christ in China Lee Lai Fun Memorial Prevocational School	E	x	x	x	x	B
	35	18	Sun Hui Rest Garden	Rec	x				-
	36	18	Kam Man Mansion	R	x	x			C
	37	18	Florence Mansion (Fai Toi Home for the Aged)	R/A	x	x			C
	38	18	Ka Hay Building (Jing Jing Kindergarten)	R/E	x	x			C
	39	18	Wah Hing Mansion	R	x	x			C
	40	18	Wa Lee Building	R	x	x			C
	41	18	Sai Po Building	R	x	x			C
	42	18	Hip Pont Building (Britannia Professional Tutorial Centre G/F)	R/E	x	x			C
	43	18	Cheung Lung Building (Hong Shui Elderly House)	R/A	x	x			C
	44	18	Royal HK Jockey Club Yan Oi Tong Swimming Pool	Rec	x				-
	45	18	Residential Development by Sun Hung Kai	R	x	x	x	x	C
	46	18	Alice English Kindergarten	E	x	x			B
	47	18	Playground	Rec	x				-
	48	18	Greenland Gardern	R	x	x			B
	49	18	Tai Hing Gardens - Phase I/II	R	x	x			B
	50	18	Tai Hing Government Office	O	x	x		x	C
	51	18	Tuen Mun School Dental Clinic	O	x	x			C
	52	18	Tuen Mun Clinic - Staff Quarter	R	x	x			C
	53	18	Tuen Mun Clinic - Out-patient	C	x	x			B
	54	18	Tuen Mun Heung Sze Committee Administration Building	O	x	x			C
	55	18	Kindergarten	C/E	x	x			C
	56	18	Kam Hing Building	R	x	x			C
	57	18	Eldo Court	R	x	x			C
	58	18	Hong Lai Garden	R	x	x		x	C
	59	18	Mai Kei Building	R	x	x			B
	60	18	Ho King Building/Sun King Building/On Chuen Building/Bit Hing Building	R	x	x	x	x	B
	61	18	Honeley Court	R	x	x			C
	62	18	Tuen Mun Mansion	R	x	x			B
	63	18	St. Simon Lui Ming Choi Technical School	E	x	x		x	B
	64	18	Tung Ming Building	R	x	x			B
	65	18	KMB Depot	O	x	x			B
	66	18	Tai Hing Building	R	x	x			B
	67	18	Man Cheung Building	R	x	x			B

List of Noise and Air Sensitive Receivers (NSRs & ASRs) for Western Section of the West Rail: West Kowloon to Tuen Mun Centre

Area (Area Code)	NSR/ASR No.	Figure No.	Description	Landuses[1]	Air Sensitive Receivers (ASRs)	Noise Sensitive Receivers (NSRs)	Representative ASR	Representative NSR	Area Sensitivity Rating A/B/C
	68	18	Shun Lee Building	R	x	x			B
	69	18	Koon Hing Building	R	x	x			B
	70	18	San Fat Estate	R	San Fat Estate is to be demolished prior to construction of West Rail & therefore is not considered a sensitive receiver				
	71	18	Luk's Factory Building	I	x				-
	72	18	Tuen Mun Police Station	O	x	x			B
	73	18	Ho Fook Tong Primary School	E	Ho Fook Tong Primary School is to be demolished prior to construction of West Rail & therefore is not considered a sensitive receiver				
	74	18	Kam Wah Garden	R	x	x	x	x	B
	75	18	The Trend Plaza	R	x	x			B
	76	18	Tuen Mun Town Park	Rec	x				-
	77	18	Playmate Factory Building	I	x				-
	78	18	Mei Kei Industrial Building	I	x				-
	79	18	Gold Son Industry Building	I	x				-
	80	18	Wing Sin Factory Building	I	x				-
	C1[2]	17	Residential uses in Fu Tei, Tuen Mun	R	x	x			C

Remark

1 Residential uses (R); Educational uses (E); Office (O); Church/Temple (C); Home for the Aged (A); Hospital/Clinic (H); Recreational uses (Rec); Industrial uses (I) and Government/ Institution/Community (GIC)
2 Committed development
3 Work in Progress (WIP)

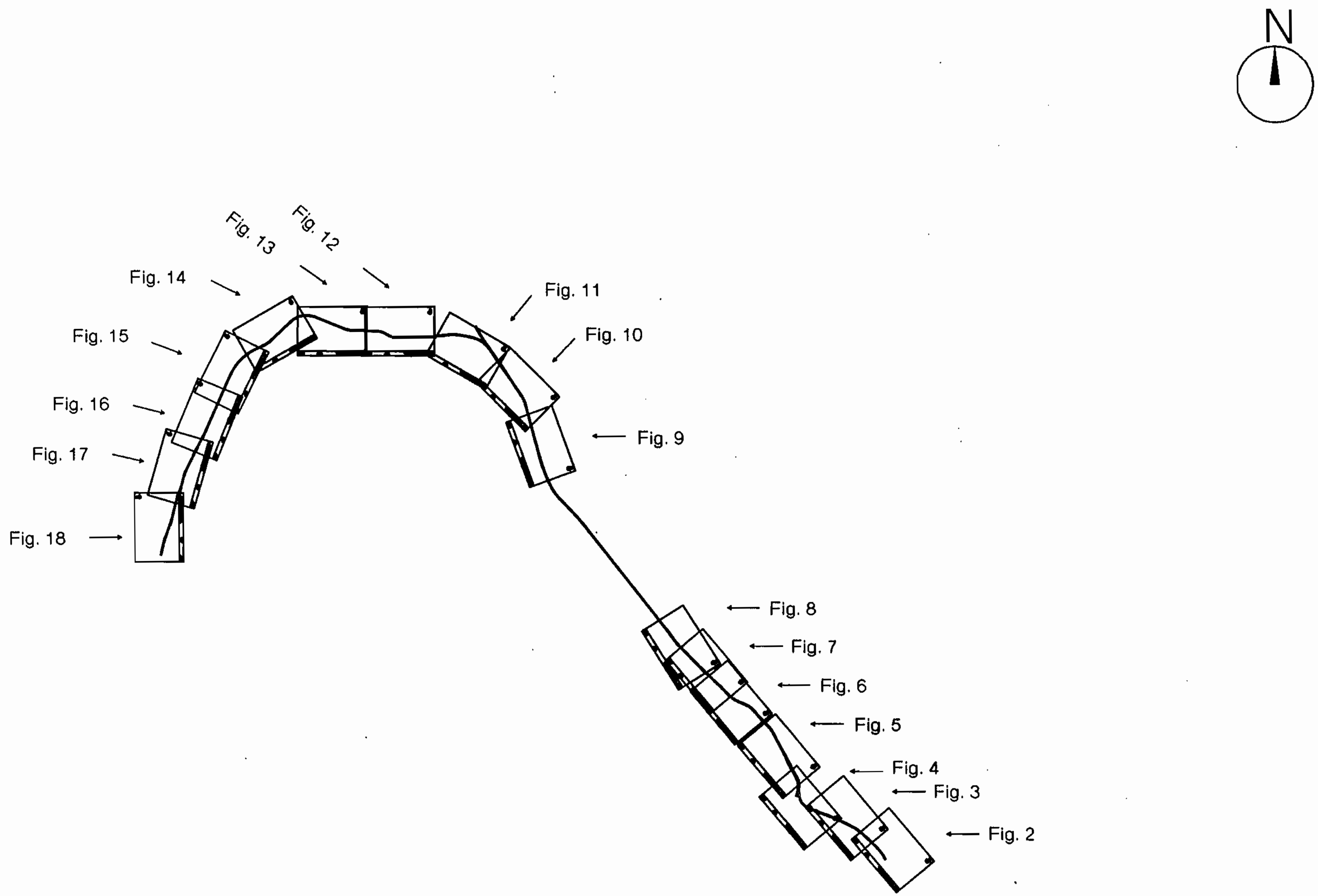
Some areas of Hong Kong are classified as Designated Areas and more stringent noise criteria are imposed. These are stated in the *Technical Memorandum on Noise from Construction Work in Designated Areas* and reproduced in the tables below for informational purposes. Where the West Rail alignment falls inside a designated area, the more stringent noise criteria apply; elsewhere the noise criteria given in the Technical Memorandum on Noise from Construction Work other than Percussive Piling applies.

Basic Noise Levels (BNLs) for Non Designated Area

Time Period	Area Sensitivity Rating A	Area Sensitivity Rating B	Area Sensitivity Rating C
All days during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day-time and evening (0700 to 2300 hours)	60	65	70
All days during the night-time (2300 to 0700 hours)	45	50	55

Basic Noise Levels (BNLs) for Designated Area

Time Period	Area Sensitivity Rating A	Area Sensitivity Rating B	Area Sensitivity Rating C
All days during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day-time and evening (0700 to 2300 hours)	45	50	55
All days during the night-time (2300 to 0700 hours)	30	35	40



WEST RAIL NOISE AND AIR SENSITIVE
RECEIVER LOCATIONS KEY PLAN

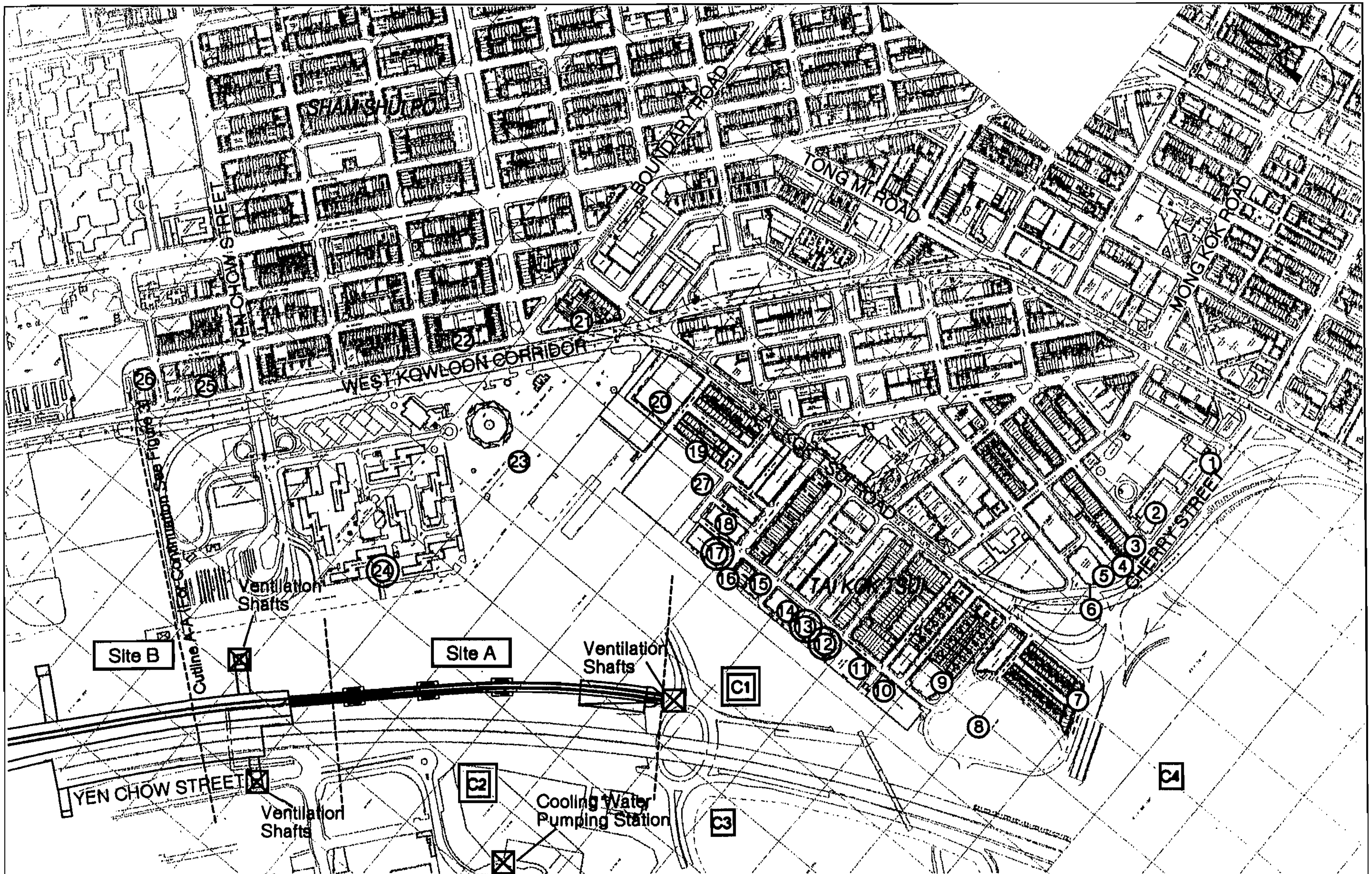
SCALE: 1/110,000

FIGURE 1

ERM

KOWLOON - CANTON
RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Work Sites

Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - TAI KOK TSUI (TKT)

FIGURE 2

SCALE: 1/5,000

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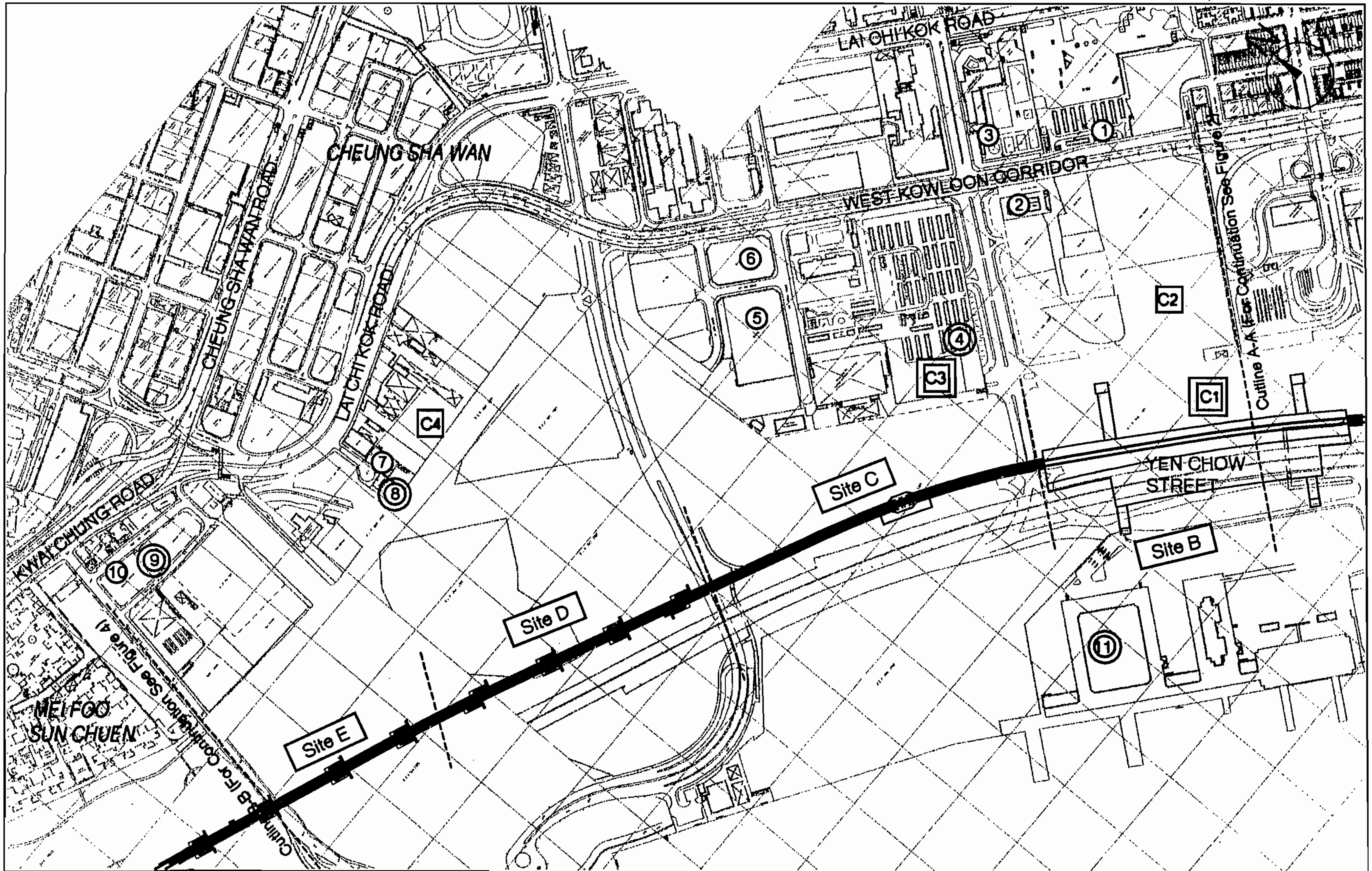
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Work Sites

Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - CHEUNG SHA WAN (CSW)

FIGURE 3

SCALE: 1/5,000

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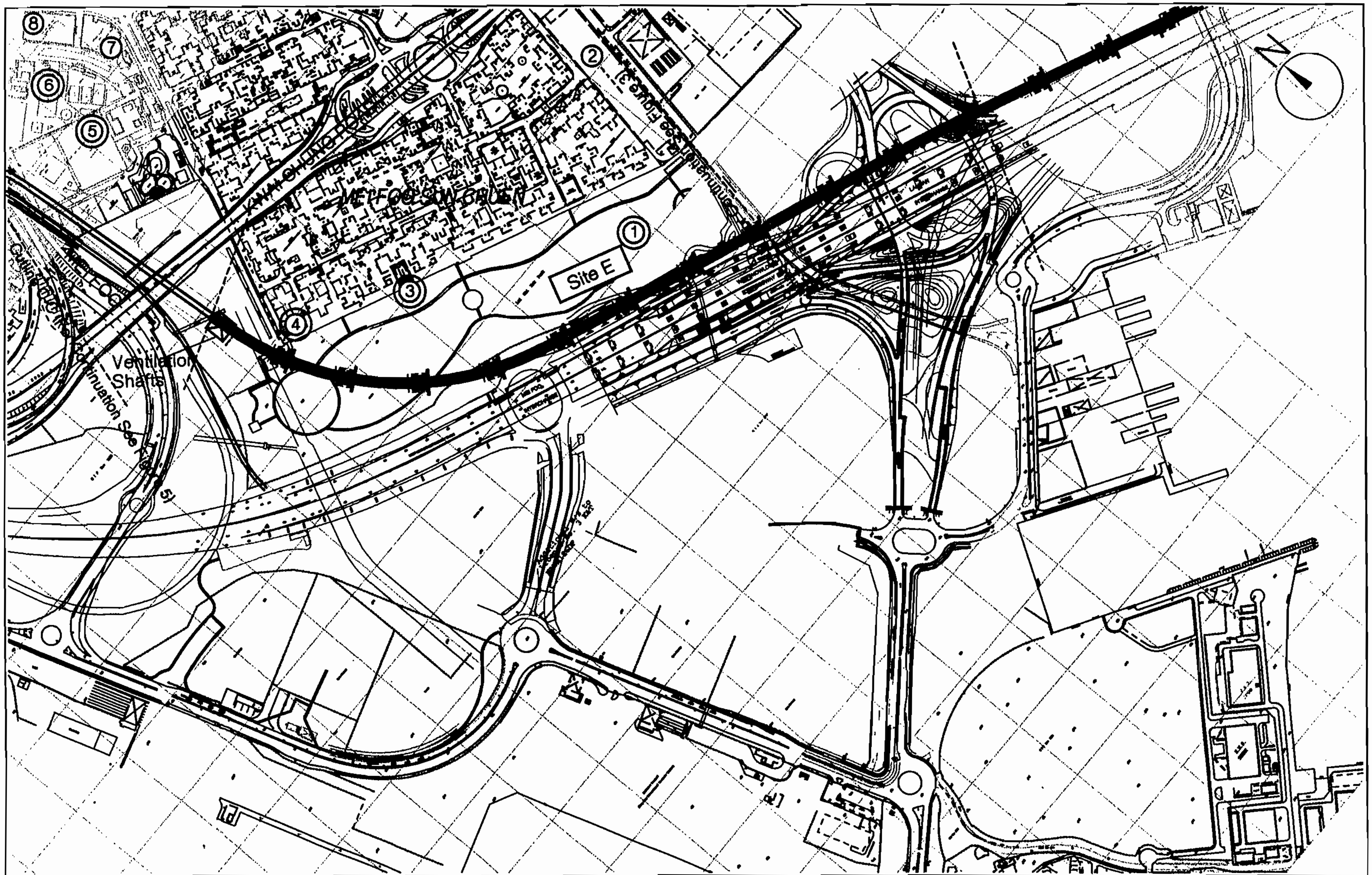
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - MEI FOO (MEF)

FIGURE 4

SCALE: 1/5,000

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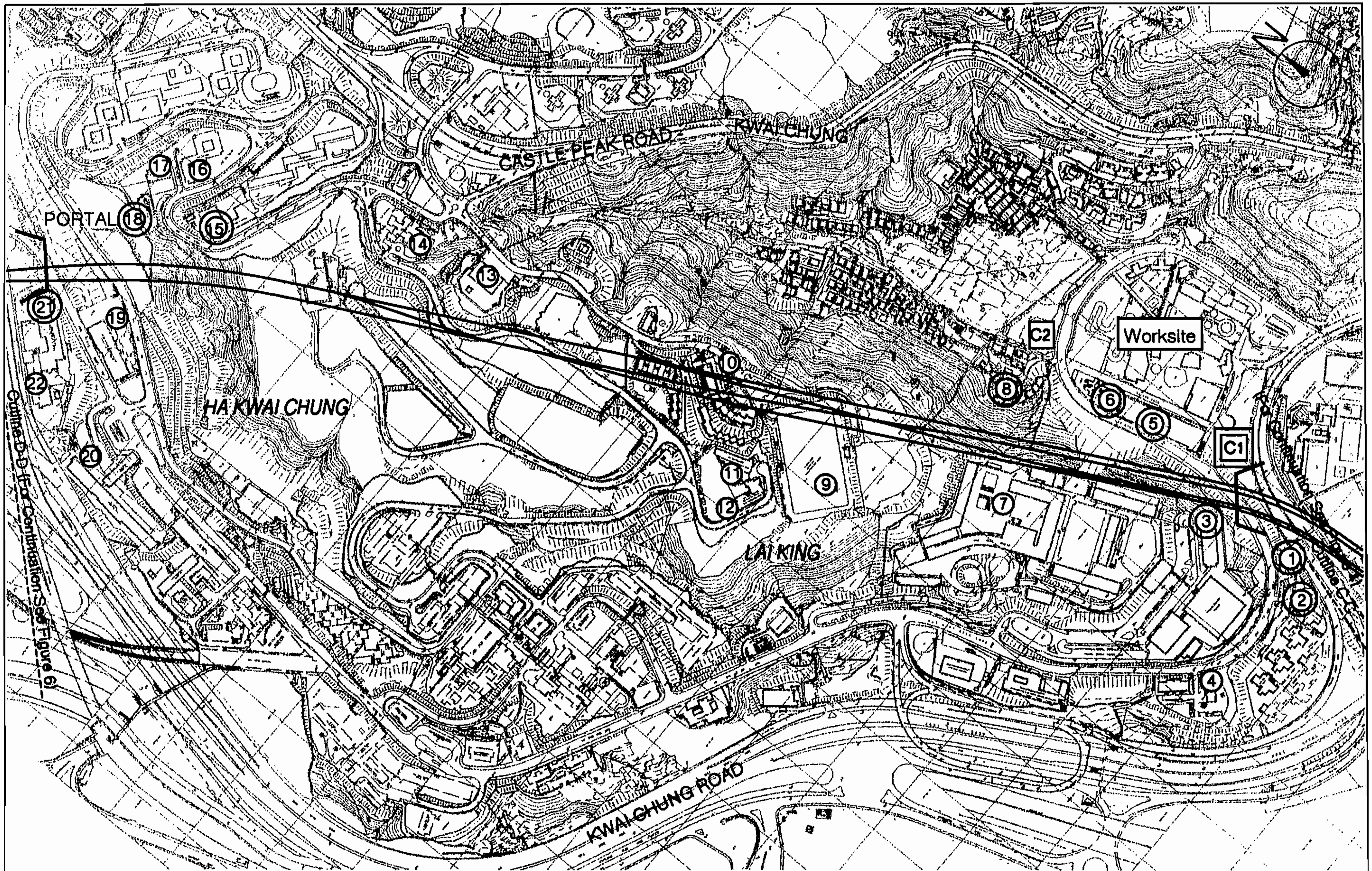
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Work Site

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - LAI KING (LAK)

FIGURE 5

SCALE: 1/5,000

usr2/ermhk/c1688/vol1/23.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- C1 Committed Noise and/or Air Sensitive Development
- C1 Representative Committed Noise and/or Air Sensitive Development
- Site A — Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS- KWAI FONG (KWF)

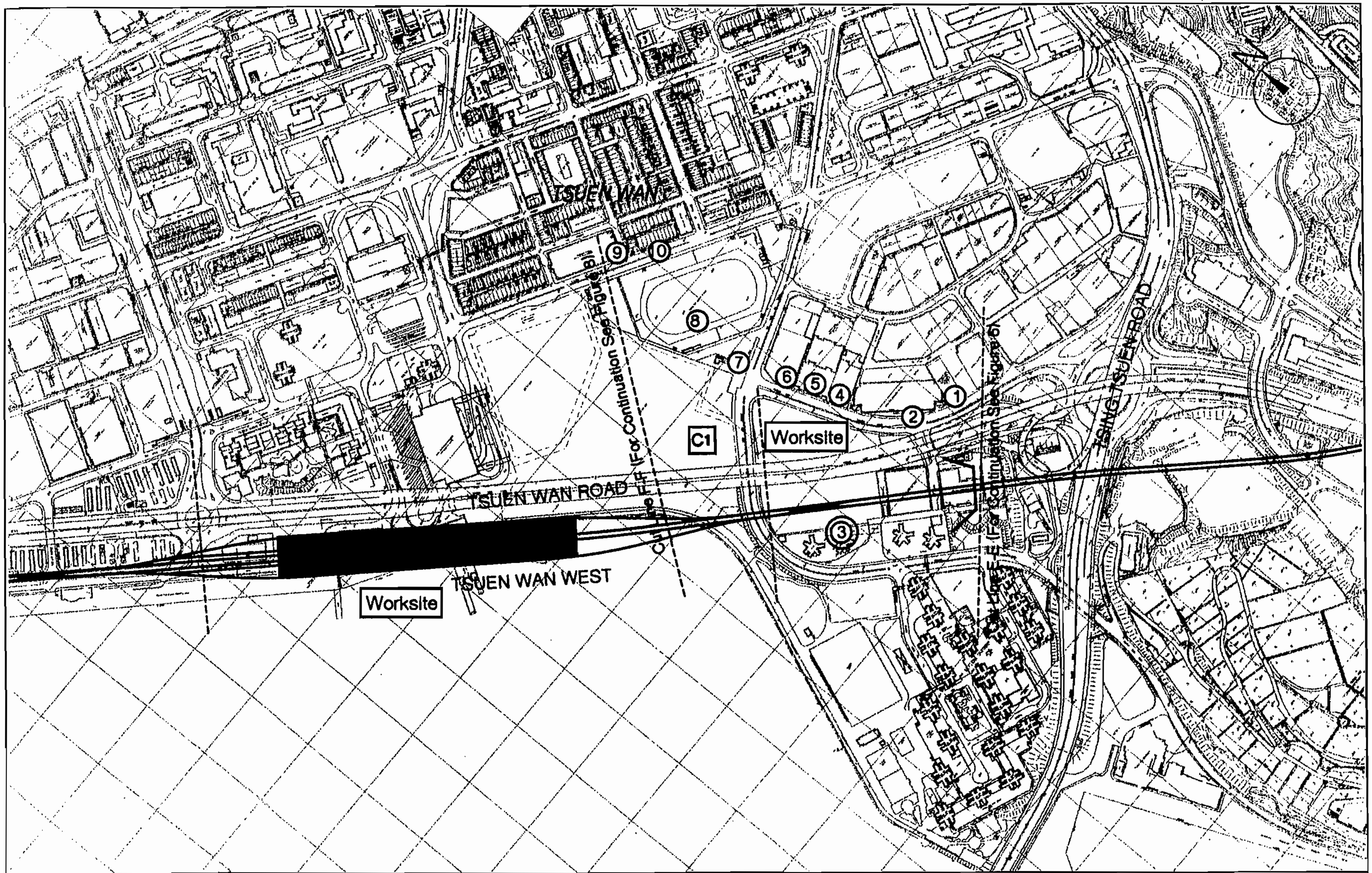
FIGURE 6

SCALE: 1/5,000

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Site A — Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - TSUEN WAN (TWN) (1 OF 2)

FIGURE 7

SCALE: 1/5,000

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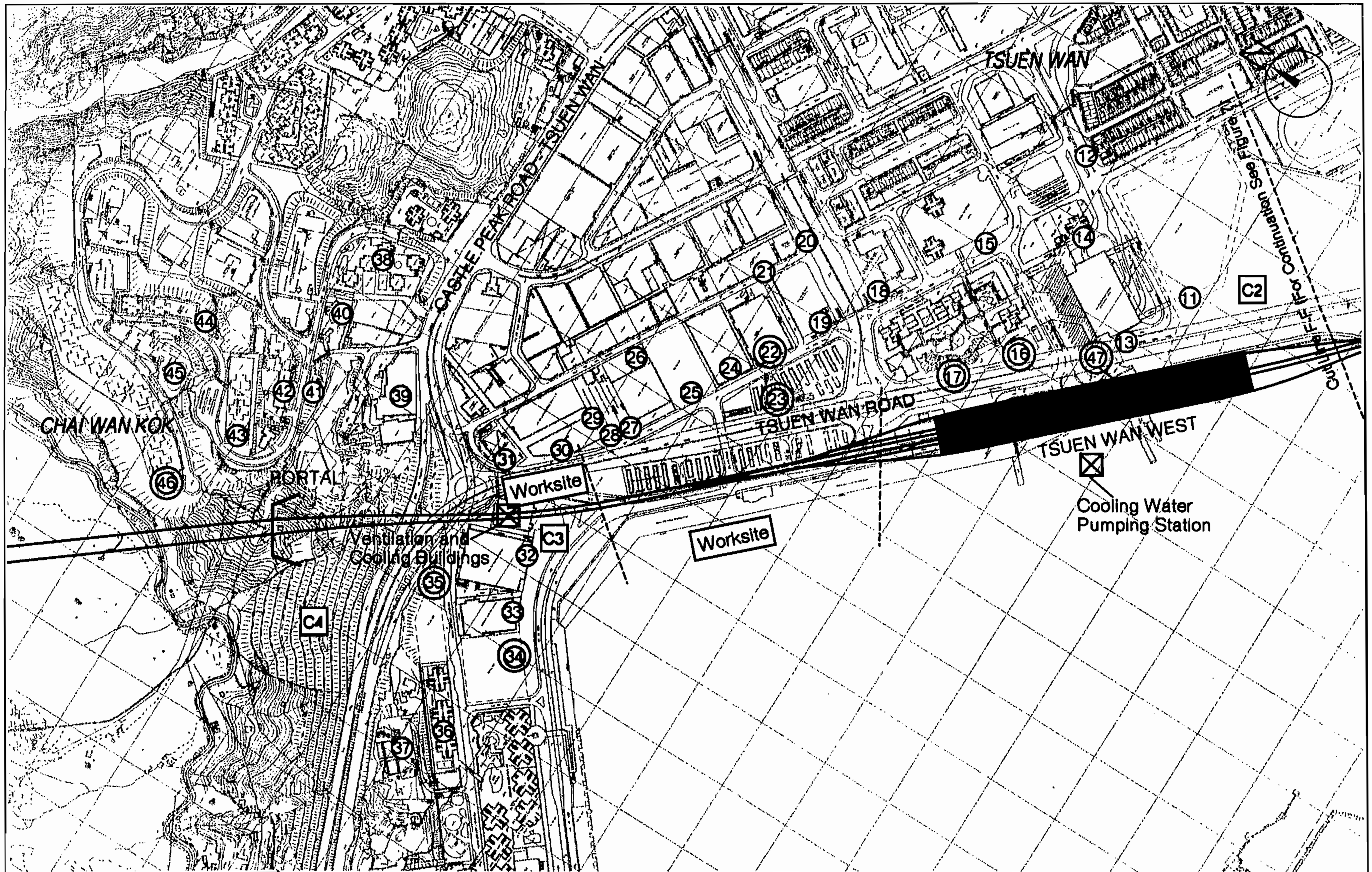
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Site A — Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - TSUEN WAN (TWN) (2 OF 2)

FIGURE 8

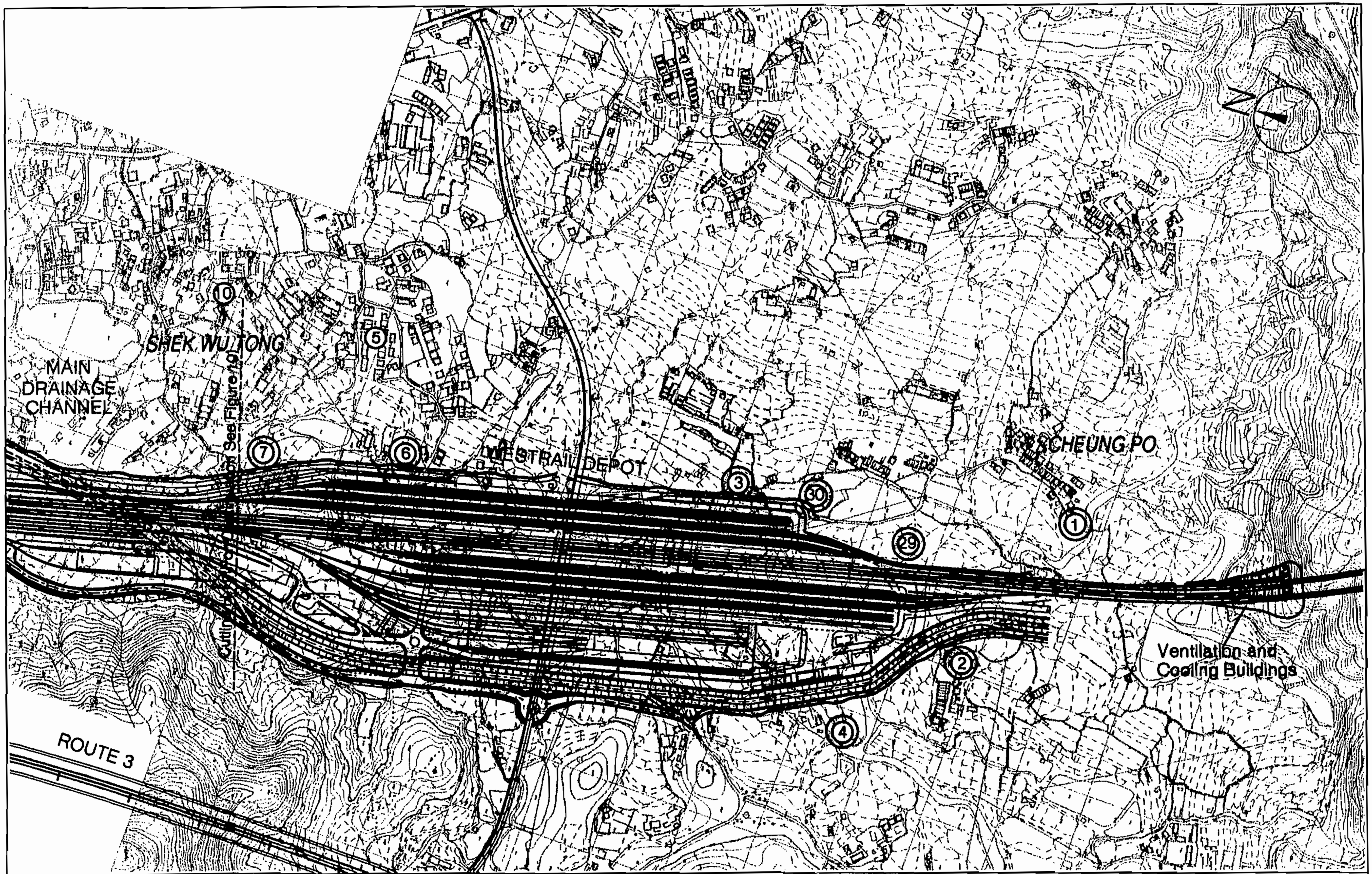
SCALE: 1/5,000

usr2/ermhk/c1588/vol1/20.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - KAM TIN (KAT) (1 OF 3)

FIGURE 9

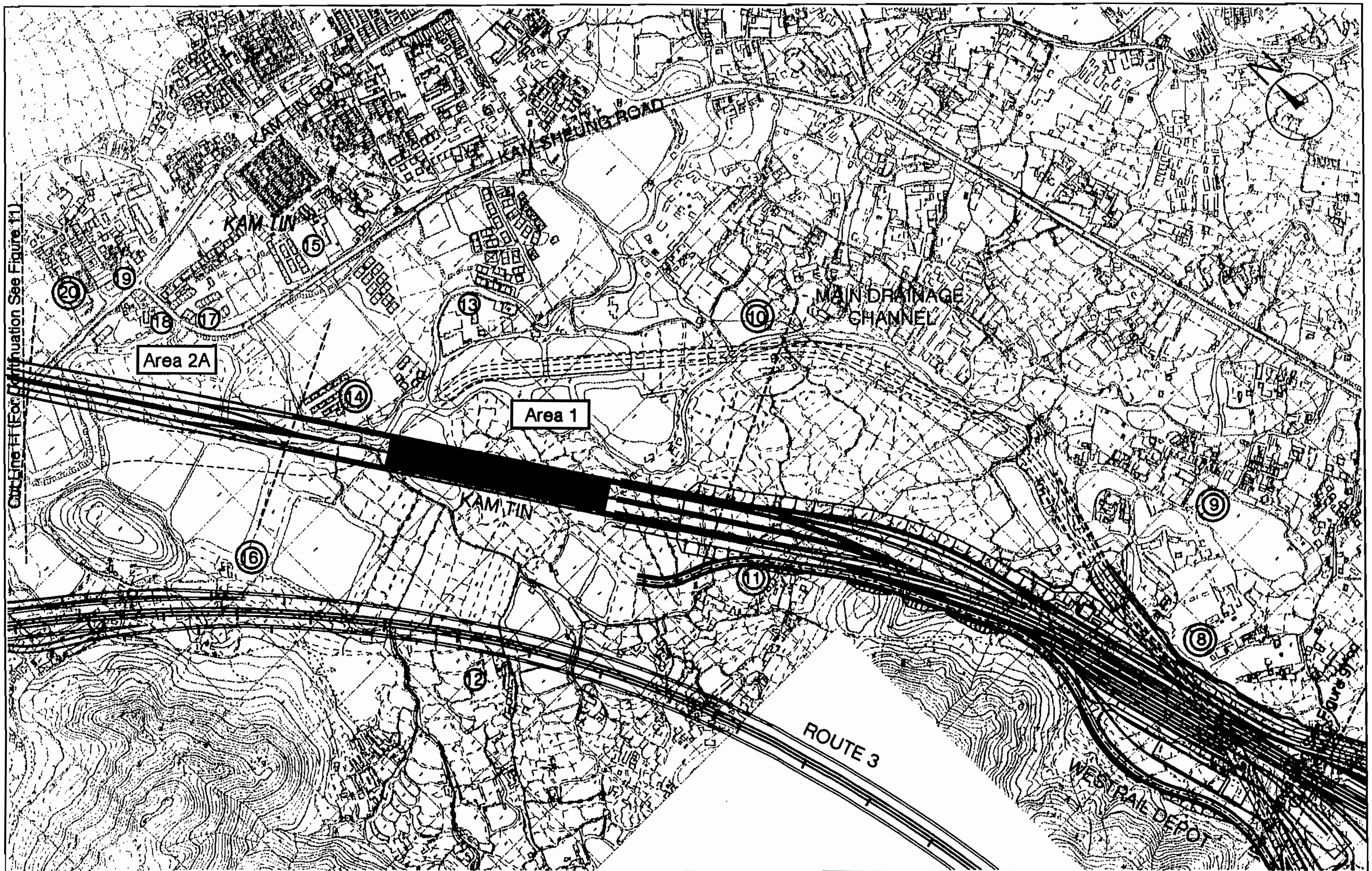
SCALE: 1/5,000

usr2/ermhk/c1588/vol1/10.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Site A — Work Sites
Work Site Boundary

NOISE AND AIR SENSITIVE
RECEIVER LOCATIONS - KAM TIN (KAT) (2 OF 3)

FIGURE 10

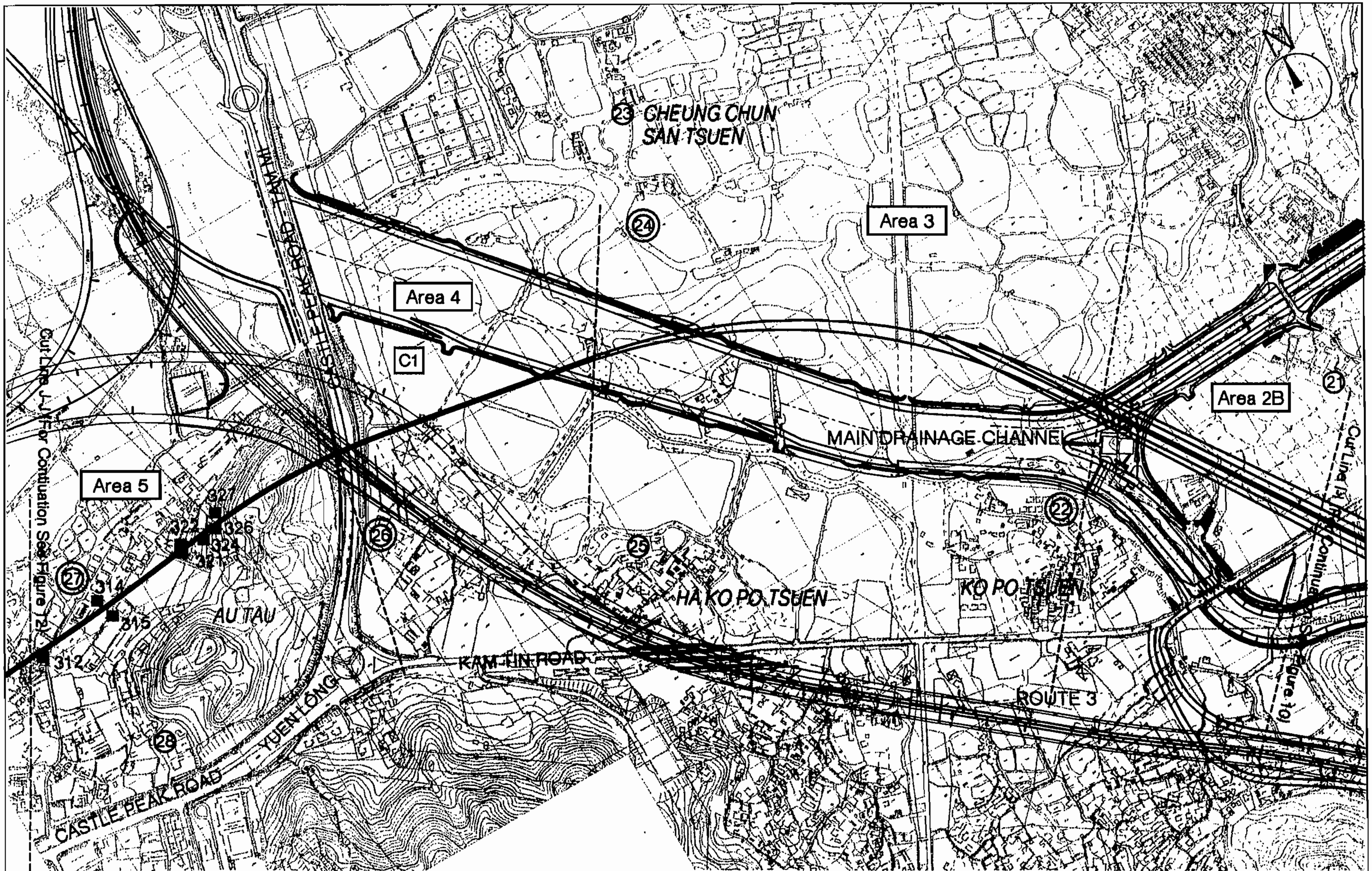
SCALE: 1/5,000

usr2/ermhk/c1686/vol/9.dgn

ERM

KOWLOON - CANTON
RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Site A — Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - KAM TIN (KAT) (3 OF 3)

FIGURE 11

SCALE: 1/5,000

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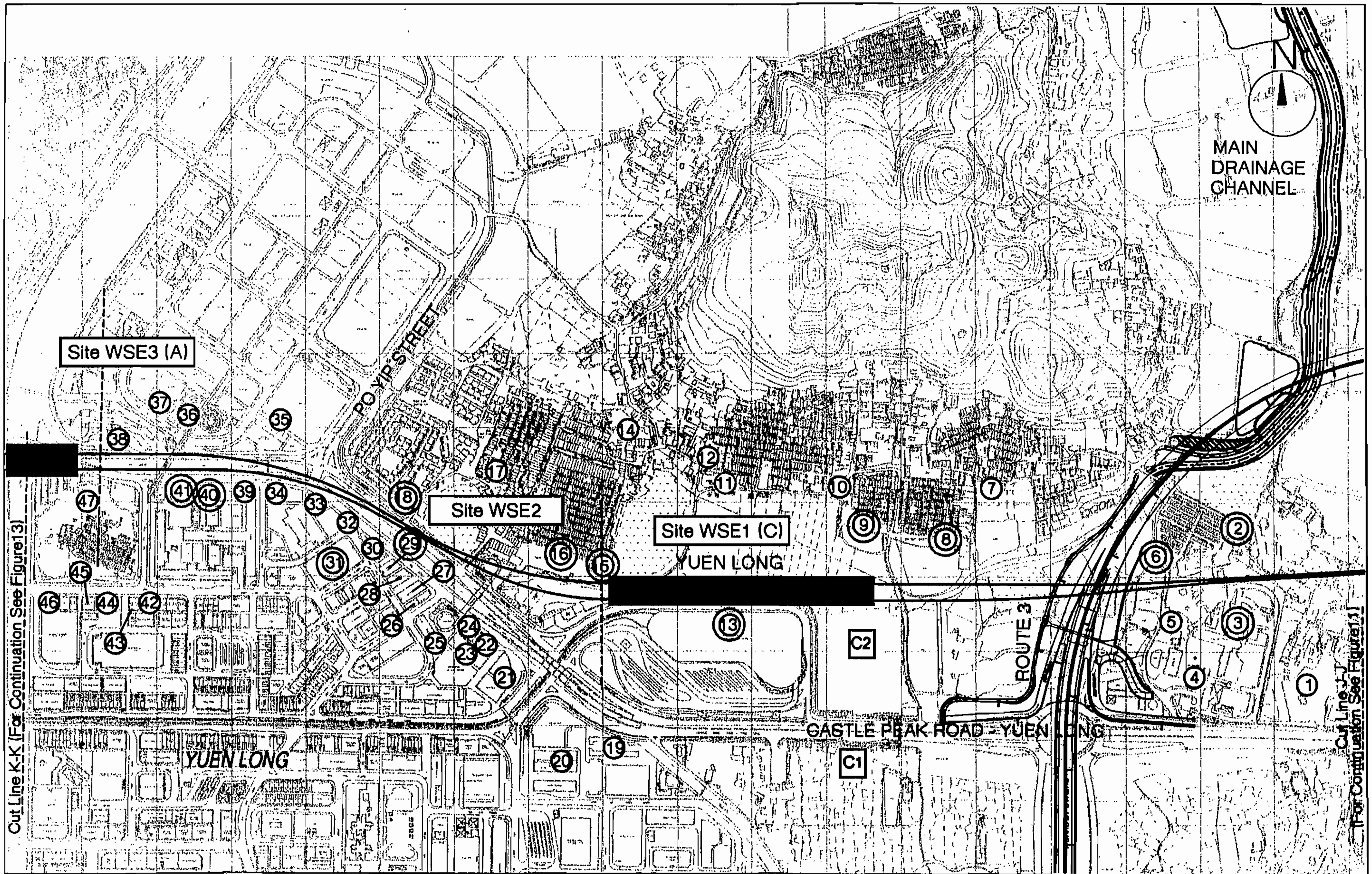
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- C1 Committed Noise and/or Air Sensitive Development
- C2 Representative Committed Noise and/or Air Sensitive Development
- Site A Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - YUEN LONG (YUL) (1 OF 2)

FIGURE 12

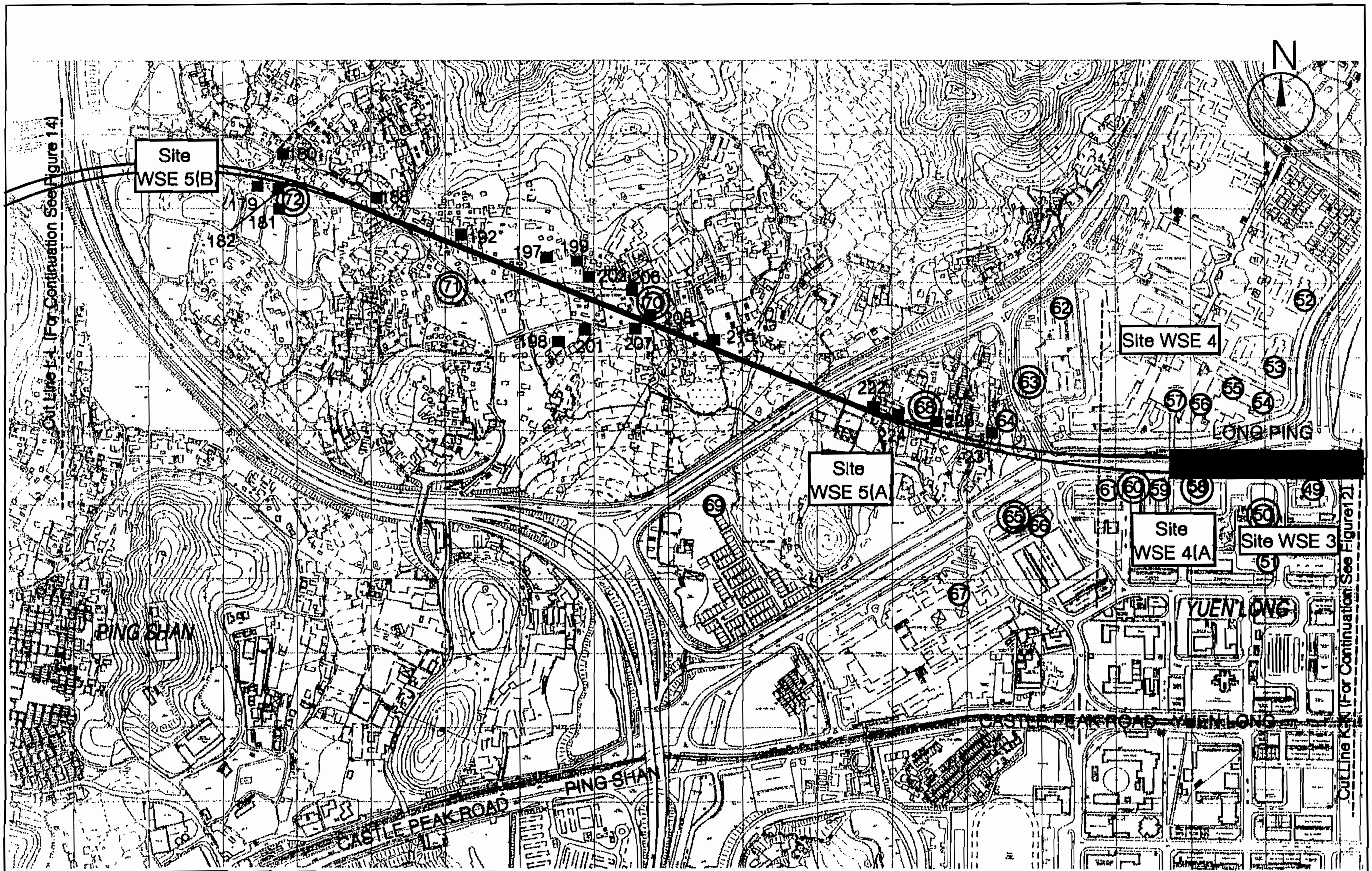
SCALE: 1/5,000

usr2/ermhk/c1588/vol1/2.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Development

Site A — Work Sites

Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - YUEN LONG (YUL) (2 OF 2)

FIGURE 13

SCALE: 1/5,000

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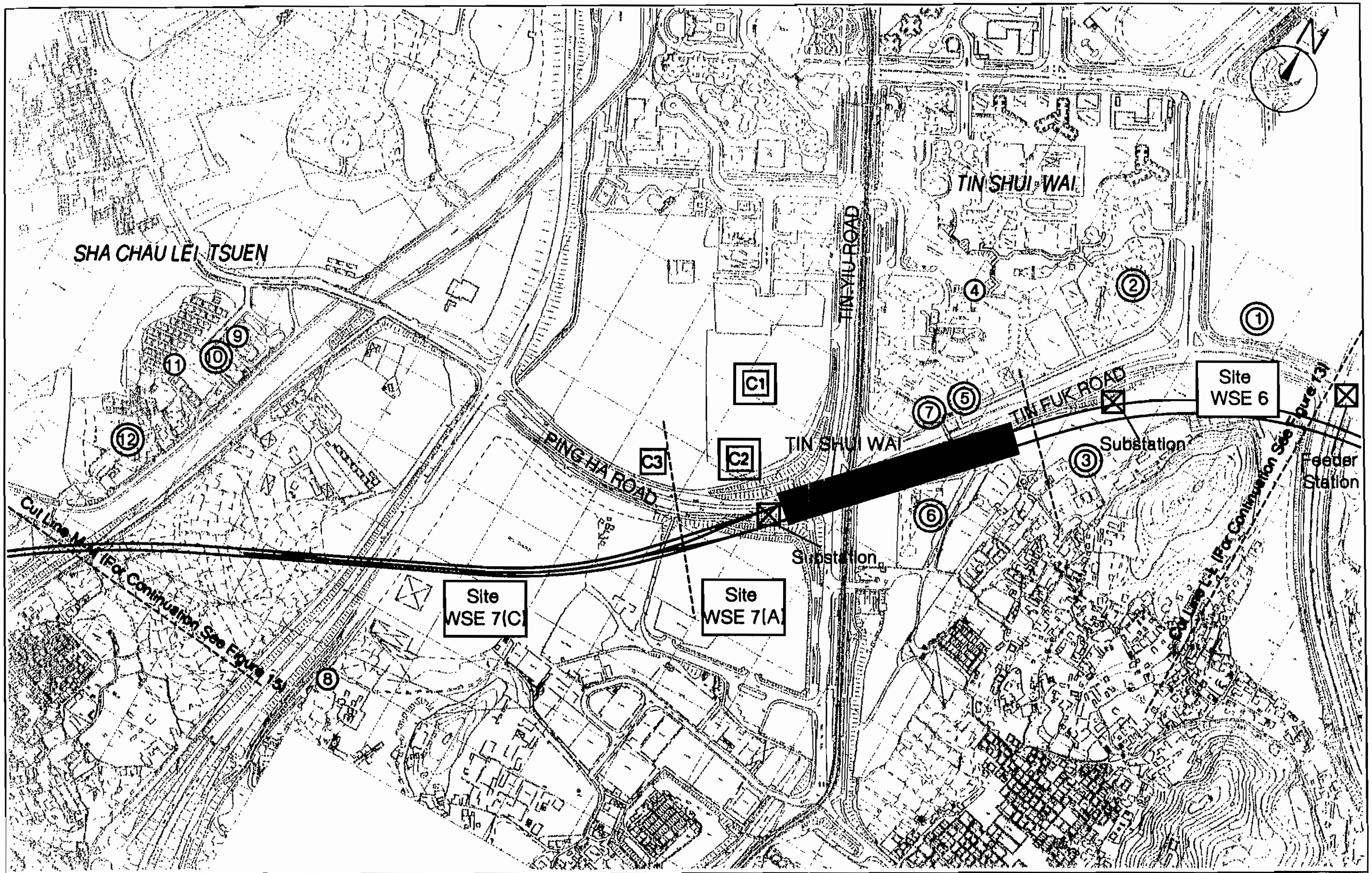
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Commited Noise and/or Air Sensitive Development

Representative Commited Noise and/or Air Sensitive Development

Site A — Work Sites

Work Site Boundary

NOISE AND AIR QUALITY SENSITIVE RECEIVER LOCATIONS - TIN SHUI WAI (TIS)

SCALE: 1/5,000

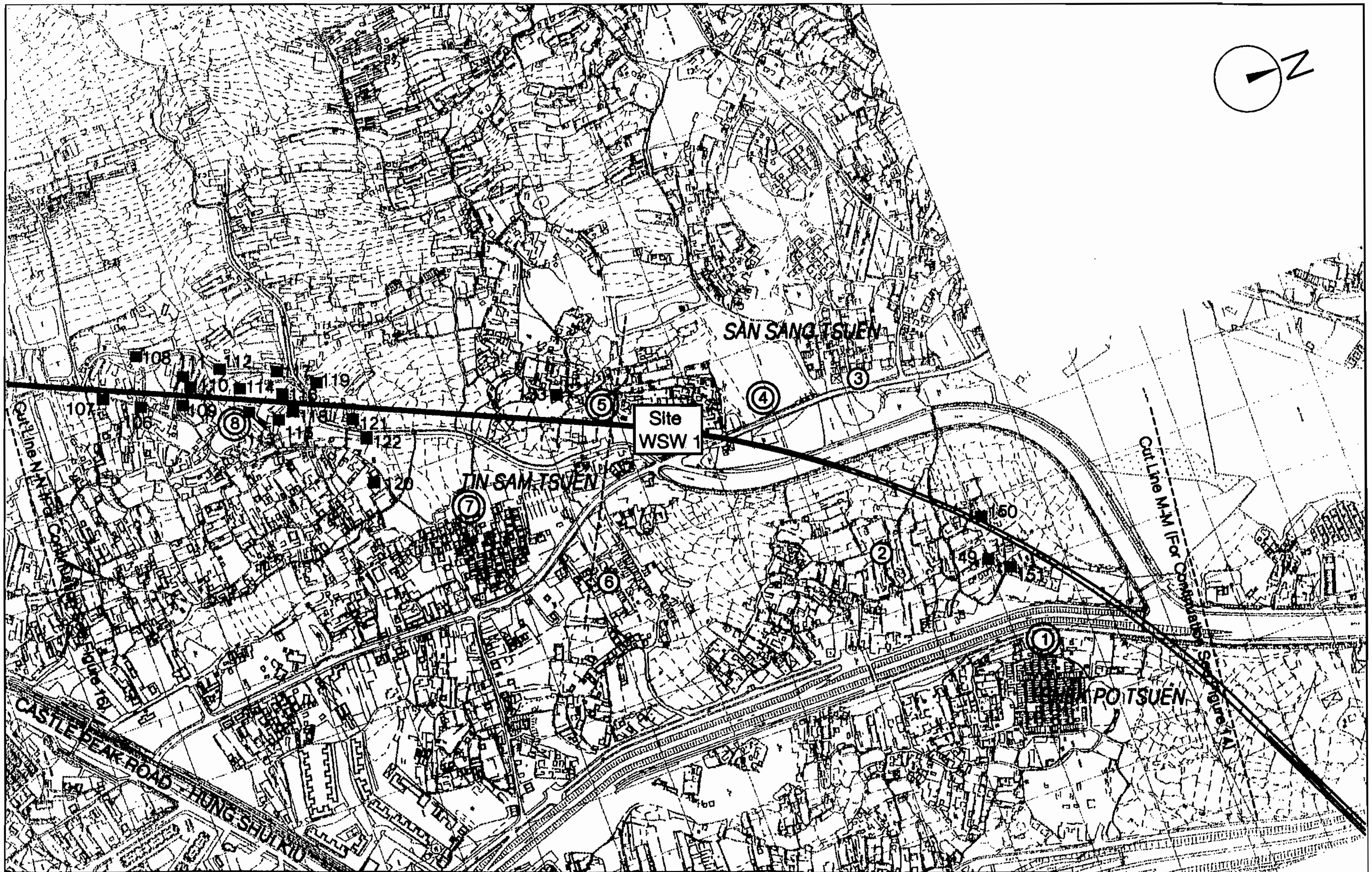
FIGURE 14

usr2/erm/kc/c1586/vol7.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Site A — Work Sites
Work Site Boundary

NOISE AND AIR QUALITY SENSITIVE RECEIVER LOCATIONS - TUEN MUN NORTH (TMN) (1 OF 2)

FIGURE 15

SCALE: 1/5,000

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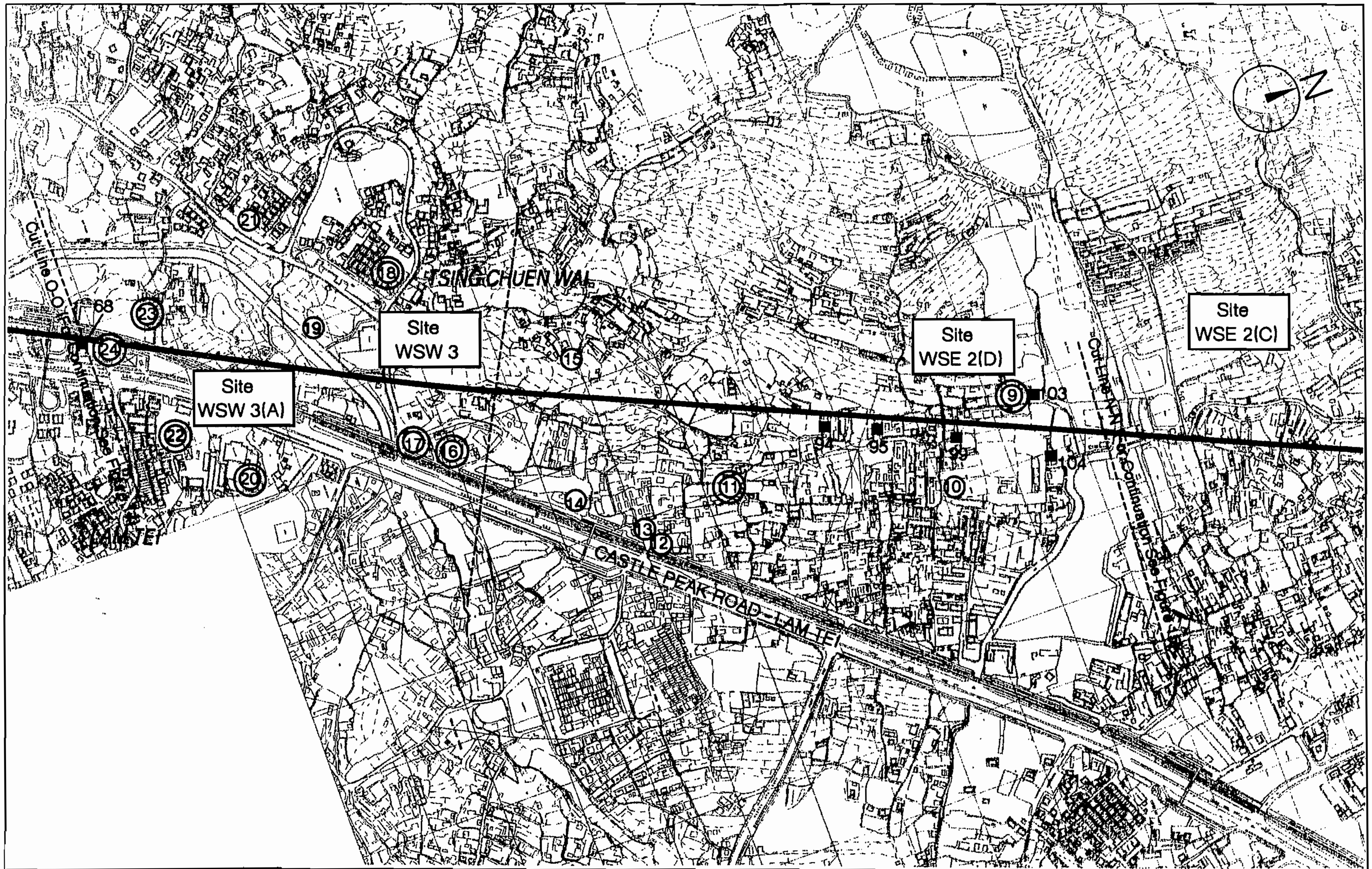
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Site A — Work Sites
Work Site Boundary

NOISE AND AIR QUALITY SENSITIVE
RECEIVER LOCATIONS - TUEN MUN NORTH (TMN) (2 OF 2)

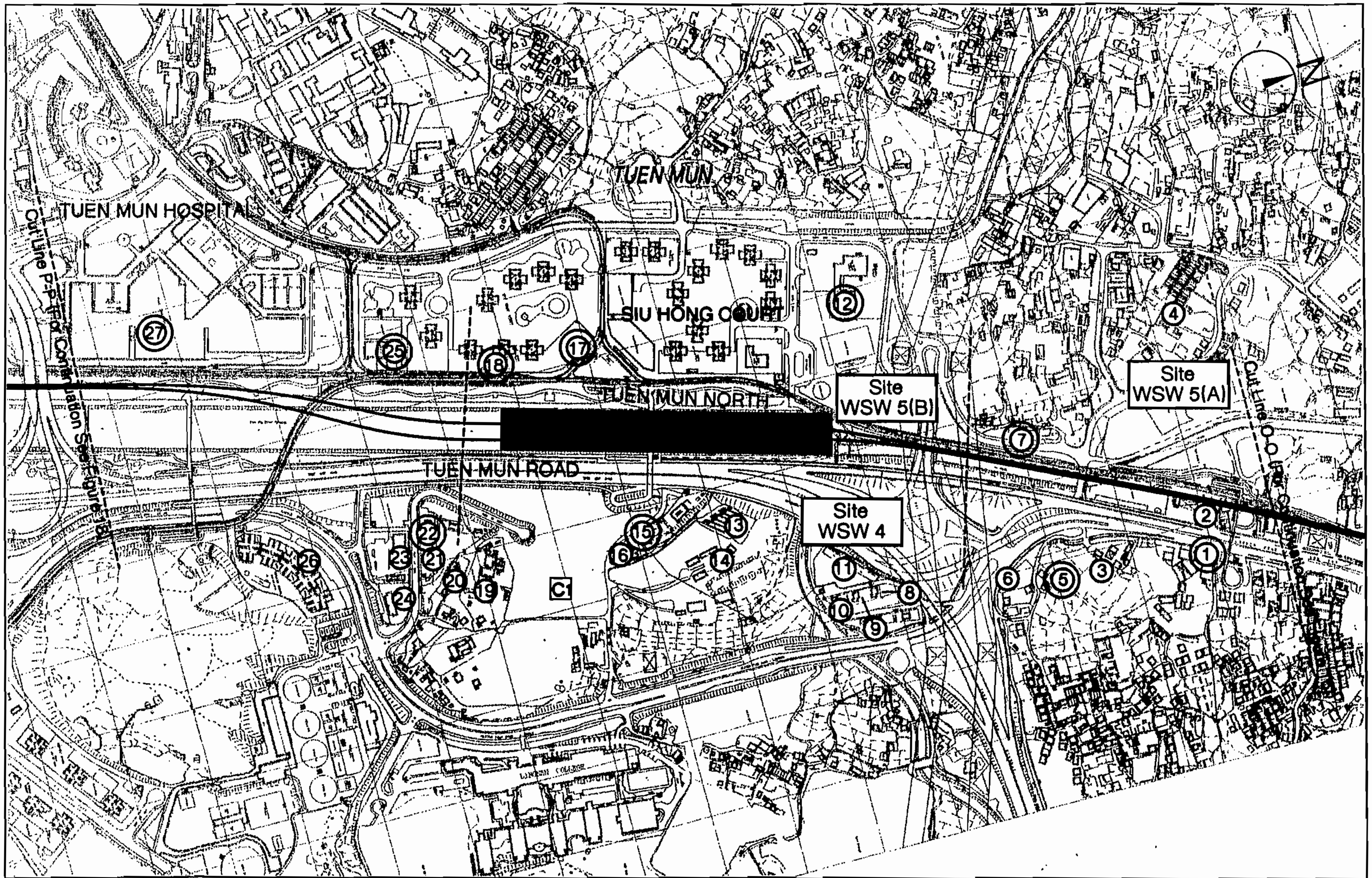
FIGURE 16

SCALE: 1/5,000

ERM

KOWLOON - CANTON
RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Site A — Work Site
Work Site Boundary

NOISE AND AIR QUALITY SENSITIVE RECEIVER LOCATIONS - TUEN MUN CENTRE (TMC)(1 OF 2)

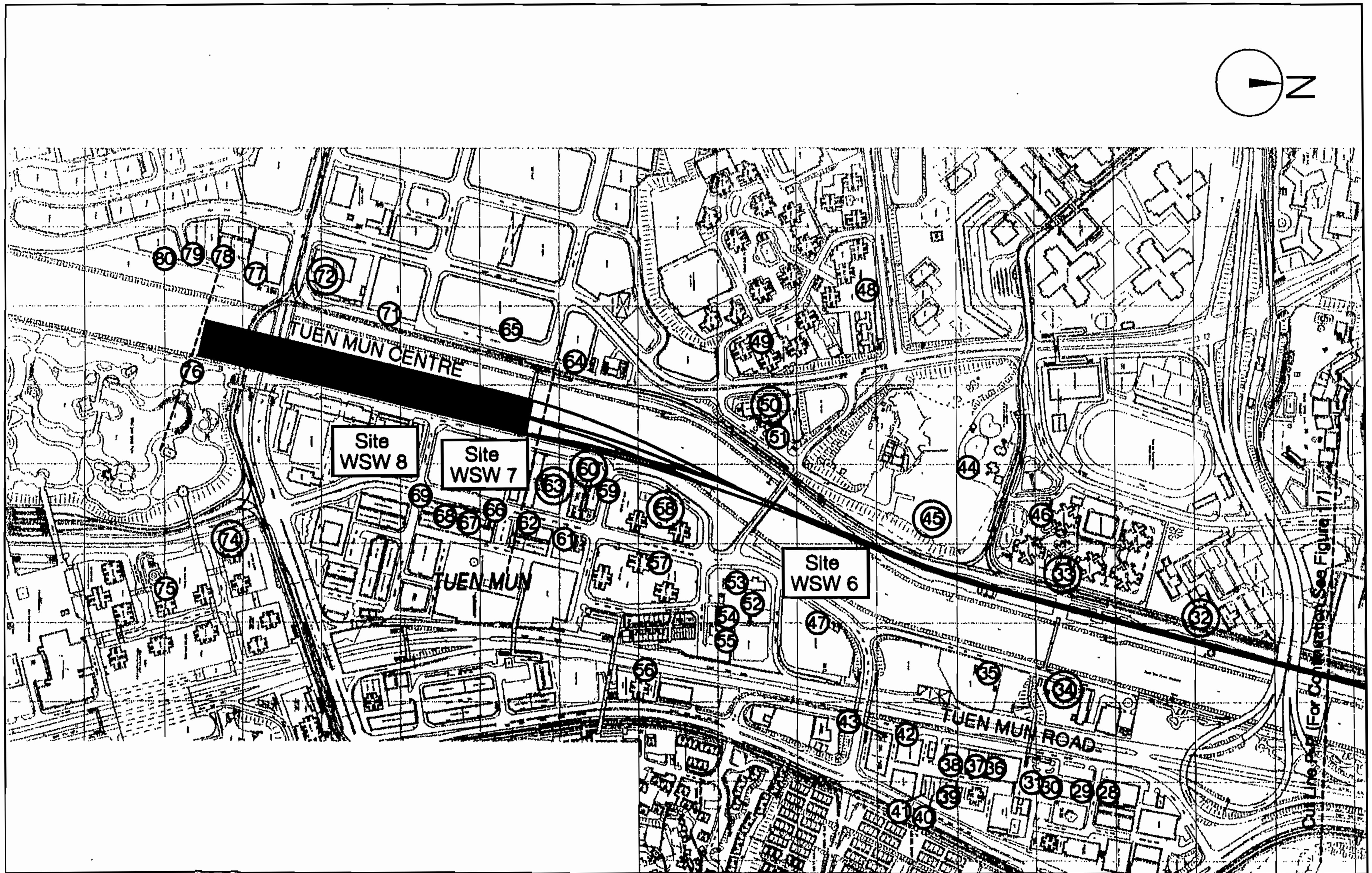
FIGURE 17

SCALE: 1/5,000

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Site A — Work Sites
- Work Site Boundary

NOISE AND AIR SENSITIVE RECEIVER LOCATIONS - TUEN MUN CENTRE (TMC) (2 OF 2)

FIGURE 18

SCALE: 1/5,000

ermN/C1568/vol1/3.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

Annex B

Calculation of Construction Noise Levels and Assumed Plant Teams

2.0. WORKS AREA A
2.1. VENTILATION BUILDING V4

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.1. Clearance	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	5	112	118.9897	7.9245E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.2. Foundation	Piling Rig	CNP166	3	100	104.771213	3E+10
(A) Bored Piling	Mobile Crane	CNP048	2	112	115.0103	3.1698E+11
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
(B) Concreting	Air Compressor	CNP003	2	104	107.0103	5.0238E+10
	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Poker Vib.	CNP170	3	113	117.771213	5.9858E+11
					Total SWL	124

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.2. Bulk Excavation	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Loader	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Air Compressor	CNP003	2	104	107.0103	5.0238E+10
	Drills	CNP183	3	116	120.771213	1.1943E+12
					Total SWL	123

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Tower Crane	CNP049	1	95	95	3162277660
Tunnel & Ventilation	Excavator	CNP081	4	112	118.0206	6.3396E+11
Building (excavation)	Crane, mobile	CNP048	1	112	112	1.5849E+11
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Lorry	CNP141	2	112	115.0103	3.1698E+11
Tunnel & Ventilation	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
Building (concreting)	Poker Vib.	CNP170	5	113	119.9897	9.9763E+11
	Air Compressor	CNP003	3	104	108.771213	7.5357E+10
	Generator	CNP101	2	108	111.0103	1.2619E+11
	Pump Lorry	CNP047	1	109	109	7.9433E+10
					Total SWL	123

3.0. WORKS AREA B (YCS STATION)

Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.1. Clearance	Excavator	CNP081		3	112	116.771213	4.7547E+11
	Lorry	CNP141		6	112	119.781513	9.5094E+11
						Total SWL	122

Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.2. Foundation	Bored Piling	CNP166		4	100	106.0206	4E+10
	Air Compressor	CNP003		4	104	110.0206	1.0048E+11
	Excavator	CNP081		3	112	116.771213	4.7547E+11
	Lorry	CNP141		5	112	118.9897	7.9245E+11
	Crane	CNP048		5	112	118.9897	7.9245E+11
	Mixer Lorry	CNP044		5	109	115.9897	3.9716E+11
	Generator	CNP101		4	108	114.0206	2.5238E+11
						Total SWL	125

Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.3. Bulk Excavation	Air Compressor	CNP003		5	104	110.9897	1.2559E+11
	Excavator	CNP081		10	112	122	1.5849E+12
	Lorry	CNP141		4	112	118.0206	6.3396E+11
	Drills	CNP183		10	116	126	3.9811E+12
						Total SWL	128

Activity

3.4. Construction of Station Structure

	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044		10	109	119	7.9433E+11
	Generator	CNP101		3	108	112.771213	1.8929E+11
	Excavator	CNP081		3	112	116.771213	4.7547E+11
	Lorry	CNP141		3	112	116.771213	4.7547E+11
	Pump Lorry	CNP047		3	109	113.771213	2.383E+11
	Tower Crane	CNP049		3	95	99.7712125	9486832981
	Poker Vib.	CNP170		10	113	123	1.9953E+12
						Total SWL	126

4.0 WORKS AREA C

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.1. Site Clearance	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	5	112	118.9897	7.9245E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.2. Bulk Excavation	Generator	CNP101	1	108	108	6.3096E+10
	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Loader	CNP081	2	112	115.0103	3.1698E+11
					Total SWL	122

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.2.1 Sheet Piling	Sheet Pile Vib.	*	3	118	122.771213	1.8929E+12
						123

*Reference source:- SWL is taken from BS5228:Part 4:1986

4.3. Construction of Tunnel Box and Ventilation Building

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump Lorry	CNP047	1	109	109	7.9433E+10
	Poker Vib.	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air Compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125

5.0. WORK AREA D

5.1. Site Clearance (as 4.1.)

5.2. Bulk Excavation
(as in 4.2)

5.3. Construction of Tunnel Box
(as in 4.3)

6.0. WORK AREA E AND TEMP. WORKS AREA						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
6.1. Site Clearance	Excavator	CNP081	3	112	116.771213	4.7547E+11
	Lorry	CNP141	5	112	118.9897	7.9245E+11
					Total SWL	121
6.2. Bulk Excavation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
(excavation)	Generator	CNP101	1	108	108	6.3096E+10
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	4	112	118.0206	6.3396E+11
	Loader	CNP081	4	112	118.0206	6.3396E+11
					Total SWL	123
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
(piling)	Sheet Pile Vib.		2	118	121.0103	1.2619E+12
						121
6.3. Construction of Tunnel Box						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	4	109	115.0206	3.1773E+11
	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Pump Lorry	CNP047	2	109	112.0103	1.5887E+11
	Poker Vib.	CNP170	4	113	119.0206	7.981E+11
	Crane	CNP048	3	112	116.771213	4.7547E+11
	Air Compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125

TS400 plant teams

Section - Cut and Cover Tunnel						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Vibratory S	Sheet pile vibrator		2	118	121.0103	1.2619E+12
	Generator	CNP101	2	108	111.0103	1.2619E+11
					Total SWL	121
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excav	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Loader	CNP081	2	112	115.0103	3.1698E+11
					Total SWL	122
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrato	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compress	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcretin	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
concrete insi	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrato	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compress	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125

Note: inside tunnel therefore minus 10 dB i.e. 115 dB

C1588 - West Rail Construction Noise Calculations

Mitigation 1 - Use of Quiet Plant

TS 400 - Southern Section

2.0. WORKS AREA A

2.1. VENTILATION BUILDING V4

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.1. Clearance	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
					Total SWL	113

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.2. Foundation	Piling Rig	CNP166	3	100	104.771213	3E+10
(A) Bored Piling	Mobile Crane	CNP048	2	105	108.0103	6.3246E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
(B) Concreting	Air Compressor	CNP003	2	100	103.0103	2E+10
	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Poker Vib.	CNP170	3	110	114.771213	3E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Loader	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Air Compressor	CNP003	2	100	103.0103	2E+10
	Drills	CNP183	3	116	120.771213	1.1943E+12
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Tower Crane	CNP049	1	95	95	3162277660
Tunnel & Ventilation	Excavator	CNP081	4	105	111.0206	1.2649E+11
Building (excavation)	Crane, mobile	CNP048	1	105	105	3.1623E+10
					Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Lorry	CNP141	2	105	108.0103	6.3246E+10
Tunnel & Ventilation	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
Building (concreting)	Poker Vib.	CNP170	5	110	116.9897	5E+11
	Air Compressor	CNP003	3	100	104.771213	3E+10
	Generator	CNP101	2	100	103.0103	2E+10
	Pump Lorry	CNP047	1	109	109	7.9433E+10
					Total SWL	120

3.0. WORKS AREA B (YCS STATION)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.1. Clearance	Excavator	CNP081	3	105	109.771213	9.4868E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.2. Foundation	Bored Piling	CNP166	4	100	106.0206	4E+10
	Air Compressor	CNP003	4	100	106.0206	4E+10
	Excavator	CNP081	3	105	109.771213	9.4868E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
	Crane	CNP048	5	105	111.9897	1.5811E+11
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	4	100	106.0206	4E+10
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.3. Bulk Excavation	Air Compressor	CNP003	5	100	106.9897	5E+10
	Excavator	CNP081	10	105	115	3.1623E+11
	Lorry	CNP141	4	105	111.0206	1.2649E+11
	Drills	CNP183	10	116	126	3.9811E+12
					Total SWL	127

Activity
3.4. Construction of Station Structure

	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	10	109	119	7.9433E+11
	Generator	CNP101	3	100	104.771213	3E+10
	Excavator	CNP081	3	105	109.771213	9.4868E+10
	Lorry	CNP141	3	105	109.771213	9.4868E+10
	Pump Lorry	CNP047	3	109	113.771213	2.383E+11
	Tower Crane	CNP049	3	95	99.7712125	9486832981
	Poker Vib.	CNP170	10	110	120	1E+12
					Total SWL	124

4.0 WORKS AREA C

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.1. Site Clearance	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
					Total SWL	113

4.2. Bulk Excavation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Generator	CNP101	1	100	100	1E+10
	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Loader	CNP081	2	105	108.0103	6.3246E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.2.1 Sheet Piling	Sheet Pile Vib.	-	3	118	122.771213	1.8929E+12
					Total SWL	123

4.3. Construction of Tunnel Box and Ventilation Building

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	2	100	103.0103	2E+10
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump Lorry	CNP047	1	109	109	7.9433E+10
	Poker Vib.	CNP170	5	110	116.9897	5E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air Compressor	CNP003	3	100	104.771213	3E+10
					Total SWL	121

5.0. WORK AREA D

5.1. Site Clearance (as 4.1.)

5.2. Bulk Excavation

(as in 4.2)

5.3. Construction of Tunnel Box

(as in 4.3)

6.0. WORK AREA E AND TEMP. WORKS AREA						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
6.1. Site Clearance	Excavator	CNP081	3	105	109.771213	9.4868E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
					Total SWL	114
6.2. Bulk Excavation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Generator	CNP101	1	100	100	1E+10
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	4	105	111.0206	1.2649E+11
	Loader	CNP081	4	105	111.0206	1.2649E+11
					Total SWL	116
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Sheet Pile Vib.		2	118	121.0103	1.2619E+12
					Total SWL	121
6.3. Construction of Tunnel Box						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	4	109	115.0206	3.1773E+11
	Generator	CNP101	2	100	103.0103	2E+10
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Pump Lorry	CNP047	2	109	112.0103	1.5887E+11
	Poker Vib.	CNP170	4	110	116.0206	4E+11
	Crane	CNP048	3	105	109.771213	9.4868E+10
	Air Compressor	CNP003	3	100	104.771213	3E+10
					Total SWL	121

TS400 Mitigation (1)

Section - Cut and Cover Tunnel

Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
1 Vibratory Sheet Piling	Sheet pile vibrator			2	118	121.0103	1.2619E+12
	Generator	CNP101		2	100	103.0103	2E+10
						Total SWL	121
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081		2	105	108.0103	6.3246E+10
	Lorry	CNP141		6	105	112.781513	1.8974E+11
	Loader	CNP081		2	105	108.0103	6.3246E+10
						Total SWL	115
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.Concreting of Tunnel	Mixer lorry	CNP044		5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101		2	100	103.0103	2E+10
	Excavator	CNP081		4	105	111.0206	1.2649E+11
	Lorry	CNP141		2	105	108.0103	6.3246E+10
	Pump lorry	CNP047		1	109	109	7.9433E+10
	Poker vibrator	CNP170		5	110	116.9897	5E+11
	Crane	CNP048		2	105	108.0103	6.3246E+10
	Air compressor	CNP003		3	100	104.771213	3E+10
						Total SWL	121
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
4. Shotcreting (spray	Mixer lorry	CNP044		5	109	115.9897	3.9716E+11
concrete inside tunnel)	Generator	CNP101		2	100	103.0103	2E+10
	Excavator	CNP081		4	105	111.0206	1.2649E+11
	Lorry	CNP141		2	105	108.0103	6.3246E+10
	Pump lorry	CNP047		1	109	109	7.9433E+10
	Poker vibrator	CNP170		5	110	116.9897	5E+11
	Crane	CNP048		2	105	108.0103	6.3246E+10
	Air compressor	CNP003		3	100	104.771213	3E+10
						Total SWL	121

Note: inside tunnel therefore minus 10 dB i.e. 111 dB

2.0. WORKS AREA A

2.1. VENTILATION BUILDING V4

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.1. Clearance	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
					Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.1.2. Foundation	Piling Rig	CNP166	3	100	104.771213	3E+10
(A) Bored Piling	Mobile Crane	CNP048	2	105	108.0103	6.3246E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
(B) Concreting	Air Compressor	CNP003	2	90	93.0103	2000000000
	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Poker Vib.	CNP170	3	105	109.771213	9.4868E+10
					Total SWL	119
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Loader	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Air Compressor	CNP003	2	90	93.0103	2000000000
	Drills	CNP183	3	106	110.771213	1.1943E+11
					Total SWL	115
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Tower Crane	CNP049	1	95	95	3162277660
Tunnel & Ventilation	Excavator	CNP081	4	105	111.0206	1.2649E+11
Building (excavation)	Crane, mobile	CNP048	1	105	105	3.1623E+10
					Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2.3. Construction of	Lorry	CNP141	2	105	108.0103	6.3246E+10
Tunnel & Ventilation	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
Building (concreting)	Poker Vib.	CNP170	5	105	111.9897	1.5811E+11
	Air Compressor	CNP003	3	90	94.7712125	3000000000
	Generator	CNP101	2	90	93.0103	2000000000
	Pump Lorry	CNP047	1	109	109	7.9433E+10
					Total SWL	118

3.0. WORKS AREA B (YCS STATION)							
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.1. Clearance	Excavator	CNP081		3	105	109.771213	9.4868E+10
	Lorry	CNP141		6	105	112.781513	1.8974E+11
						Total SWL	115
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.2. Foundation	Bored Piling	CNP166		4	100	106.0206	4E+10
	Air Compressor	CNP003		4	90	96.0205999	4000000000
	Excavator	CNP081		3	105	109.771213	9.4868E+10
	Lorry	CNP141		5	105	111.9897	1.5811E+11
	Crane	CNP048		5	105	111.9897	1.5811E+11
	Mixer Lorry	CNP044		5	109	115.9897	3.9716E+11
	Generator	CNP101		4	90	96.0205999	4000000000
						Total SWL	119
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3.3. Bulk Excavation	Air Compressor	CNP003		5	90	96.9897	5000000000
	Excavator	CNP081		10	105	115	3.1623E+11
	Lorry	CNP141		4	105	111.0206	1.2649E+11
	Drills	CNP183		10	106	116	3.9811E+11
						Total SWL	119
Activity							
3.4. Construction of Station Structure							
	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044		10	109	119	7.9433E+11
	Generator	CNP101		3	90	94.7712125	3000000000
	Excavator	CNP081		3	105	109.771213	9.4868E+10
	Lorry	CNP141		3	105	109.771213	9.4868E+10
	Pump Lorry	CNP047		3	109	113.771213	2.383E+11
	Tower Crane	CNP049		3	95	99.7712125	9486832981
	Poker Vib.	CNP170		10	105	115	3.1623E+11
						Total SWL	122

4.0 WORKS AREA C

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.1. Site Clearance	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	5	105	111.9897	1.5811E+11
					Total SWL	113

4.2. Bulk Excavation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Generator	CNP101	1	90	90	1000000000
	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Loader	CNP081	2	105	108.0103	6.3246E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4.2.1 Sheet Piling	Sheet Pile Vib.	-	3	118	122.771213	1.8929E+12
					Total SWL	123

4.3. Construction of Tunnel Box and Ventilation Building

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump Lorry	CNP047	1	109	109	7.9433E+10
	Poker Vib.	CNP170	5	105	111.9897	1.5811E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air Compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	120

5.0. WORK AREA D

5.1. Site Clearance (as 4.1.)

5.2. Bulk Excavation
(as in 4.2)

5.3. Construction of Tunnel Box
(as in 4.3)

6.0. WORK AREA E AND TEMP. WORKS AREA							
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
6.1. Site Clearance	Excavator	CNP081		3	105	109.771213	9.4868E+10
	Lorry	CNP141		5	105	111.9897	1.5811E+11
						Total SWL	114
6.2. Bulk Excavation							
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
	Generator	CNP101		1	90	90	1000000000
	Excavator	CNP081		4	105	111.0206	1.2649E+11
	Lorry	CNP141		4	105	111.0206	1.2649E+11
	Loader	CNP081		4	105	111.0206	1.2649E+11
						Total SWL	116
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
	Sheet Pile Vib.			2	118	121.0103	1.2619E+12
						Total SWL	121
6.3. Construction of Tunnel Box							
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044		4	109	115.0206	3.1773E+11
	Generator	CNP101		2	90	93.0103	2000000000
	Excavator	CNP081		4	105	111.0206	1.2649E+11
	Lorry	CNP141		6	105	112.781513	1.8974E+11
	Pump Lorry	CNP047		2	109	112.0103	1.5887E+11
	Poker Vib.	CNP170		4	105	111.0206	1.2649E+11
	Crane	CNP048		3	105	109.771213	9.4868E+10
	Air Compressor	CNP003		3	90	94.7712125	3000000000
						Total SWL	120

Section - Cut and Cover Tunnel						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Vibratory Sheet Piling	Sheet pile vibrator		2	118	121.0103	1.2619E+12
	GEN	CNP101	2	90	93.0103	2000000000
					Total SWL	121
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Loader	CNP081	2	105	108.0103	6.3246E+10
					Total SWL	115
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel Slabs	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	105	111.9897	1.5811E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	120
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcrating (spray concrete inside tunnel)	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	105	111.9897	1.5811E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	120

Note: inside tunnel therefore minus 10 dB i.e. 110 dB

C1588 - West Rail Construction Noise Calculations

TS 400 - Southern Section

2.0. WORKS AREA A

2.1. VENTILATION BUILDING V4

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2.1.1. Clearance	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
					Total SWL	108	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2.1.2. Foundation	Piling Rig	CNP166	1	100	100	10000000000	50	5000000000
(A) Bored Piling	Mobile Crane	CNP048	1	105	105	31622776602	50	15811388301
					Total SWL	106	Total SWL	103
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
(B) Concreting	Air Compressor	CNP003	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	50	15811388301
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Mixer Lorry	CNP044	1	109	109	79432823472	50	39716411736
	Poker Vib.	CNP170	1	105	105	31622776602	100	31622776602
					Total SWL	112	Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2.2. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Loader	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Air Compressor	CNP003	1	90	90	1000000000	100	1000000000
	Drills	CNP183	1	106	106	39810717055	100	39810717055
					Total SWL	111	Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2.3. Construction of	Tower Crane	CNP049	1	95	95	3162277660	100	3162277660
Tunnel & Ventilation	Excavator	CNP081	1	105	105	31622776602	100	31622776602
Building (excavation)	Crane, mobile	CNP048	1	105	105	31622776602	100	31622776602
					Total SWL	108	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2.3. Construction of	Lorry	CNP141	1	105	105	31622776602	10	3162277660
Tunnel & Ventilation	Mixer Lorry	CNP044	1	109	109	79432823472	100	79432823472
Building (concreting)	Poker Vib.	CNP170	1	105	105	31622776602	100	31622776602
	Air Compressor	CNP003	1	90	90	1000000000	100	1000000000
	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Pump Lorry	CNP047	1	109	109	79432823472	100	79432823472
					Total SWL	114	Total SWL	113

3.0. WORKS AREA B (YCS STATION)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.1. Clearance	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.2 Piling for Station	Piling, reverse circu	CNP186	1	100	100	10000000000	100	10000000000
	Poker Vibrator	CNP170	1	105	105	31622776602	50	15811388301
	Crane	CNP048	1	105	105	31622776602	100	31622776602
	Mixer Lorry	CNP044	1	109	109	79432823472	50	39716411736
					Total SWL	112	Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.3. Pilecap Construct	Mixer lorry	CNP044	1	109	109	79432823472	100	79432823472
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Poker Vibrator	CNP170	1	105	105	31622776602	100	31622776602
					Total SWL	112	Total SWL	112

Activity

3.4 Column Construction

PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
Poker Vibrator	CNP170	1	105	105	31622776602	100	31622776602
Mixer Lorry	CNP044	1	109	109	79432823472	100	79432823472
Mobile crane	CNP048	1	105	105	31622776602	100	31622776602
				Total SWL	112	Total SWL	112

Activity

3.4. Construction of Station Structure

PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
Air Compressor	CNP001	1	90	90	1000000000	100	1000000000
Mobile crane	CNP048	1	105	105	31622776602	100	31622776602
Poker Vib.	CNP170	1	105	105	31622776602	100	31622776602
concrete pump	CNP047	1	105	105	31622776602	100	31622776602
Mixer Lorry	CNP044	1	109	109	79432823472	100	79432823472
				Total SWL	112	Total SWL	112

Section - Cut and Cover Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Vibratory Sheet Piling	Sheet pile vibrator		1	118	118	6.30957E+11	20	1.26191E+11
	GEN	CNP101	1	90	90	1000000000	20	200000000
					Total SWL	118	Total SWL	111
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Loader	CNP081	1	105	105	31622776602	100	31622776602
					Total SWL	110	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.Concreting of Tunnel Slabs	Mixer lorry	CNP044	1	109	109	79432823472	100	79432823472
	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	0	0
	Pump lorry	CNP047	1	109	109	79432823472	0	0
	Poker vibrator	CNP170	1	105	105	31622776602	100	31622776602
	Crane	CNP048	1	105	105	31622776602	100	31622776602
	Air compressor	CNP003	1	90	90	1000000000	100	1000000000
					Total SWL	115	Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4. Shotcreting (spray concrete inside tunnel)	Mixer lorry	CNP044	1	109	109	79432823472	40	31773129389
	Generator	CNP101	1	90	90	1000000000	40	400000000
	Excavator	CNP081	1	105	105	31622776602	40	12649110641
	Lorry	CNP141	1	105	105	31622776602	0	0
	Pump lorry	CNP047	1	109	109	79432823472	0	0
	Poker vibrator	CNP170	1	105	105	31622776602	40	12649110641
	Crane	CNP048	1	105	105	31622776602	40	12649110641
	Air compressor	CNP003	1	90	90	1000000000	40	400000000
					Total SWL	115	Total SWL	108

Note: inside tunnel therefore minus 10 dB i.e. 101 dB

C1588 - West Rail Construction Noise Calculations

Plant Teams for TS 300 - Central Section

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	113	116	3.99E+11
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	114	117	5.02E+11
	Poker Vibrator	CNP170	2	113	116	3.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	121

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	113	118	5.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete pump	CNP047	1	109	109	7.94E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	121

Section- Reclamation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Seawall construction	Derrick Barge	CNP061	1	104	104	25118864315
and Removal	Hopper Barge	CNP061	1	104	104	25118864315
	Flat Barge	CNP061	1	104	104	25118864315
	Tugboat	CNP221	1	110	110	1E+11
					Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Sand filling	Grab Dredger	CNP063	1	112	112	1.58489E+11
	Small piling plant	CNP167	1	114	114	2.51189E+11
	Bulldozer	CNP030	1	115	115	3.16228E+11
					Total SWL	119
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Vibro compaction	Vibro compactor	CNP050	1	105	105	31622776602
					Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Surcharge	Truck	CNP141	1	112	112	1.58489E+11
	Excavator	CNP081	1	112	112	1.58489E+11
	Bulldozer	CNP030	1	115	115	3.16228E+11
					Total SWL	118
Activity						
5 Construction of New Pier						
5.1 Foundation						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Piling Rig	CNP166	1	100	100	10000000000
	Mobile Crane	CNP048	1	112	112	1.58489E+11
	Air Compressor	CNP003	1	104	104	25118864315
	Lorry	CNP141	2	112	115.0103	3.16979E+11
	Mixer Lorry	CNP044	2	109	112.0103	1.58866E+11
	Generator	CNP101	1	108	108	63095734448
					Total SWL	119
5.2 Superstrure construction						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	3	109	113.771213	2.38298E+11
	Generator	CNP101	1	108	108	63095734448
	Lorry	CNP141	1	112	112	1.58489E+11
	Pump Lorry	CNP047	1	109	109	79432823472
	Tower Crane	CNP049	1	95	95	3162277660
	Poker Vib.	CNP170	3	113	117.771213	5.98579E+11
					Total SWL	121

TS300 plant teams

Section - Cut and Cover Tunnel (Bored Piling)						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Bored Piling	grab and chisel	CNP164	2	115	118.0103	6.3246E+11
	Generator	CNP101	2	108	111.0103	1.2619E+11
					Total SWL	119
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Loader	CNP081	2	112	115.0103	3.1698E+11
					Total SWL	122
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcreting (spray	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
concrete inside tunnel)	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125 #

Note: inside tunnel therefore minus 10 dB i.e. 115 dB

TS300 plant teams

Section - Cut and Cover Tunnel (sheet piling)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Vibratory Sheet Piling	Sheet pile vibrator	*	2	118	121.0103	1.2619E+12
	Generator	CNP101	2	108	111.0103	1.2619E+11
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	112	115.0103	3.1698E+11
	Lorry	CNP141	6	112	119.781513	9.5094E+11
	Loader	CNP081	2	112	115.0103	3.1698E+11
					Total SWL	122

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcreting (spray	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
concrete inside tunnel)	Generator	CNP101	2	108	111.0103	1.2619E+11
	Excavator	CNP081	4	112	118.0206	6.3396E+11
	Lorry	CNP141	2	112	115.0103	3.1698E+11
	Pump lorry	CNP047	1	109	109	7.9433E+10
	Poker vibrator	CNP170	5	113	119.9897	9.9763E+11
	Crane	CNP048	2	112	115.0103	3.1698E+11
	Air compressor	CNP003	3	104	108.771213	7.5357E+10
					Total SWL	125 #

* Reference source:- SWL is taken from BS5228:Part 4: 1986

Note: inside tunnel therefore minus 10 dB i.e. 115 dB

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1A. Tunnelling (day)	Generator	CNP101	1	108	108	6.3096E+10
	Excavator	CNP081	1	112	112	1.5849E+11
	Lorry	CNP141	4	112	118	6.3396E+11
	Drill	CNP183	1	106	106	3.9811E+10 *
	(below ground)				Total SWL	120

*Includes 10 dB Shielding from Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1B. Tunnelling (night)	Generator	CNP101	1	98	98	6309573445 **
	Excavator	CNP081	1	112	112	1.5849E+11
	Drill	CNP183	1	106	106	3.9811E+10 *
	(below ground)				Total SWL	113

*Includes 10 dB Shielding from Tunnel

** generator shieldied by 10 dB

TS300 plant teams

Section - Construction of Pumping Station / Sub Station / Cooling Plant						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1. Site Clearance	Excavator	CNP081	1	112	112	1.58489E+11
	Lorry	CNP141	5	112	119	7.92447E+11
					Total SWL	120
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bored Piling	Piling Rig	CNP166	3	100	104.771213	30000000000
	Mobile Crane	CNP048	2	112	115.0103	3.16979E+11
					Total SWL	115
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3. Concreting	Air Compressor	CNP003	2	104	107.0103	50237728630
	Excavator	CNP081	2	112	115.0103	3.16979E+11
	Lorry	CNP141	6	112	119.781513	9.50936E+11
	Mixer Lorry	CNP044	5	109	115.9897	3.97164E+11
	Poker Vib.	CNP170	3	113	117.771213	5.98579E+11
						124
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Bulk Excavation	Excavator	CNP081	2	112	115.0103	3.16979E+11
	Loader	CNP081	2	112	115.0103	3.16979E+11
	Lorry	CNP141	2	112	115.0103	3.16979E+11
	Air Compressor	CNP003	2	104	107.0103	50237728630
	Drills	CNP183	3	116	120.771213	1.19432E+12
						123
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5. Construction of	Tower Crane	CNP049	1	95	95	3162277660
Building Structure	Excavator	CNP081	4	112	118.0206	6.33957E+11
(excavation)	Crane, mobile	CNP048	1	112	112	1.58489E+11
					Total SWL	119
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
6. Construction of	Lorry	CNP141	2	112	115.0103	3.16979E+11
Building Structure	Mixer Lorry	CNP044	5	109	115.9897	3.97164E+11
(concreting)	Poker Vib.	CNP170	5	113	119.9897	9.97631E+11
	Air Compressor	CNP003	3	104	108.771213	75356592945
	Generator	CNP101	2	108	111.0103	1.26191E+11
	Pump Lorry	CNP047	1	109	109	79432823472
					Total SWL	123

Section - Subway Construction (near Mount Sterling Mall)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Demolition	Breaker	CNP027	1	122	122	1.58489E+12
	Bulldozer	CNP030	1	115	115	3.16228E+11
	Compactor	CNP050	1	105	105	31622776602
					Total SWL	123

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Bored Piling	Rev. Cir. Drill	CNP166	1	100	100	10000000000
	Generator	CNP101	1	108	108	63095734448
					Total SWL	109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Bulk Excavation	Excavator	CNP081	1	112	112	1.58489E+11
	Loader	CNP081	1	112	112	1.58489E+11
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Concreting	Generator	CNP101	1	108	108	63095734448
	Poker vibrator	CNP170	1	113	113	1.99526E+11
	Crane	CNP048	1	112	112	1.58489E+11
	Air compressor	CNP003	1	104	104	25118864315
					Total SWL	116

C1588 - West Rail Construction Noise Calculations

TS 300 - Central Section

Mitigation 1 - Use of Quiet Plant

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	110	113	2.00E+11
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	114	117	5.02E+11
	Poker Vibrator	CNP170	2	110	113	2.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	120

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	118

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	110	115	3.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete pump	CNP047	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	118

TS300 Mitigation 1

Section- Reclamation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Seawall construction	Derrick Barge	CNP061	1	104	104	2.5119E+10
and Removal	Hopper Barge	CNP061	1	104	104	2.5119E+10
	Flat Barge	CNP061	1	104	104	2.5119E+10
	Tugboat	CNP221	1	110	110	1E+11
					Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Sand filling	Grab Dredger	CNP063	1	112	112	1.5849E+11
	Small piling plant	CNP167	1	114	114	2.5119E+11
	Bulldozer	CNP030	1	110	110	1E+11
					Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Vibro compaction	Vibro compactor	CNP050	1	105	105	3.1623E+10
					Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Surcharge	Truck	CNP141	1	105	105	3.1623E+10
	Excavator	CNP081	1	105	105	3.1623E+10
	Bulldozer	CNP030	1	110	110	1E+11
					Total SWL	112
Activity						
5 Construction of New Pier						
5.1 Foundation						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Piling Rig	CNP166	1	100	100	1E+10
	Mobile Crane	CNP048	1	105	105	3.1623E+10
	Air Compressor	CNP003	1	100	100	1E+10
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Mixer Lorry	CNP044	2	109	112.0103	1.5887E+11
	Generator	CNP101	1	100	100	1E+10
					Total SWL	115
5.2 Superstrure construction						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Mixer Lorry	CNP044	3	109	113.771213	2.383E+11
	Generator	CNP101	1	100	100	1E+10
	Lorry	CNP141	1	105	105	3.1623E+10
	Pump Lorry	CNP047	1	109	109	7.9433E+10
	Tower Crane	CNP049	1	95	95	3162277660
	Poker Vib.	CNP170	3	110	114.771213	3E+11
					Total SWL	118

Section - Cut and Cover Tunnel (Sheet Piling)							
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1Vibratory sheet piling	Sheet pile vibrator	*	2	118	121.0103	1.2619E+12
	Generator	CNP101	2	100	103.0103	2E+10
					Total SWL	121

*Reference source:- SWL is taken from BS5228:Part 4: 1986

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Loader	CNP081	2	105	108.0103	6.3246E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101	2	100	103.0103	2E+10
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	105	105	3.1623E+10
	Poker vibrator	CNP170	5	110	116.9897	5E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	100	104.771213	3E+10
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcreting (spray	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
concrete inside tunnel)	Generator	CNP101	2	100	103.0103	2E+10
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	105	105	3.1623E+10
	Poker vibrator	CNP170	5	110	116.9897	5E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	100	104.771213	3E+10
					Total SWL	121

Note: inside tunnel therefore minus 10 dB i.e. 111 dB

Section - Cut and Cover Tunnel (Bored Piling)							
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	
1 Bored Piling	Large diamenter bored	CNP164	2	110	113.0103	2E+11	
	Generator	CNP101	2	100	103.0103	2E+10	
					Total SWL	113	
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	
2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10	
	Lorry	CNP141	6	105	112.781513	1.8974E+11	
	Loader	CNP081	2	105	108.0103	6.3246E+10	
					Total SWL	115	
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	
3.Concreting of Tunnel Slabs	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11	
	Generator	CNP101	2	100	103.0103	2E+10	
	Excavator	CNP081	4	105	111.0206	1.2649E+11	
	Lorry	CNP141	2	105	108.0103	6.3246E+10	
	Pump lorry	CNP047	1	105	105	3.1623E+10	
	Poker vibrator	CNP170	5	110	116.9897	5E+11	
	Crane	CNP048	2	105	108.0103	6.3246E+10	
	Air compressor	CNP003	3	100	104.771213	3E+10	
					Total SWL	121	
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	
4. Shotcreting (spray concrete inside tunnel)	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11	
	Generator	CNP101	2	100	103.0103	2E+10	
	Excavator	CNP081	4	105	111.0206	1.2649E+11	
	Lorry	CNP141	2	105	108.0103	6.3246E+10	
	Pump lorry	CNP047	1	105	105	3.1623E+10	
	Poker vibrator	CNP170	5	110	116.9897	5E+11	
	Crane	CNP048	2	105	108.0103	6.3246E+10	
	Air compressor	CNP003	3	100	104.771213	3E+10	
					Total SWL	121	
Note: inside tunnel therefore minus 10 dB i.e. 111 dB							

Section - Tunnelling						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1A. Tunnelling (day)	Generator	CNP101	1	100	100	1E+10
	Excavator	CNP081	1	105	105	3.1623E+10
	Lorry	CNP141	4	105	111	1.2649E+11
	Drill	CNP183	1	106	106	3.9811E+10
	(below ground)				Total SWL	113
		*Includes 10 dB Shielding from Tunnel				
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1B. Tunnelling (night)	Generator	CNP101	1	90	90	1000000000
	Excavator	CNP081	1	105	105	3.1623E+10
	Drill	CNP183	1	106	106	3.9811E+10
	(below ground)				Total SWL	109
		*Includes 10 dB Shielding from Tunnel				
		** generator shieldied by 10 dB				

TS300 Mitigation 1

Section - Construction of Pumping Station / Sub Station / Cooling Plant						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1. Site Clearance	Excavator	CNP081	1	105	105	3.1623E+10
	Lorry	CNP141	5	105	112	1.5811E+11
					Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bored Piling	Piling Rig	CNP166	3	100	104.771213	3E+10
	Mobile Crane	CNP048	2	105	108.0103	6.3246E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3. Concreting	Air compressor	CNP003	2	100	103.0103	2E+10
	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
	Poker vibrator	CNP170	3	110	114.771213	3E+11
						120
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Loader	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	2	100	103.0103	2E+10
	Drill	CNP183	3	116	120.771213	1.1943E+12
						121
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5. Excavation for Building Structure	Tower Crane	CNP049	1	95	95	3162277660
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Crane, mobile	CNP048	1	105	105	3.1623E+10
					Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
6. Concreting for Building Structure	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Concrete lorry mixer	CNP044	5	109	115.9897	3.9716E+11
	Poker Vibrator	CNP170	5	110	116.9897	5E+11
	Air Compressor	CNP003	3	100	104.771213	3E+10
	Generator	CNP101	2	100	103.0103	2E+10
	Pump Lorry	CNP047	1	105	105	3.1623E+10
					Total SWL	120

Section - Subway Construction (near Mount Sterling Mall)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Demolition	Breaker	CNP027	1	122	122	1.5849E+12
	Bulldozer	CNP030	1	110	110	1E+11
	Compactor	CNP050	1	100	100	1E+10
					Total SWL	122
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Bored Piling	Rev. Cir. Drill	CNP166	1	100	100	1E+10
	Generator	CNP101	1	100	100	1E+10
					Total SWL	103
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Bulk Excavation	Excavator	CNP081	1	105	105	3.1623E+10
	Loader	CNP081	1	105	105	3.1623E+10
					Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Concreting	Generator	CNP101	1	100	100	1E+10
	Poker vibrator	CNP170	1	110	110	1E+11
	Crane	CNP048	1	112	112	1.5849E+11
	Air compressor	CNP003	1	100	100	1E+10
					Total SWL	114

C1588 - West Rail Construction Noise Calculations

TS 300 - Central Section

Mitigation 2 - Use of Quiet Plant + Barrier

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	105	108	6.32E+10
					Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	114	117	5.02E+11
	Poker Vibrator	CNP170	2	105	108	6.32E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	119

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	105	111	1.26E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	116
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	105	110	9.49E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	115
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	105	111	1.26E+11
	Concrete pump	CNP047	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	115

TS300 Mitigation 2

Section- Reclamation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Seawall construction and Removal	Derrick Barge	CNP061	1	104	104	25118864315
	Hopper Barge	CNP061	1	104	104	25118864315
	Flat Barge	CNP061	1	104	104	25118864315
	Tugboat	CNP221	1	110	110	1E+11
					Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Sand filling	Grab Dredger	CNP063	1	112	112	1.58489E+11
	Small piling plant	CNP167	1	114	114	2.51189E+11
	Bulldozer	CNP030	1	110	110	1E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Vibro compaction	Vibro compactor	CNP050	1	105	105	31622776602
					Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Surcharge	Truck	CNP141	1	105	105	31622776602
	Excavator	CNP081	1	105	105	31622776602
	Bulldozer	CNP030	1	110	110	1E+11
					Total SWL	112

Activity

5 Construction of New Pier

5.1 Foundation

PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
Piling Rig	CNP166	1	100	100	10000000000
Mobile Crane	CNP048	1	105	105	31622776602
Air Compressor	CNP003	1	100	100	10000000000
Lorry	CNP141	2	105	108.0103	63245553203
Mixer Lorry	CNP044	2	109	112.0103	1.58866E+11
Generator	CNP101	1	100	100	10000000000
				Total SWL	115

5.2 Superstrure construction

PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
Mixer Lorry	CNP044	3	109	113.771213	2.38298E+11
Generator	CNP101	1	100	100	10000000000
Lorry	CNP141	1	105	105	31622776602
Pump Lorry	CNP047	1	109	109	79432823472
Tower Crane	CNP049	1	95	95	3162277660
Poker Vib.	CNP170	3	110	114.771213	3E+11
				Total SWL	118

Section - Cut and Cover Tunnel (Sheet Piling)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Vibratory Sheet Piling	Sheet pile vibrator	*	2	118	121.0103	1.2619E+12
	Generator	CNP101	2	90	93.0103	2000000000
					Total SWL	121

*Reference source:- SWL is taken from BS5228:Part 4: 1986

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	6.3246E+10
	Lorry	CNP141	6	105	112.781513	1.8974E+11
	Loader	CNP081	2	105	108.0103	6.3246E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
Slabs	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	105	105	3.1623E+10
	Poker vibrator	CNP170	5	105	111.9897	1.5811E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcreting (spray	Mixer lorry	CNP044	5	109	115.9897	3.9716E+11
concrete inside tunnel)	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.2649E+11
	Lorry	CNP141	2	105	108.0103	6.3246E+10
	Pump lorry	CNP047	1	105	105	3.1623E+10
	Poker vibrator	CNP170	5	105	111.9897	1.5811E+11
	Crane	CNP048	2	105	108.0103	6.3246E+10
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	119

Note: inside tunnel therefore minus 10 dB i.e. 109 dB

Section - Cut and Cover Tunnel (Bored Piling)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Bored Piling	Large diamenter bored	CNP164	2	110	113.0103	2E+11
	Generator	CNP101	2	90	93.0103	2000000000
					Total SWL	113

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2. Bulk Excavation	Excavator	CNP081	2	105	108.0103	63245553203
	Lorry	CNP141	6	105	112.781513	1.89737E+11
	Loader	CNP081	2	105	108.0103	63245553203
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3.Concreting of Tunnel Slabs	Mixer lorry	CNP044	5	109	115.9897	3.97164E+11
	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.26491E+11
	Lorry	CNP141	2	105	108.0103	63245553203
	Pump lorry	CNP047	1	105	105	31622776602
	Poker vibrator	CNP170	5	105	111.9897	1.58114E+11
	Crane	CNP048	2	105	108.0103	63245553203
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4. Shotcreting (spray concrete inside tunnel)	Mixer lorry	CNP044	5	109	115.9897	3.97164E+11
	Generator	CNP101	2	90	93.0103	2000000000
	Excavator	CNP081	4	105	111.0206	1.26491E+11
	Lorry	CNP141	2	105	108.0103	63245553203
	Pump lorry	CNP047	1	105	105	31622776602
	Poker vibrator	CNP170	5	105	111.9897	1.58114E+11
	Crane	CNP048	2	105	108.0103	63245553203
	Air compressor	CNP003	3	90	94.7712125	3000000000
					Total SWL	119

Note: inside tunnel therefore minus 10 dB i.e. 109 dB

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1A. Tunnelling (day)	Generator	CNP101	1	90	90	1000000000
	Excavator	CNP081	1	105	105	31622776602
	Lorry	CNP141	4	105	111	1.26491E+11
	Drill	CNP183	1	106	106	39810717055 *
	(below ground)				Total SWL	113

*Includes 10 dB Shielding from Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1B. Tunnelling (night)	Generator	CNP101	1	90	90	1000000000 **
	Excavator	CNP081	1	105	105	31622776602
	Drill	CNP183	1	106	106	39810717055 *
	(below ground)				Total SWL	109

*Includes 10 dB Shielding from Tunnel
** generator shieldied by 10 dB

TS300 Mitigation 2

Section - Construction of Pumping Station / Sub Station / Cooling Plant							
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
1. Site Clearance	Excavator	CNP081	1	105		105	31622776602
	Lorry	CNP141	5	105		112	1.58114E+11
						Total SWL	113
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
2. Bored Piling	Piling Rig	CNP166	3	100		104.771213	30000000000
	Mobile Crane	CNP048	2	105		108.0103	63245553203
						Total SWL	110
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
3. Concreting	Air compressor	CNP003	2	90		93.0103	2000000000
	Excavator	CNP081	2	105		108.0103	63245553203
	Lorry	CNP141	6	105		112.781513	1.89737E+11
	Mixer lorry	CNP044	5	109		115.9897	3.97164E+11
	Poker vibrator	CNP170	3	105		109.771213	94868329805
						Total SWL	119
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
4. Bulk Excavation	Excavator	CNP081	2	105		108.0103	63245553203
	Loader	CNP081	2	105		108.0103	63245553203
	Lorry	CNP141	2	105		108.0103	63245553203
	Air compressor	CNP003	2	90		93.0103	2000000000
	Drill	CNP183	3	106		110.771213	1.19432E+11
						Total SWL	115
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
5. Excavation for Building Structure	Tower Crane	CNP049	1	95		95	3162277660
	Excavator	CNP081	4	105		111.0206	1.26491E+11
	Crane, mobile	CNP048	1	105		105	31622776602
						Total SWL	112
Activity	PME	TM ref	UNIT	SWL		sub-SWL	10^(SWL/10)
6. Concreting for Building Structure	Lorry	CNP141	2	105		108.0103	63245553203
	Concrete lorry mixer	CNP044	5	109		115.9897	3.97164E+11
	Poker Vibrator	CNP170	5	105		111.9897	1.58114E+11
	Air Compressor	CNP003	3	90		94.7712125	3000000000
	Generator	CNP101	2	90		93.0103	2000000000
	Pump Lorry	CNP047	1	105		105	31622776602
						Total SWL	118

Section - Subway Construction (near Mount Sterling Mall)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Demolition	Breaker	CNP027	1	117	117	5.01187E+11
	Bulldozer	CNP030	1	105	105	31622776602
	Compactor	CNP050	1	100	100	10000000000
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Bored Piling	Rev. Cir. Drill	CNP166	1	100	100	10000000000
	Generator	CNP101	1	90	90	1000000000
					Total SWL	100

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Bulk Excavation	Excavator	CNP081	1	100	100	10000000000
	Loader	CNP081	1	100	100	10000000000
					Total SWL	103

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Concreting	Generator	CNP101	1	90	90	1000000000
	Poker vibrator	CNP170	1	105	105	31622776602
	Crane	CNP048	1	107	107	50118723363
	Air compressor	CNP003	1	90	90	1000000000
					Total SWL	109

C1589 - West Rail Construction Noise Calculations

TS 300 - Central Section

Mitigation 3 - Use of Quiet Plant + Barrier + Reduction in no. of plant + On Time

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
							Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2A Excavation for &	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
Construction of	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
Drainage	Compactor, vibratory	CNP050	1	105	105	3.16E+10	100	3.162E+10
					Total SWL	110	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2B Excavation for	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
Minor Retaining	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
Wall	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
	Poker Vibrator	CNP170	2	105	108	6.32E+10	100	6.325E+10
					Total SWL	113		112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Formation	Grader	CNP104	1	113	113	2.00E+11	100	1.995E+11
Preparation	Roller, vibratory	CNP186	1	108	108	6.31E+10	100	6.31E+10
					Total SWL	114	Total SWL	114

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2A Piling for Station	Drilling Rig*	-	1	114	114	2.51E+11	100	2.512E+11
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.162E+10
					Total SWL	116	Total SWL	116

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.162E+10
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Station/Development	Air Compressor	CNP001	1	90	90	1.00E+09	100	1E+09
Construction	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.162E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
					Total SWL	112	Total SWL	112

TS300 Mitigation 3

Section - Construction of Pumping Station / Sub Station / Cooling Plant								
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1. Site Clearance	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
					Total SWL	108	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2. Bored Piling	Piling Rig	CNP166	1	100	100	10000000000	100	1E+10
	Mobile Crane	CNP048	1	105	105	31622776602	100	3.162E+10
					Total SWL	106	Total SWL	106
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3. Concreting	Air compressor	CNP003	1	90	90	1000000000	100	1E+09
	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Mixer lorry	CNP044	1	109	109	79432823472	100	7.943E+10
	Poker vibrator	CNP170	1	105	105	31622776602	100	3.162E+10
						112	Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Loader	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Air compressor	CNP003	1	90	90	1000000000	100	1E+09
	Drill	CNP183	1	106	106	39810717055	100	3.981E+10
						111	Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5. Excavation for Building Structure	Tower Crane	CNP049	1	95	95	3162277660	100	3.162E+09
	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Crane, mobile	CNP048	1	105	105	31622776602	100	3.162E+10
					Total SWL	108	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
6. Concreting for Building Structure	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Concrete lorry mixer	CNP044	1	109	109	79432823472	100	7.943E+10
	Poker Vibrator	CNP170	1	105	105	31622776602	100	3.162E+10
	Air Compressor	CNP003	1	90	90	1000000000	100	1E+09
	Generator	CNP101	1	90	90	1000000000	100	1E+09
	Pump Lorry	CNP047	1	105	105	31622776602	100	3.162E+10
					Total SWL	112	Total SWL	112

TS300 Mitigation 3

Section- Reclamation								
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Seawall construcion	Derrick Barge	CNP061	1	104	104	25118864315	100	2.512E+10
and Removal	Hopper Barge	CNP061	1	104	104	25118864315	100	2.512E+10
	Flat Barge	CNP061	1	104	104	25118864315	100	2.512E+10
	Tugboat	CNP221	1	110	110	1E+11	100	1E+11
					Total SWL	112	Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Sand filling	Grab Dredger	CNP063	1	112	112	1.58489E+11	100	1.585E+11
	Small piling plant	CNP167	1	114	114	2.51189E+11	100	2.512E+11
	Bulldozer	CNP030	1	110	110	1E+11	100	1E+11
					Total SWL	117	Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Vibro compaction	Vibro compactor	CNP050	1	105	105	31622776602	100	3.162E+10
					Total SWL	105	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Surcharge	Truck	CNP141	1	105	105	31622776602	10	3.162E+09
	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Bulldozer	CNP030	1	110	110	1E+11	100	1E+11
					Total SWL	112	Total SWL	111
Activity								
5 Construction of New Pier								
5.1 Foundation								
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
	Piling Rig	CNP166	1	100	100	10000000000	100	1E+10
	Mobile Crane	CNP048	1	105	105	31622776602	100	3.162E+10
	Air Compressor	CNP003	1	100	100	10000000000	100	1E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Mixer Lorry	CNP044	1	109	109	79432823472	100	7.943E+10
	Generator	CNP101	1	100	100	10000000000	100	1E+10
					Total SWL	112	Total SWL	112
5.2 Superstrure construction								
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
	Mixer Lorry	CNP044	1	109	109	79432823472	100	7.943E+10
	Generator	CNP101	1	100	100	10000000000	100	1E+10
	Lorry	CNP141	1	105	105	31622776602	10	11.237238
	Pump Lorry	CNP047	1	109	109	79432823472	100	7.943E+10
	Tower Crane	CNP049	1	95	95	3162277660	100	3.162E+09
	Poker Vib	CNP170	1	110	110	1E+11	100	1E+11
					Total SWL	115	Total SWL	114

Section - Cut and Cover Tunnel (Sheet Piling)								
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Vibratory Sheet Piling	Sheet pile vibrator	*	1	110	110	1E+11	100	1E+11
	Generator	CNP101	1	90	90	1000000000	100	1E+09
					Total SWL	110	Total SWL	110
*Reference source:- SWL is taken from BS5228:Part 4: 1986								
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Loader	CNP081	1	105	105	31622776602	100	3.162E+10
					Total SWL	110	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.Concreting of Tunnel	Mixer lorry	CNP044	1	109	109	79432823472	100	7.943E+10
Slabs	Generator	CNP101	1	90	90	1000000000	100	1E+09
	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Pump lorry	CNP047	1	105	105	31622776602	100	3.162E+10
	Poker vibrator	CNP170	1	105	105	31622776602	100	3.162E+10
	Crane	CNP048	1	105	105	31622776602	100	3.162E+10
	Air compressor	CNP003	1	90	90	1000000000	100	1E+09
					Total SWL	114	Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4. Shotcreting (spray	Mixer lorry	CNP044	1	109	109	79432823472	100	7.943E+10
concrete inside tunnel)	Generator	CNP101	1	90	90	1000000000	100	1E+09
	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Pump lorry	CNP047	1	105	105	31622776602	100	3.162E+10
	Poker vibrator	CNP170	1	105	105	31622776602	100	3.162E+10
	Crane	CNP048	1	105	105	31622776602	100	3.162E+10
	Air compressor	CNP003	1	90	90	1000000000	100	1E+09
					Total SWL	114	Total SWL	113
Note: inside tunnel therefore minus 10 dB i.e. 103 dB								

TS300 Mitigation 3

Section - Cut and Cover Tunnel (Bored Piling)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Bored Piling	Large diameter b	CNP164	2	110	113.0103	2E+11	100	2E+11
	Generator	CNP101	1	90	90	1000000000	100	1000000000
					Total SWL	113	Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Loader	CNP081	1	105	105	31622776602	100	31622776602
					Total SWL	110	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.Concreting of T	Mixer lorry	CNP044	1	109	109	79432823472	100	79432823472
Slabs	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Pump lorry	CNP047	1	105	105	31622776602	100	31622776602
	Poker vibrator	CNP170	1	105	105	31622776602	100	31622776602
	Crane	CNP048	1	105	105	31622776602	100	31622776602
	Air compressor	CNP003	1	90	90	1000000000	100	1000000000
					Total SWL	114	Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4. Shotcreting (sp	Mixer lorry	CNP044	1	109	109	79432823472	100	79432823472
concrete inside tu	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Pump lorry	CNP047	1	105	105	31622776602	100	31622776602
	Poker vibrator	CNP170	1	105	105	31622776602	100	31622776602
	Crane	CNP048	1	105	105	31622776602	100	31622776602
	Air compressor	CNP003	1	90	90	1000000000	100	1000000000
					Total SWL	114	Total SWL	113

Note: inside tunnel therefore minus 10 dB i.e. 103 dB

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1A. Tunnelling (da	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Drill	CNP183	1	106	106	39810717055	100	39810717056
	(below ground)				Total SWL	110	Total SWL	108
		*Includes 10 dB Shielding from Tunnel						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1B. Tunnelling (ni	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	31622776602	100	31622776602
	Drill	CNP183	1	106	106	39810717055	100	39810717056
	(below ground)				Total SWL	109	Total SWL	108
		*Includes 10 dB Shielding from Tunnel						
		** generator shielded by 10 dB						

Section - At-grade, Formation Preparation (with additional mitigation measures)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
							Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2A Excavation for &	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
Construction of	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
Drainage	Compactor, vibratory	CNP050	1	105	105	3.16E+10	100	3.162E+10
					Total SWL	110	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2B Excavation for	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
Minor Retaining	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
Wall	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
	Poker Vibrator	CNP170	2	105	108	6.32E+10	50	3.162E+10
					Total SWL	113		112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Formation	Grader	CNP104	1	113	113	2.00E+11	40	7.981E+10
Preparation	Roller, vibratory	CNP186	1	108	108	6.31E+10	40	2.52E+10
					Total SWL	114	Total SWL	110

Section - Station/Development Construction (with additional mitigation measures)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2A Piling for Station	Drilling Rig*	-	1	114	114	2.51E+11	40	1.005E+11
	Poker Vibrator	CNP170	1	105	105	3.16E+10	40	1.265E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	40	3.177E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	40	1.265E+10
					Total SWL	116	Total SWL	112

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.162E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.162E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.162E+10
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Station/Development	Air Compressor	CNP001	1	90	90	1.00E+09	100	1E+09
Construction	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.162E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.162E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	100	3.162E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.943E+10
					Total SWL	112	Total SWL	112

Section - Station Construction (additional mitigations to Mei Foo Station)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.1. Clearance	Excavator	CNP081	1	105	105	31622776602	100	3.162E+10
	Lorry	CNP141	1	105	105	31622776602	80	2.53E+10
					Total SWL	108	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.2 Piling for Station	Piling, reverse circulation drill	CNP186	1	100	100	10000000000	45	4.5E+09
	Poker Vibrator	CNP170	1	105	105	31622776602	45	1.423E+10
	Crane	CNP048	1	105	105	31622776602	45	1.423E+10
	Mixer Lorry	CNP044	1	109	109	79432823472	45	3.574E+10
					Total SWL	112	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.3. Pilecap Construction	Mixer lorry	CNP044	1	109	109	79432823472	45	3.574E+10
	Excavator	CNP081	1	105	105	31622776602	45	1.423E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Poker Vibrator	CNP170	1	105	105	31622776602	45	1.423E+10
					Total SWL	112	Total SWL	108

Activity

3.4 Column Construction

	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
	Poker Vibrator	CNP170	1	105	105	31622776602	95	3.004E+10
	Mixer Lorry	CNP044	1	109	109	79432823472	10	7.943E+09
	Mobile crane	CNP048	1	105	105	31622776602	95	3.004E+10
					Total SWL	112	Total SWL	108

Activity

3.4. Construction of Station Structure

	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
	Air Compressor	CNP001	1	90	90	1000000000	65	650000000
	Mobile crane	CNP048	1	105	105	31622776602	65	2.055E+10
	Poker Vib.	CNP170	1	105	105	31622776602	65	2.055E+10
	concrete pump	CNP047	1	105	105	31622776602	65	2.055E+10
	Mixer Lorry	CNP044	1	109	109	79432823472	10	7.943E+09
					Total SWL	112	Total SWL	108

TS300 Mitigation 3

Section - Cut and Cover Tunnel (Sheet Piling, with additional mitigation measures)								
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Vibratory Sheet Piling	Sheet pile vibrator	*	1	110	110	1E+11	100	1E+11
	Generator	CNP101	1	90	90	1000000000	100	1E+09
					Total SWL	110	Total SWL	110

*Reference source:- SWL is taken from BS5228:Part 4: 1986

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2. Bulk Excavation	Excavator	CNP081	1	105	105	31622776602	40	1.265E+10
	Lorry	CNP141	1	105	105	31622776602	10	3.162E+09
	Loader	CNP081	1	105	105	31622776602	40	1.265E+10
					Total SWL	110	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3.Concreting of Tunnel Slabs	Mixer lorry	CNP044	1	109	109	79432823472	40	3.177E+10
	Generator	CNP101	1	90	90	1000000000	40	400000000
	Excavator	CNP081	1	105	105	31622776602	40	1.265E+10
	Lorry	CNP141	1	105	105	31622776602	0	0
	Pump lorry	CNP047	1	105	105	31622776602	0	0
	Poker vibrator	CNP170	1	105	105	31622776602	40	1.265E+10
	Crane	CNP048	1	105	105	31622776602	40	1.265E+10
	Air compressor	CNP003	1	90	90	1000000000	40	400000000
					Total SWL	114	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4. Shotcreting (spray concrete inside tunnel)	Mixer lorry	CNP044	1	109	109	79432823472	40	3.177E+10
	Generator	CNP101	1	90	90	1000000000	40	400000000
	Excavator	CNP081	1	105	105	31622776602	40	1.265E+10
	Lorry	CNP141	1	105	105	31622776602	0	0
	Pump lorry	CNP047	1	105	105	31622776602	0	0
	Poker vibrator	CNP170	1	105	105	31622776602	40	1.265E+10
	Crane	CNP048	1	105	105	31622776602	40	1.265E+10
	Air compressor	CNP003	1	90	90	1000000000	40	400000000
					Total SWL	114	Total SWL	108

Note: inside tunnel therefore minus 10 dB i.e. 103 dB

TS300 Mitigation 3

Section - Subway Construction (near Mount Sterling Mall)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Demolition	Breaker	CNP027	1	108	108	63095734448	50	3.155E+10
	Bulldozer	CNP030	1	105	105	31622776602	0	0
	Compactor	CNP050	1	100	100	10000000000	0	0
					Total SWL	110	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Bored Piling	Rev. Cir. Drill	CNP186	1	100	100	10000000000	100	1E+10
	Generator	CNP101	1	90	90	1000000000	100	1E+09
					Total SWL	100	Total SWL	100
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Bulk Excavation	Excavator	CNP081	1	100	100	10000000000	100	1E+10
	Loader	CNP081	1	100	100	10000000000	100	1E+10
					Total SWL	103	Total SWL	103
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Concreting	Generator	CNP101	1	90	90	1000000000	35	350000000
	Poker vibrator	CNP170	1	105	105	31622776602	35	1.107E+10
	Crane	CNP048	1	107	107	50118723363	35	1.754E+10
	Air compressor	CNP003	1	90	90	1000000000	35	350000000
					Total SWL	109	Total SWL	105

Section - Subway Construction (near Mount Sterling Mall, alternative mitigation)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Demolition	Breaker	CNP027	1	108	108	63095734448	0	0
	Bulldozer	CNP030	1	105	105	31622776602	100	3.162E+10
	Compactor	CNP050	1	100	100	10000000000	0	0
					Total SWL	110	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Bored Piling	Rev. Cir. Drill	CNP186	1	100	100	10000000000	100	1E+10
	Generator	CNP101	1	90	90	1000000000	100	1E+09
					Total SWL	100	Total SWL	100
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Bulk Excavation	Excavator	CNP081	1	100	100	10000000000	100	1E+10
	Loader	CNP081	1	100	100	10000000000	100	1E+10
					Total SWL	103	Total SWL	103
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Concreting	Generator	CNP101	1	90	90	1000000000	35	350000000
	Poker vibrator	CNP170	1	105	105	31622776602	35	1.107E+10
	Crane	CNP048	1	107	107	50118723363	35	1.754E+10
	Air compressor	CNP003	1	90	90	1000000000	35	350000000
					Total SWL	109	Total SWL	105

C1588 - West Rail Construction Noise Calculations

Plant Teams for TS600

West Rail Depot

Section - West Rail Depot

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1.1Earth Work	Bulldozer	CNP030	3	115	119.7712125	9.48683E+11	83.8	241580218.1
	Front and Loader	CNP081	2	112	115.0103	3.16979E+11	79.1	80717947.47
	Crane	CNP048	1	112	112	1.58489E+11	76.1	40358973.74
	Scrapers	CNP204	3	119	123.7712125	2.38298E+12	87.8	606822072
	Lorry	CNP141	6	112	119.7815125	9.50936E+11	83.8	242153842.4
	Grader	CNP104	2	113	116.0103	3.99052E+11	80.1	101617875.3
	Water Trucks	CNP141	1	112	112	1.58489E+11	76.1	40358973.74
	Rollers	CNP185	2	108	111.0103	1.26191E+11	75.1	32134393.68
	Bore Pile Rig	CNP164	1	115	115	3.16228E+11	79.1	80526739.37
					Total SWL	128	Total LAeq	92
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
2.0. Building Work	Air Compressor	CNP003	20	104	117.0103	5.02377E+11	81.1	127929325.5
	Lorry	CNP141	10	112	122	1.58489E+12	86.1	403589737.4
	Crane	CNP048	6	112	119.7815125	9.50936E+11	83.8	242153842.4
	Concrete Lorry Mixer	CNP044	2	109	112.0103	1.58866E+11	76.1	40454804.8
	Light Trucks	CNP141	20	112	125.0103	3.16979E+12	89.1	807179474.7
					Total SWL	128	Total LAeq	92
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
3.0. Railway Systems Installations	Crane	CNP048	3	112	116.7712125	4.75468E+11	80.8	121078821.2
	Excavator	CNP081	1	112	112	1.58489E+11	76.1	40358973.74
	Truck	CNP141	2	112	115.0103	3.16979E+11	79.1	80717947.47
	Tamping Machine	*	1	103	103	19952623150	67.1	5080893.763
	Loco + 6 Wagons	**	1	118	118	6.30957E+11	82.0	158489319.2
	Rail Train	***	1	109	109	79432823472	73.1	20227402.4
	Rail Welder	****	1	106	106	39810717055	70.1	10137715.85
	Grinder	CNP065	1	98	98	6309573445	62.1	1606719.684
	Saw (concrete)	CNP203	1	115	115	3.16228E+11	79.1	80526739.37
					Total SWL	123	Total LAeq	87
					Fixed Sources	122		

Reference sources:-

* SWL is taken from manufacturer's data
** SWL is derived from calculation of railway noise
*** SWL is based on KCRC monitoring data
**** SWL is based on KCRC monitoring data

TS600 plant teams

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11	76.1	40358973.74
	Lorry	CNP141	2	112	115	3.17E+11	79.1	80717947.47
					Total SWL	117	Total LAeq	81

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
2 Ground Treatment & Fill								
	Excavator/Loader	CNP081	1	112	112	1.58E+11	76.1	40358973.74
	Lorry	CNP141	2	112	115	3.17E+11	79.1	80717947.47
	Bulldozer	CNP030	1	115	115	3.16E+11	79.1	80526739.37
	Compactor, vibrat	CNP050	2	105	108	6.32E+10	72.1	16105347.87
					Total SWL	119	Total LAeq	83

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
3 Access Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11	76.1	40358973.74
	Lorry	CNP141	1	112	112	1.58E+11	76.1	40358973.74
	Roller, vibratory	CNP186	1	108	108	6.31E+10	72.1	16067196.84
					Total SWL	116	Total LAeq	80

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
4 Excavation for &	Excavator/Loader	CNP081	1	112	112	1.58E+11	76.1	40358973.74
Construction of	Lorry	CNP141	1	112	112	1.58E+11	76.1	40358973.74
Drainage	Compactor, vibrat	CNP050	1	105	105	3.16E+10	69.1	8052673.937
					Total SWL	115	Total LAeq	79

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
1A. Tunnelling (day)	Generator	CNP101	1	108	108	6.31E+10	72.1	16067196.84
	Excavator	CNP081	1	112	112	1.58E+11	76.1	40358973.74
	Lorry	CNP141	4	112	118	6.34E+11	82.1	161435894.9
	Drill	CNP183	1	106	106	3.98E+10	70.1	10137715.85 *
	(below ground)				Total SWL	120	Total LAeq	84

*includes 10 dB Shielding from Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/1	LAeq@25m	
1B. Tunnelling (night)	Generator	CNP101	1	98	98	6.31E+09	62.1	1606719.684 **
	Excavator	CNP081	1	112	112	1.58E+11	76.1	40358973.74
	Drill	CNP183	1	106	106	3.98E+10	70.1	10137715.85 *
	(below ground)				Total SWL	113	Total LAeq	77

*includes 10 dB Shielding from Tunnel

** generator shielded by 10 dB

C1588 - West Rail Construction Noise Calculations

Mitigation 1 - Use of Quiet Plant

TS 600

West Rail Depot

Section - West Rail Depot

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1.1Earth Work	Bulldozer	CNP030	3	110	114.771213	3E+11	78.8	76394372.68
	Front and Loader	CNP081	2	105	108.0103	63245553203	72.1	16105347.87
	Crane	CNP048	1	105	105	31622776602	69.1	8052673.937
	Scrapers	CNP204	3	119	123.771213	2.38298E+12	87.8	606822072
	Lorry	CNP141	6	105	112.781513	1.89737E+11	76.8	48316043.62
	Grader	CNP104	2	113	116.0103	3.99052E+11	80.1	101617875.3
	Water Trucks	CNP141	1	105	105	31622776602	69.1	8052673.937
	Rollers	CNP185	2	108	111.0103	1.26191E+11	75.1	32134393.66
	Bore Pile Rig	CNP164	1	110	110	1E+11	74.1	25464790.89
					Total SWL	126	Total LAeq	90

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
2.0. Building Work	Air Compressor	CNP003	20	100	113.0103	2E+11	77.1	50929581.79
	Lorry	CNP141	10	105	115	3.16228E+11	79.1	80526739.37
	Crane	CNP048	6	105	112.781513	1.89737E+11	76.8	48316043.62
	Concrete Lorry Mi	CNP044	2	109	112.0103	1.58866E+11	76.1	40454804.8
	Light Trucks	CNP141	20	105	118.0103	6.32456E+11	82.1	161053478.7
					Total SWL	122	Total LAeq	86

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
3.0. Railway Systems	Crane	CNP048	3	105	109.771213	94868329805	73.8	24158021.81
Installations	Excavator	CNP081	1	105	105	31622776602	69.1	8052673.937
	Truck	CNP141	2	105	108.0103	63245553203	72.1	16105347.87
	Tamping Machine	*	1	103	103	19952623150	67.1	5080893.763
	Loco + 6 Wagons	**	1	118	118	6.30957E+11	82.0	158489319.2
	Rail Train	***	1	109	109	79432823472	73.1	20227402.4
	Rail Welder	****	1	106	106	39810717055	70.1	10137715.85
	Grinder	CNP065	1	98	98	6309573445	62.1	1606719.684
	Saw (concrete)	CNP203	1	115	115	3.16228E+11	79.1	80526739.37
					Total SWL	121	Total LAeq	85
					Fixed Source	118		

Reference sources:-
* SWL is taken from manufacturer's data
** SWL is derived from calculation of railway noise
*** SWL is based on KCRC monitoring data
**** SWL is based on KCRC monitoring data

TS600 mitigation (1)

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052673.937
	Lorry	CNP141	2	105	108	6.32E+10	72.1	16105347.87
					Total SWL	110	Total LAeq	74

Activity

2 Ground Treatment & Fill

	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052673.937
	Lorry	CNP141	2	105	108	6.32E+10	72.1	16105347.87
	Bulldozer	CNP030	1	110	110	1.00E+11	74.1	25464790.89
	Compactor, vibrat	CNP050	2	105	108	6.32E+10	72.1	16105347.87
					Total SWL	114	Total LAeq	78

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
3 Access Constructio	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052673.937
	Lorry	CNP141	1	105	105	3.16E+10	69.1	8052673.937
	Roller, vibratory	CNP186	1	108	108	6.31E+10	72.1	16067196.84
					Total SWL	111	Total LAeq	75

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
4 Excavation for &	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052673.937
Construction of	Lorry	CNP141	1	105	105	3.16E+10	69.1	8052673.937
Drainage	Compactor, vibrat	CNP050	1	105	105	3.16E+10	69.1	8052673.937
					Total SWL	110	Total LAeq	74

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1A. Tunnelling (day)	Generator	CNP101	1	100	100	10000000000	64.1	2546479.089
	Excavator	CNP081	1	105	105	31622776602	69.1	8052673.937
	Lorry	CNP141	4	105	111	1.26491E+11	75.1	32210695.75
	Drill	CNP183	1	106	106	39810717055	70.1	10137715.85 *
	(below ground)				Total SWL	113	Total LAeq	77

*Includes 10 dB Shielding from Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1B. Tunnelling (night)	Generator	CNP101	1	90	90	1000000000	54.1	254647.9089 **
	Excavator	CNP081	1	105	105	31622776602	69.1	8052673.937
	Drill	CNP183	1	106	106	39810717055	70.1	10137715.85 *
	(below ground)				Total SWL	109	Total LAeq	73

*Includes 10 dB Shielding from Tunnel

** generator shielded by 10 dB

C1588 - West Rail Construction Noise Calculations

Mitigation 2 - Use of Quiet Plant + Barrier

TS 600

West Rail Depot

Section - West Rail Depot

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
1.1Earth Work	Bulldozer	CNP030	3	110	114.7712	3E+11	78.8	76394373
	Front and Loader	CNP081	2	105	108.0103	63245553203	72.1	16105348
	Crane	CNP048	1	105	105	31622776602	69.1	8052674
	Scrapers	CNP204	3	119	123.7712	2.38298E+12	87.8	606822072
	Lorry	CNP141	6	105	112.7815	1.89737E+11	76.8	48316044
	Grader	CNP104	2	113	116.0103	3.99052E+11	80.1	101617875
	Water Trucks	CNP141	1	105	105	31622776602	69.1	8052674
	Rollers	CNP185	2	108	111.0103	1.26191E+11	75.1	32134394
	Bore Pile Rig	CNP164	1	110	110	1E+11	74.1	25464791
					Total SWL	126	Total LAeq	90

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
2.0. Building Work	Air Compressor	CNP003	20	90	103.0103	20000000000	67.1	5092958
	Lorry	CNP141	10	105	115	3.16228E+11	79.1	80526739
	Crane	CNP048	6	105	112.7815	1.89737E+11	76.8	48316044
	Concrete Lorry Mixer	CNP044	2	109	112.0103	1.58866E+11	76.1	40454805
	Light Trucks	CNP141	20	105	118.0103	6.32456E+11	82.1	161053479
					Total SWL	121	Total LAeq	85

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	LAeq@25m	
3.0. Railway Systems	Crane	CNP048	3	105	109.7712	94868329805	73.8	24158022
Installations	Excavator	CNP081	1	105	105	31622776602	69.1	8052674
	Truck	CNP141	2	105	108.0103	63245553203	72.1	16105348
	Tamping Machine	*	1	103	103	19952623150	67.1	5080894
	Loco + 6 Wagons	**	1	118	118	6.30957E+11	82.0	158489319
	Rail Train	***	1	109	109	79432823472	73.1	20227402
	Rail Welder	****	1	96	96	3981071706	60 1	1013772
	Grinder	CNP085	1	88	88	630957344.5	52.1	160672
	Saw (concrete)	CNP203	1	105	105	31622776602	69 1	8052674
					Total SWL	120	Total LAeq	84
					Fixed Sou	115		

Reference sources:-

* SWL is taken from manufacturer's data

** SWL is derived from calculation of railway noise

*** SWL is based on KCRC monitoring data

**** SWL is based on KCRC monitoring data

TS600 mitigation (2)

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052674
	Lorry	CNP141	2	105	108	6.32E+10	72.1	16105348
					Total SW	110	Total LAeq	74

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
2 Ground Treatment & Fill								
	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052674
	Lorry	CNP141	2	105	108	6.32E+10	72.1	16105348
	Bulldozer	CNP030	1	105	105	3.16E+10	69.1	8052674
	Compactor, vibrator	CNP050	2	105	108	6.32E+10	72.1	16105348
					Total SW	113	Total LAeq	77

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
3 Access Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	69.1	8052674
	Lorry	CNP141	1	105	105	3.16E+10	69.1	8052674
	Roller, vibratory	CNP186	1	108	108	6.31E+10	72.1	16067197
					Total SW	111	Total LAeq	75

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
4 Excavation for &	Excavator/Loader	CNP081	1	112	112	1.58E+11	76.1	40358974
Construction of	Lorry	CNP141	1	112	112	1.58E+11	76.1	40358974
Drainage	Compactor, vibrator	CNP050	1	105	105	3.16E+10	69.1	8052674
					Total SW	115	Total LAeq	79

Section - Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
1A. Tunnelling (day)	Generator	CNP101	1	90	90	1E+09	54.1	254648
	Excavator	CNP081	1	105	105	3.16E+10	69.1	8052674
	Lorry	CNP141	4	105	111	1.26E+11	75.1	32210696
	Drill	CNP183	1	106	106	3.98E+10	70.1	10137716 *
	(below ground)				Total SW	113	Total LAeq	77

*Includes 10 dB Shielding from Tunnel

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/	LAeq@25m	
1B. Tunnelling (night)	Generator	CNP101	1	90	90	1E+09	54.1	254648 **
	Excavator	CNP081	1	105	105	3.16E+10	69.1	8052674
	Drill	CNP183	1	106	106	3.98E+10	70.1	10137716 *
	(below ground)				Total SW	109	Total LAeq	73

*Includes 10 dB Shielding from Tunnel

** generator shielded by 10 dB

C1588 - West Rail Construction Noise Calculations

Mitigation 3 - Use of Quiet Plant + Barrier + Reduction in no. of plant + On-Time Correction
TS600

West Rail Depot

Section - West Rail Depot

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
1.1Earth Work	Bulldozer	CNP030	1	110	110	1E+11	100	1E+11
	Front and Loader	CNP081	1	105	105	31622776602	100	3.1623E+10
	Crane	CNP048	1	105	105	31622776602	100	3.1623E+10
	Scrapers	CNP204	1	119	119	7.94328E+11	100	7.9433E+11
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Grader	CNP104	1	113	113	1.99526E+11	100	1.9953E+11
	Water Trucks	CNP141	1	105	105	31622776602	100	3.1623E+10
	Rollers	CNP185	1	108	108	63095734448	100	6.3096E+10
	Bore Pile Rig	CNP164	1	110	110	1E+11	100	1E+11
					Total SWL	121		121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
2.0. Building Work	Air Compressor	CNP003	20	90	103.0103	20000000000	100	2E+10
	Lorry	CNP141	6	105	112.781513	1.89737E+11	10	1.8974E+10
	Crane	CNP048	6	105	112.781513	1.89737E+11	100	1.8974E+11
	Concrete Lorry Mixer	CNP044	2	109	112.0103	1.58866E+11	100	1.5887E+11
	Light Trucks	CNP141	10	105	115	3.16228E+11	10	3.1623E+10
					Total SWL	119		116

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
3.0. Railway Systems	Crane	CNP048	1	105	105	31622776602	100	3.1623E+10
Installations	Excavator	CNP081	1	105	105	31622776602	100	3.1623E+10
	Truck	CNP141	1	105	105	31622776602	10	3162277660
	Tamping Machine	*	1	103	103	19952623150	100	1.9953E+10
	Loco + 6 Wagons	**	1	118	118	6.30957E+11	100	6.3096E+11
	Rail Train	***	1	109	109	79432823472	100	7.9433E+10
	Rail Welder	****	1	96	96	3981071706	100	3981071706
	Grinder	CNP065	1	88	88	630957344.5	100	630957344
	Saw (concrete)	CNP203	1	105	105	31622776602	100	3.1623E+10
					Total SWL	119		119
					Fixed Source	114		113

Reference sources:-
* SWL is taken from manufacturer's data
** SWL is derived from calculation of railway noise
*** SWL is based on KCRC monitoring data
**** SWL is based on KCRC monitoring data

C1588 - West Rail Construction Noise Calculations

Mitigation 3 - Use of Quiet Plant + Barrier + Reduction in no. of plant + On-Time Correction

TS600

West Rail Depot

Section - West Rail Depot (additional mitigations to Area 5)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
1.1Earth Work	Bulldozer	CNP030	1	110	110	1E+11	50	5E+10
	Front and Loader	CNP081	1	105	105	31622776602	100	3.1623E+10
	Crane	CNP048	1	105	105	31622776602	100	3.1623E+10
	Scrapers	CNP204	1	119	119	7.94328E+11	0	0
	Lorry	CNP141	1	105	105	31622776602	10	3162277660
	Grader	CNP104	1	113	113	1.99526E+11	0	0
	Water Trucks	CNP141	1	105	105	31622776602	10	3162277660
	Rollers	CNP185	1	108	108	63095734448	50	3.1548E+10
	Bore Pile Rig	CNP164	1	110	110	1E+11	100	1E+11
					Total SWL	121		114

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
2.0. Building Work	Air Compressor	CNP003	20	90	103.0103	20000000000	100	2E+10
	Lorry	CNP141	6	105	112.781513	1.89737E+11	100	1.8974E+11
	Crane	CNP048	6	105	112.781513	1.89737E+11	100	1.8974E+11
	Concrete Lorry Mixer	CNP044	2	109	112.0103	1.58866E+11	100	1.5887E+11
	Light Trucks	CNP141	10	105	115	3.16228E+11	100	3.1623E+11
					Total SWL	119		119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	%On-time	
3.0. Railway Systems	Crane	CNP048	1	105	105	31622776602	100	3.1623E+10
Installations	Excavator	CNP081	1	105	105	31622776602	100	3.1623E+10
	Truck	CNP141	1	105	105	31622776602	10	3162277660
	Tamping Machine	*	1	103	103	19952623150	100	1.9953E+10
	Loco + 6 Wagons	**	1	118	118	6.30957E+11	0	0
	Rail Train	***	1	109	109	79432823472	100	7.9433E+10
	Rail Welder	****	1	96	96	3981071706	100	3981071706
	Grinder	CNP065	1	88	88	630957344.5	100	630957344
	Saw (concrete)	CNP203	1	105	105	31622776602	100	3.1623E+10
					Total SWL	119		113
					Fixed Source	114		113

Reference sources:-

* SWL is taken from manufacturer's data
** SWL is derived from calculation of railway noise
*** SWL is based on KCRC monitoring data
**** SWL is based on KCRC monitoring data

TS600 mitigation (3)

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.1623E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
					Total SW	108		105
Activity								
2 Ground Treatment & Fill								
	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.1623E+10
	Lorry	CNP141	1	105	105	3.16E+10	100	3.1623E+10
	Bulldozer	CNP030	1	105	105	3.16E+10	100	3.1623E+10
	Compactor, vibratory	CNP050	1	105	105	3.16E+10	100	3.1623E+10
					Total SW	111		111
Activity	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
3 Access Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.1623E+10
	Lorry	CNP141	1	105	105	3.16E+10	100	3.1623E+10
	Roller, vibratory	CNP186	1	108	108	6.31E+10	100	6.3096E+10
					Total SW	111		111
Activity	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
4 Excavation for &	Excavator/Loader	CNP081	1	112	112	1.58E+11	85	1.3472E+11
Construction of	Lorry	CNP141	1	112	112	1.58E+11	10	1.5849E+10
Drainage	Compactor, vibratory	CNP050	1	105	105	3.16E+10	85	2.6879E+10
					Total SW	115	100	115.423291
								112

Section -Tunnelling

Activity	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
1A. Tunnelling (day)	Generator	CNP101	1	90	90	1000000000	100	1000000000
	Excavator	CNP081	1	105	105	3.1623E+10	100	3.1623E+10
	Lorry	CNP141	1	105	105	3.1623E+10	10	3162277660
	Drill	CNP183	1	106	106	3.9811E+10	100	3.9811E+10 *
	(below ground)				Total SW	110		109
		*Includes 10 dB Shielding from Tunnel						
Activity	PME	TM ref	UNIT	SWL	sub-SW	10^(SWL/10)	%On-time	
1B. Tunnelling (night)	Generator	CNP101	1	90	90	1000000000	100	1000000000 **
	Excavator	CNP081	1	105	105	3.1623E+10	100	3.1623E+10
	Drill	CNP183	1	106	106	3.9811E+10	100	3.9811E+10 *
	(below ground)				Total SW	108.599394		109
		*Includes 10 dB Shielding from Tunnel						
		** generator shieldied by 10 dB						

C1588 - West Rail Construction Noise Calculations

TS100 Plant Teams

Section - At-grade, Formation Preparation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Access Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	116
Activity						
3 Ground Treatment & Fill						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
	Bulldozer	CNP030	1	115	115	3.16E+11
	Compactor, vibratory	CNP050	2	105	108	6.32E+10
					Total SWL	119

Section - Standard Viaduct Sections						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	6	100	108	6.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	113	116	3.99E+11
					Total SWL	118
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	121
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	113	118	5.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	120
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	108	108	6.31E+10
					Total SWL	117

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	114	117	5.02E+11
	Poker Vibrator	CNP170	2	113	116	3.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	121

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	121
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	113	118	5.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	120
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete pump	CNP047	1	109	109	7.94E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	121

Section - At-grade, Formation Preparation						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Access Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	111
Activity						
3 Ground Treatment & Fill						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
	Bulldozer	CNP030	1	110	110	1.00E+11
	Compactor, vibratory	CNP050	2	105	108	6.32E+10
					Total SWL	114

Section - Standard Viaduct Sections						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	6	100	108	6.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	110	113	2.00E+11
					Total SWL	116
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	118
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	110	115	3.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	117
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10
night time)	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	100	100	1.00E+10
					Total SWL	112

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	114	117	5.02E+11
	Poker Vibrator	CNP170	2	110	113	2.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	120

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	118

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	110	115	3.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete pump	CNP047	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	118

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TS100

Mitigation 2 - Use of Quiet Plant + Barrier

Section - At-grade, Formation Preparation							
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Access Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	111
Activity						
3 Ground Treatment & Fill						
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
	Bulldozer	CNP030	1	110	110	1.00E+11
	Compactor, vibratory	CNP050	2	105	108	6.32E+10
					Total SWL	114

Section - Standard Viaduct Sections						
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	6	90	98	6.00E+09
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	100	103	2.00E+10
					Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	100	106	4.00E+10
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	115
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	100	105	3.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	113
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10
night time)	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	90	90	1.00E+09
					Total SWL	112

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Piling for Station	Drilling Rig*	-	2	104	107	5.02E+10
	Poker Vibrator	CNP170	2	100	103	2.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	114

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Piling for Development	Drilling Rig*	-	6	104	112	1.51E+11
	Poker Vibrator	CNP170	2	100	103	2.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	116

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	100	106	4.00E+10
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	100	105	3.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	113

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	100	106	4.00E+10
	Concrete pump	CNP047	1	95	95	3.16E+09
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	114

C1588 - West Rail Construction Noise Calculations

TS100

Mitigation 3 - Use of Quiet Plant + Barrier + Reduction in no. of plant

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	2	105	108	6.32E+10	10	6.32E+09
					Total SWL	110	Total SWL	108
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Access Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
	Roller, vibratory	CNP186	1	108	108	6.31E+10	100	63095734448
					Total SWL	111	Total SWL	110
Activity								
3 Ground Treatment & Fill								
	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	2	105	108	6.32E+10	10	6324555320
	Bulldozer	CNP030	1	110	110	1.00E+11	100	1E+11
	Compactor, vibratory	CNP050	2	105	108	6.32E+10	100	63245553203
					Total SWL	114	Total SWL	113

Section - Standard Viaduct Sections

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
					Total SWL	108	Total SWL	105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Piling	Piling, reverse circulation drill	CNP186	1	100	100	1.00E+10	100	10000000000
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
					Total SWL	111	Total SWL	111
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
					Total SWL	112	Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
	Mobile crane	CNP048	1	105	105	3.16E+10	100	31622776602
					Total SWL	112	Total SWL	112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10	100	31622776602
night time)	Stressing Rig*	-	1	110	110	1.00E+11	100	1E+11
	Generator	CNP101	1	90	90	1.00E+09	100	1000000000
					Total SWL	112	Total SWL	112

* Remark: - SWL is assumed based on TM ref. CNP281 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2A Piling for Station	Drilling Rig*	-	1	114	114	2.51E+11	100	2.51189E+11
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
	Mobile crane	CNP048	1	105	105	3.16E+10	100	31622776602
					Total SWL	116	Total SWL	116

* Remark :- measured SWL of Percussive Drilling Machine at MTRC construction site (Central Subway)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
	Mobile crane	CNP048	1	105	105	3.16E+10	100	31622776602
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	100	1000000000
	Mobile crane	CNP048	1	105	105	3.16E+10	100	31622776602
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete pump	CNP047	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
					Total SWL	112	Total SWL	112

Section - Standard Viaduct Sections (with additional mitigation measures for Area 2a)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Sea Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Piling	Piling, reverse circulation drill	CNP165	1	100	100	1.00E+10	80	8000000000
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	80	63546258778
	Poker Vibrator	CNP170	1	105	105	3.16E+10	80	25298221281
					Total SWL	111	Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	0	0
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	31622776602
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	79432823472
					Total SWL	112	Total SWL	112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	75	23717082451
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	75	59574617604
	Mobile crane	CNP048	1	105	105	3.16E+10	75	23717082451
					Total SWL	112	Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10	65	20554804791
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10	65	20554804791
night time)	Stressing Rig*	-	1	110	110	1.00E+11	65	65000000000
	Generator	CNP101	1	90	90	1.00E+09	65	650000000
					Total SWL	112	Total SWL	110

* Remark: - SWL is assumed based on TM ref. CNP281 (Winch, pneumatic powered)

Section - Standard Viaduct Sections (with additional mitigation measures for Area 5)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
1 Sea Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	31622776602
	Lorry	CNP141	1	105	105	3.16E+10	10	3162277660
					Total SWL	108	Total SWL	105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
2 Piling	Piling, reverse circulation drill	CNP165	1	100	100	1.00E+10	50	5000000000
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	50	39716411736
	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	15811388301
					Total SWL	111	Total SWL	108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	80	25298221281
	Lorry	CNP141	1	105	105	3.16E+10	0	0
	Poker Vibrator	CNP170	1	105	105	3.16E+10	80	25298221281
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	80	63546258778
					Total SWL	112	Total SWL	111

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	75	23717082451
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	75	59574617604
	Mobile crane	CNP048	1	105	105	3.16E+10	75	23717082451
					Total SWL	112	Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% ON TIME	CNL
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10	40	12649110641
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10	40	12649110641
night time)	Stressing Rig*	-	1	110	110	1.00E+11	40	40000000000
	Generator	CNP101	1	90	90	1.00E+09	40	400000000
					Total SWL	112	Total SWL	108

* Remark: - SWL is assumed based on TM ref. CNP281 (Winch, pneumatic powered)

C1588 - West Rail Construction Noise Calculations

Plant Teams For TS200

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	113	116	3.99E+11
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Standard Viaduct Sections

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	6	100	108	6.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	113	116	3.99E+11
					Total SWL	118

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	113	118	5.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	108	108	6.31E+10
					Total SWL	117

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	2	112	115	3.17E+11
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation drill	CNP166	2	100	103	2.00E+10
	Poker Vibrator	CNP170	2	113	116	3.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	119

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	112	112	1.58E+11
	Lorry	CNP141	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	121

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	113	118	5.99E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	112	112	1.58E+11
					Total SWL	120

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	112	112	1.58E+11
	Poker Vibrator	CNP170	4	113	119	7.98E+11
	Concrete pump	CNP047	1	109	109	7.94E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	121

C1588 - West Rail Construction Noise Calculations

Mitigation 1 - Use of Quiet Plant (TS200)

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	110
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	110	113	2.00E+11
					Total SWL	115
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Standard Viaduct Sections

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
2 Piling	Piling, reverse circulation drill	CNP166	6	100	108	6.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	110	113	2.00E+11
					Total SWL	116
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	118
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
4 Column Construction	Poker Vibrator	CNP170	3	110	115	3.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	117
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Mobile crane	CNP048	1	105	105	3.16E+10
	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	100	100	1.00E+10
					Total SWL	112

* Remark: - SWL is assumed based on TM ref. CNP281 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation drill	CNP166	2	100	103	2.00E+10
	Poker Vibrator	CNP170	2	110	113	2.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	116

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	118

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	110	115	3.00E+11
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	117

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	100	100	1.00E+10
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	110	116	4.00E+11
	Concrete pump	CNP047	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	118

C1588 - West Rail Construction Noise Calculations

Mitigation 2 - Use of Quiet Plant + Barrier (TS200)

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2A Excavation for &	Excavator/Loader	CNP081	1	105	105	3.16E+10
Construction of	Lorry	CNP141	1	105	105	3.16E+10
Drainage	Compactor, vibratory	CNP050	1	105	105	3.16E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2B Excavation for	Excavator/Loader	CNP081	1	105	105	3.16E+10
Minor Retaining	Lorry	CNP141	1	105	105	3.16E+10
Wall	Concrete lorry mixer	CNP044	1	109	109	7.94E+10
	Poker Vibrator	CNP170	2	105	108	6.32E+10
					Total SWL	113

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Formation	Grader	CNP104	1	113	113	2.00E+11
Preparation	Roller, vibratory	CNP186	1	108	108	6.31E+10
					Total SWL	114

Section - Standard Viaduct Sections

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	6	100	108	6.00E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Poker Vibrator	CNP170	2	105	108	6.32E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	105	111	1.26E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	116

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	3	105	110	9.49E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	115

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10
night time)	Stressing Rig*	-	1	110	110	1.00E+11
	Generator	CNP101	1	90	90	1.00E+09
					Total SWL	112

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	2	105	108	6.32E+10
					Total SWL	110
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
2A Piling for Station	Piling, reverse circulation drill	CNP166	2	100	103	2.00E+10
	Poker Vibrator	CNP170	2	105	108	6.32E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	114
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	105	111	1.26E+11
	Concrete lorry mixer	CNP044	3	109	114	2.38E+11
					Total SWL	116
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
4 Column Construction	Poker Vibrator	CNP170	3	105	110	9.49E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
	Mobile crane	CNP048	1	105	105	3.16E+10
					Total SWL	115
Activity	**PME**	**TM ref**	**UNIT**	**SWL**	**sub-SWL**	**10^(SWL/10)**
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09
	Mobile crane	CNP048	1	105	105	3.16E+10
	Poker Vibrator	CNP170	4	105	111	1.26E+11
	Concrete pump	CNP047	1	105	105	3.16E+10
	Concrete lorry mixer	CNP044	2	109	112	1.59E+11
					Total SWL	115

C1588 - West Rail Construction Noise Calculations

Mitigation 3 - Use of Quiet Plant + Barrier + Reduction in no. of plant + on-time Correction

Section - At-grade, Formation Preparation

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2A Excavation for & Construction of Drainage	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Compactor, vibratory	CNP050	1	95	95	3.16E+09	100	3.16E+09
					Total SWL	108		106

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2B Excavation for Minor Retaining Wall	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.94E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	112		112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Formation Preparation	Grader	CNP104	1	113	113	2.00E+11	100	2.00E+11
	Roller, vibratory	CNP186	1	108	108	6.31E+10	100	6.31E+10
					Total SWL	114		114

Section - Standard Viaduct Sections

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling	Piling, reverse circulation	CNP166	1	100	100	1.00E+10	100	1.00E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	111		107

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	0	0.00E+00
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.94E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	112		112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
	Stressing Rig*	-	1	110	110	1.00E+11	100	1.00E+11
	Generator	CNP101	1	90	90	1.00E+09	100	1.00E+09
					Total SWL	112		112

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Standard Viaduct Sections (additional mitigations for Yuen Long to Long Ping)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	30	9.49E+09
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SW	108		1[illegible]

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	1	100	100	1.00E+10	65	6.50E+09
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E[illegible]9
	Poker Vibrator	CNP170	1	105	105	3.16E+10	65	2.06E[illegible]0
					Total SW	111		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	45	1.42E[illegible]0
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	45	1.42E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	45	3.57E[illegible]10
					Total SW	112		[illegible]08

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	35	1.11E[illegible]10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	35	2.78[illegible]10
	Mobile crane	CNP048	1	105	105	3.16E+10	35	1.11E+10
					Total SW	112		107

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	105	105	3.16E+10	75	2.37E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	75	2.37E+10
	Stressing Rig*	-	1	110	110	1.00E+11	75	7.50[illegible]10
	Generator	CNP101	1	90	90	1.00E+09	75	7.50[illegible]08
					Total SW	112		111

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Standard Viaduct Sections (additional mitigations for Long Ping to Tin Shui Wai)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	70	2.21[illegible]
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16[illegible]0
					Total SW	108		10

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	1	100	100	1.00E+10	45	4.50[illegible]0
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+0[illegible]
	Poker Vibrator	CNP170	1	105	105	3.16E+10	45	1.42[illegible]1[illegible]
					Total SW	111		[illegible]10

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	30	9.4[illegible]
	Lorry	CNP141	1	105	105	3.16E+10	0	0.0[illegible]
	Poker Vibrator	CNP170	1	105	105	3.16E+10	30	9.4[illegible]
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+[illegible]
					Total SW	112		1[illegible]

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	30	9.49E+[illegible]
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	30	2.3[illegible]
	Mobile crane	CNP048	1	105	105	3.16E+10	30	9.4[illegible]
					Total SW	112		1[illegible]

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Beam Erection (may be undertaken in night time)	Excavator/Loader	CNP081	1	105	105	3.16E+10	40	1.2[illegible]
	Mobile crane	CNP048	1	105	105	3.16E+10	40	1.26E[illegible]
	Stressing Rig*	-	1	110	110	1.00E+11	40	4.00E[illegible]
	Generator	CNP101	1	90	90	1.00E+09	40	4.0[illegible]
					Total SW	112		

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Standard Viaduct Sections (additional mitigations for Tin Shui Wai to Tuen Mun North)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	1	100	100	1.00E+10	65	6.50E+09
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	65	2.06E+10
					Total SWL	111		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	40	1.26E+10
	Lorry	CNP141	1	105	105	3.16E+10	0	0.00E+00
	Poker Vibrator	CNP170	1	105	105	3.16E+10	40	1.26E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	40	1.26E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	40	1.26E+10
					Total SWL	112		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10	50	1.58E+10
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
night time)	Stressing Rig*	-	1	110	110	1.00E+11	0	0.00E+00
	Generator	CNP101	1	90	90	1.00E+09	50	5.00E+08
					Total SWL	112		105

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Standard Viaduct Sections (additional mitigations for Tuen Mun North to Tuen Mun Centre)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling	Piling, reverse circulation drill	CNP166	1	100	100	1.00E+10	65	6.50E+09
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	65	2.06E+10
					Total SWL	111		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	40	1.26E+10
	Lorry	CNP141	1	105	105	3.16E+10	0	0.00E+00
	Poker Vibrator	CNP170	1	105	105	3.16E+10	40	1.26E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		105
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.94E+10
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	112		112
Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Beam Erection	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
(may be undertaken in	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
night time)	Stressing Rig*	-	1	110	110	1.00E+11	100	1.00E+11
	Generator	CNP101	1	90	90	1.00E+09	100	1.00E+09
					Total SWL	112		112

* Remark: - SWL is assumed based on TM ref. CNP261 (Winch, pneumatic powered)

Section - Station/Development Construction

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation	CNP166	1	100	100	1.00E+10	100	1.00E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	112		109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	100	7.94E+10
					Total SWL	112		112

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	104	104	2.51E+10	10	2.51E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
					Total SWL	109		108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	100	1.00E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	100	3.16E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	100	3.16E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	100	3.16E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		110

Section - Station/Development Construction (additional mitigations for Yuen Long Station)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation	CNP166	1	100	100	1.00E+10	80	8.00E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	80	2.53E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	80	2.53E+10
					Total SWL	112		108

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	55	1.74E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	55	1.74E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	55	4.37E+10
					Total SWL	112		109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	104	104	2.51E+10	10	2.51E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
					Total SWL	109		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	35	3.50E+08
	Mobile crane	CNP048	1	105	105	3.16E+10	35	1.11E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	35	1.11E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	35	1.11E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		106

Section - Station/Development Construction (additional mitigations for Long Ping Station)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation	CNP166	1	100	100	1.00E+10	50	5.00E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
					Total SWL	112		106

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	55	1.74E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	55	1.74E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	55	4.37E+10
					Total SWL	112		109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	104	104	2.51E+10	10	2.51E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
					Total SWL	109		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	35	3.50E+08
	Mobile crane	CNP048	1	105	105	3.16E+10	35	1.11E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	35	1.11E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	35	1.11E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		106

Section - Station/Development Construction (additional mitigations for Tin Shui Wai Station)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation	CNP165	1	100	100	1.00E+10	65	6.50E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	65	2.06E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	65	2.06E+10
					Total SWL	112		107

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	70	2.21E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	70	2.21E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	70	5.56E+10
					Total SWL	112		110

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	60	1.90E+10
	Concrete lorry mixer	CNP044	1	104	104	2.51E+10	10	2.51E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	60	1.90E+10
					Total SWL	109		106

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	50	5.00E+08
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		107

Section - Station/Development Construction (additional mitigations for Tuen Mun Centre Station)

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
1 Site Clearance	Excavator/Loader	CNP081	1	105	105	3.16E+10	100	3.16E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
					Total SWL	108		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
2 Piling for Station	Piling, reverse circulation	CNP166	1	100	100	1.00E+10	50	5.00E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
					Total SWL	112		106

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
3 Pilecap Construction	Excavator/Loader	CNP081	1	105	105	3.16E+10	55	1.74E+10
	Lorry	CNP141	1	105	105	3.16E+10	10	3.16E+09
	Poker Vibrator	CNP170	1	105	105	3.16E+10	55	1.74E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	55	4.37E+10
					Total SWL	112		109

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
4 Column Construction	Poker Vibrator	CNP170	1	105	105	3.16E+10	50	1.58E+10
	Concrete lorry mixer	CNP044	1	104	104	2.51E+10	10	2.51E+09
	Mobile crane	CNP048	1	105	105	3.16E+10	50	1.58E+10
					Total SWL	109		105

Activity	PME	TM ref	UNIT	SWL	sub-SWL	10^(SWL/10)	% on-time	10^(SWL/10)
5 Station/Development Construction	Air Compressor	CNP001	1	90	90	1.00E+09	35	3.50E+08
	Mobile crane	CNP048	1	105	105	3.16E+10	35	1.11E+10
	Poker Vibrator	CNP170	1	105	105	3.16E+10	35	1.11E+10
	Concrete pump	CNP047	1	105	105	3.16E+10	35	1.11E+10
	Concrete lorry mixer	CNP044	1	109	109	7.94E+10	10	7.94E+09
					Total SWL	112		106

Annex C

Calculation of Noise Emissions From West Rail Depot

Unmitigated Noise Levels

NSR 9/1	Cheung Po (Church and Playground)	Xr 5465.2	Yr 861.7	Hr 19.0																			
		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr'	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csul	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	420.0	0	0	75	-52.47	0.00	0.00	0.00	-2.21	-3.16	2.5	0	38.7
S2	Train Wash	100.0	0.0	0	0.0	1	100	4960	2240	18	1468.0	0	0	30	-63.33	0.00	0.00	0.00	-1.06	-4.11	2.5	0	26.0
S3	EMU Running Maintenance (North)	0.0	80.0	600.0	0.0	1	100	5180	1460	17	671.6	0	0	40	-56.54	0.00	0.00	0.00	0.00	-1.88	2.5	-20	25.9
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	425.5	0	0	25	-52.58	0.00	0.00	0.00	0.00	-1.19	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	962.3	0	0	20	-59.67	0.00	0.00	0.00	-0.63	-2.69	2.5	-20	19.1
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	1121.1	0	0	25	-60.99	0.00	0.00	0.00	-0.83	-3.14	2.5	-20	12.3
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1260.0	0	0	25	-62.01	0.00	0.00	0.00	-0.85	-3.53	2.5	-20	13.9
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	63.1	1	100	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	63.1
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	49.5	1	100	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	49.5
																						Total	63.3

NSR 9/2	Tai Kek Tsuen	Xr 5114.9	Yr 843.3	Hr 17.6																			
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csul	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	333.1	0	0	10	-50.45	0.00	0.00	0.00	-0.32	-0.93	2.5	0	42.6
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1405.3	0	0	15	-62.96	0.00	0.00	0.00	-0.52	-3.93	2.5	0	27.1
S3	EMU Running Maintenance (North)	0.0	80.0	400.0	0.0	1	100	5180	1460	17	618.3	0	0	60	-55.82	0.00	0.00	0.00	-1.67	-1.73	2.5	-20	23.3
S4	EMU Running Maintenance (South)	0.0	0.0	3080.0	0.0	1	100	5135	1130	17	287.4	0	0	45	-49.17	0.00	0.00	0.00	-0.95	-0.80	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	880.8	0	0	30	-58.90	0.00	0.00	0.00	-1.34	-2.47	2.5	-20	19.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	1029.2	0	0	20	-60.25	0.00	0.00	0.00	-0.93	-2.88	2.5	-20	13.2
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1172.2	0	0	15	-61.38	0.00	0.00	0.00	-0.72	-3.28	2.5	-20	14.9
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	66.7	1	100	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	66.7
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	58.9	1	100	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0	58.9
																						Total	67.4

See page 7 for definition of terms used in the above tables

NSR 9/3	Village houses S of Cheung Po	Xr 5344.0	Yr 1062.0	Hr 18.5																				
		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied									CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri		dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	198.4	0	0	25	-45.88	0.00	0.00	0.00	-0.57	-0.55	2.5	0		47.5
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1239.0	0	0	20	-61.88	0.00	0.00	0.00	-0.68	-3.47	2.5	0		28.5
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	438.5	0	0	10	-52.84	0.00	0.00	0.00	-0.25	-1.23	2.5	-20		0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	219.8	0	0	5	-46.84	0.00	0.00	0.00	-0.09	-0.82	2.5	-20		45.8
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	729.1	0	0	5	-57.26	0.00	0.00	0.00	-0.15	-2.04	2.5	-20		20.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	887.8	0	0	20	-58.97	0.00	0.00	0.00	-0.62	-2.49	2.5	-20		21.8
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	1027.3	0	0	5	-60.23	0.00	0.00	0.00	-0.16	-2.88	2.5	-20		24.0
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	67.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		67.1
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	55.5	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		55.5
																							Total	67.5

NSR 9/4	Village houses S of Tai Kek Tsuen	Xr 5082.0	Yr 950.0	Hr 14.9																				
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied									CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri		dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	240.8	0	0	5	-47.63	0.00	0.00	0.00	-0.10	-0.87	2.5	0		46.1
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1295.8	0	0	20	-62.25	0.00	0.00	0.00	-0.92	-3.63	2.5	0		27.7
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	515.9	0	0	5	-54.25	0.00	0.00	0.00	-0.20	-1.44	2.5	-20		0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	187.8	0	0	50	-45.47	0.00	0.00	0.00	-1.30	-0.53	2.5	-20		45.9
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	771.8	0	0	60	-57.75	0.00	0.00	0.00	-1.85	-2.18	2.5	-20		20.3
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	918.8	0	0	25	-59.26	0.00	0.00	0.00	-0.81	-2.57	2.5	-20		14.6
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1061.7	0	0	25	-60.52	0.00	0.00	0.00	-0.84	-2.97	2.5	-20		16.0
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	64.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		64.1
S9	Rolling Noise- Sidings (Soundplan Data)	0.0	0.0	0.0	55.6	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0		55.6
																							Total	64.8

NSR 9/5	Kam Cheq Garden	Xr 5323.0	Yr 1668.0	Hr 19.2																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	516.2	0	0	70	-54.26	0.00	0.00	0.00	-2.15	-1.45	2.5	0	38.8
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	879.2	0	0	90	-58.64	0.00	0.00	0.00	-2.58	-1.90	2.5	0	33.4
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	262.7	0	0	50	-48.39	0.00	0.00	0.00	-1.50	-0.74	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	568.0	0	0	45	-55.09	0.00	0.00	0.00	-1.79	-1.69	2.5	-20	34.7
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	297.9	0	0	60	-49.48	0.00	0.00	0.00	-1.08	-0.83	2.5	-20	28.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	416.0	0	0	80	-52.38	0.00	0.00	0.00	-1.95	-1.16	2.5	-20	28.3
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	519.6	0	0	85	-54.31	0.00	0.00	0.00	-2.24	-1.45	2.5	-20	28.3
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	62.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	62.3
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	53.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	53.3
																						Total	62.8

NSR 9/6	Village houses to S of Kam Cheq Garden	Xr 5214.0	Yr 1640.0	Hr 18.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	471.2	0	0	25	-53.46	0.00	0.00	0.00	-0.86	-1.32	2.5	0	38.9
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	651.5	0	0	80	-56.28	0.00	0.00	0.00	-2.27	-1.82	2.5	0	34.1
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	187.9	0	0	10	-45.48	0.00	0.00	0.00	-0.18	-0.53	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	516.1	0	0	15	-54.25	0.00	0.00	0.00	-0.39	-1.45	2.5	-20	37.1
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	200.6	0	0	10	-46.05	0.00	0.00	0.00	0.00	-0.56	2.5	-20	33.7
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	339.8	0	0	15	-50.63	0.00	0.00	0.00	0.00	-0.95	2.5	-20	32.2
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	461.7	0	0	20	-53.29	0.00	0.00	0.00	0.00	-1.29	2.5	-20	32.7
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	65.8	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	65.8
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	57.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	57.1
																						Total	66.4

See page 7 for definition of terms used in the above tables

NSR		Xr	Yr	Hr																			
9/7	Village house to N of Tin Sam (Kau Tsuen)	5193.0	1785.0	10.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	615.1	0	0	10	-55.78	0.00	0.00	0.00	-0.29	-1.72	2.5	0	36.7
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	511.2	0	0	50	-54.17	0.00	0.00	0.00	-0.79	-1.43	2.5	0	38.1
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	326.7	0	0	5	-50.28	0.00	0.00	0.00	-0.08	-0.91	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	657.6	0	0	5	-56.36	0.00	0.00	0.00	-0.11	-1.84	2.5	-20	34.8
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	175.5	0	0	0	-44.90	0.00	0.00	0.00	0.00	-0.49	2.5	-20	34.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	249.5	0	0	25	-47.95	0.00	0.00	0.00	-0.15	-0.70	2.5	-20	35.0
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	343.6	0	0	60	-50.72	0.00	0.00	0.00	-0.41	-0.96	2.5	-20	35.2
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	64.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	64.3
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	59.2	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	59.2
																						Total	65.5

NSR		Xr	Yr	Hr																			
10/8	Village house south of Shek Wu Tong	5080.0	2051.0	10.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	886.7	0	0	30	-58.96	0.00	0.00	0.00	-0.98	-2.48	2.5	0	32.1
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	223.9	0	0	0	-47.01	0.00	0.00	0.00	0.00	-0.63	2.5	0	46.9
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	596.4	0	0	0	-55.51	0.00	0.00	0.00	0.00	-1.67	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	922.6	0	0	20	-59.30	0.00	0.00	0.00	-0.47	-2.58	2.5	-20	30.8
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	334.8	0	0	0	-50.50	0.00	0.00	0.00	0.00	-0.94	2.5	-20	28.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	228.3	0	0	0	-47.18	0.00	0.00	0.00	0.00	-0.84	2.5	-20	36.0
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	163.2	0	0	0	-44.27	0.00	0.00	0.00	0.00	-0.46	2.5	-20	42.6
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	70.2	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	70.2
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	55.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	55.1
																						Total	70.4

NSR		Xr	Yr	Hr																			
10/9	Shek Wu Tong	5264.0	2148.0	16.5																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	979.6	0	0	80	-59.82	0.00	0.00	0.00	-2.55	-2.74	2.5	0	29.4
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	318.2	0	0	90	-50.05	0.00	0.00	0.00	-1.99	-0.89	2.5	0	41.6
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5180	1460	17	893.8	0	0	55	-58.83	0.00	0.00	0.00	-1.59	-1.94	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	1024.2	0	0	50	-60.21	0.00	0.00	0.00	-1.81	-2.87	2.5	-20	28.5
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	486.0	0	0	75	-53.73	0.00	0.00	0.00	-2.46	-1.36	2.5	-20	22.7
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	421.0	0	0	60	-52.49	0.00	0.00	0.00	-1.88	-1.18	2.5	-20	28.3
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	369.1	0	0	70	-51.34	0.00	0.00	0.00	-2.09	-1.03	2.5	-20	32.8
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	61.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	61.1
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	49.5	1	100	0	0	0	0	0	0	95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	49.5
																						Total	61.5

NSR		Xr	Yr	Hr																			
9/29	Kwan Tai Temple	5328.4	956.9	14.6																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	258.5	0	0	40	-48.25	0.00	0.00	0.00	-0.81	-0.72	2.5	0	44.7
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1334.4	0	0	5	-62.51	0.00	0.00	0.00	-0.22	-3.74	2.5	0	28.0
S3	EMU Running Maintenance (North)	0.0	80.0	600.0	0.0	1	100	5180	1460	17	529.9	0	0	15	-54.48	0.00	0.00	0.00	-0.57	-1.48	2.5	-20	27.7
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	258.1	0	0	5	-48.23	0.00	0.00	0.00	-0.15	-0.72	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	818.6	0	0	5	-58.28	0.00	0.00	0.00	-0.15	-2.29	2.5	-20	21.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	976.5	0	0	5	-59.79	0.00	0.00	0.00	-0.16	-2.73	2.5	-20	14.6
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1117.7	0	0	5	-60.97	0.00	0.00	0.00	-0.16	-3.13	2.5	-20	16.0
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	73.6	1	100	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	73.6
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	80.2	1	100	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	80.2
																						Total	73.8

See page 7 for definition of terms used in the above tables

NSR		Xr	Yr	Hr																			
9/30	Sites for which building licences have been a	5360.3	1116.9	21.5																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Clac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	187.9	0	0	0	-45.48	0.00	0.00	0.00	0.00	-0.53	2.5	0	48.5
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1192.3	0	0	0	-61.53	0.00	0.00	0.00	0.00	-3.34	2.5	0	29.8
S3	EMU Running Maintenance (North)	0.0	80.0	600.0	0.0	1	100	5160	1460	17	397.3	0	0	0	-51.98	0.00	0.00	0.00	0.00	-1.11	2.5	-20	31.2
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	225.6	0	0	0	-47.07	0.00	0.00	0.00	0.00	-0.63	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	687.6	0	0	0	-56.75	0.00	0.00	0.00	0.00	-1.93	2.5	-20	23.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	846.5	0	0	0	-58.55	0.00	0.00	0.00	0.00	-2.37	2.5	-20	18.4
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	984.6	0	0	0	-59.87	0.00	0.00	0.00	0.00	-2.76	2.5	-20	17.7
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	68.3	1	100	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	68.3
S9	Rolling Noise- Sidings (Soundplan Data)	0.0	0.0	0.0	56.1	1	100	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	56.1
																						Total	68.6

NSR		Xr	Yr	Hr																			
10/10	Village houses along Kam Sheung Road	4759.0	2492.0	16.6																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Clac	Csri	dBA
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	68.6	1	100	0	0	0	0.0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	68.6
																						Total	68.6

NSR		Xr	Yr	Hr																			
10/11	houses to the south of the proposed Kam Tin	4740.0	2510.0	18.8																			
Plant Information		Basic Noise Level, dBA						Layout							Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Clac	Csri	dBA
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	71.6	1	100	0	0	0	0.0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0	71.6
																						Total	71.6

See page 7 for definition of terms used in the above tables

Definition of Terms

SWL is the sound power level of a source, dBA
SPL is the internal sound pressure level within a building, dBA
S is the surface area of the wall of a building which faces the NSR, m^2
LAeq is the equivalent continuous noise level over a 30 minute period,
dB %ON is the assumed % on time of each source
No is the number of items of plant operating simultaneously.
Xr,Yr,Hr are the coordinates of the NSR, m
Xs,Ys,Hsare the coordinates of the source, m

Lsr is the horizontal distance between the source and NSR, m
Lb is the horizontal distance between the source and barrier, m
Hb is the height of the barrier above datum, m.
% Gnd Abs is the estimated % of soft ground between the source and receiver
CLsr is the correction for the slant distance between the source and the NSR, dB(A)
C%on is the correction due to the % on-time, dB(A)
CNo is the correction for plant numbers. Not applicable for travelling trains.

Cb is the barrier attenuation calculated using the CRN methodology (for rolling stock it is calculated by SoundPlan), dB(A)
Cgnd is the ground attenuation calculated using the CRN methodology, dB(A)
Catm is the air absorption calculated using CONCAWE methodology, dB(A)
Cfac is the facade correction, dB(A)
Csrl is the sound reduction provided by the building envelope, dB(A)
CNL is the corrected noise level, LAeq (30 minutes), dB

See page 7 for definition of terms used in the above tables

Mitigated Noise Levels

NSR 9/1	Cheung Po (Church and Playground)	Xr 5465.2	Yr 861.7	Hr 19.0																			
		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr'	C%on	CNo	Cb	Cgnd	Calm	Clac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	420.0	0	0	75	-52.47	0.00	0.00	0.00	-2.21	-3.16	2.5	0	36.7
S2	Train Wash	100.0	0.0	0	0.0	1	100	4960	2240	18	1468.0	0	0	30	-63.33	0.00	0.00	0.00	-1.06	-4.11	2.5	0	26.0
S3	EMU Running Maintenance (North)	0.0	80.0	600.0	0.0	1	100	5160	1460	17	671.6	0	0	40	-56.54	0.00	0.00	0.00	0.00	-1.88	2.5	-20	25.9
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	425.5	0	0	25	-52.58	0.00	0.00	0.00	0.00	-1.19	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	962.3	0	0	20	-59.67	0.00	0.00	0.00	-0.63	-2.69	2.5	-20	19.1
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	1121.1	0	0	25	-60.99	0.00	0.00	0.00	-0.83	-3.14	2.5	-20	12.3
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1260.0	0	0	25	-62.01	0.00	0.00	0.00	-0.85	-3.53	2.5	-20	13.9
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	63.1	1	100	0	0	0	0	0	0	0	0	0	0	-8.54	0.00	0.00	0.00	0	54.6
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	49.5	1	100	0	0	0	0	0	0	0	0	0	0	-8.80	0.00	0.00	0.00	0	42.7
																						Total	54.9

NSR 9/2	Tai Kek Tsuen	Xr 5114.9	Yr 843.3	Hr 17.6																			
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	333.1	0	0	10	-50.45	0.00	0.00	0.00	-0.32	-0.93	2.5	0	42.8
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1405.3	0	0	15	-62.96	0.00	0.00	0.00	-0.52	-3.93	2.5	0	27.1
S3	EMU Running Maintenance (North)	0.0	80.0	400.0	0.0	1	100	5160	1460	17	618.3	0	0	60	-55.82	0.00	0.00	0.00	-1.87	-1.73	2.5	-20	23.3
S4	EMU Running Maintenance (South)	0.0	0.0	3080.0	0.0	1	100	5135	1130	17	287.4	0	0	45	-49.17	0.00	0.00	0.00	-0.95	-0.80	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	880.8	0	0	30	-58.90	0.00	0.00	0.00	-1.34	-2.47	2.5	-20	19.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	1029.2	0	0	20	-60.25	0.00	0.00	0.00	-0.93	-2.88	2.5	-20	13.2
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1172.2	0	0	15	-61.38	0.00	0.00	0.00	-0.72	-3.28	2.5	-20	14.9
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	66.7	1	100	0	0	0	0	0	0	0	0	0	0	-13.65	0.00	0.00	0.00	0	53.1
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	58.9	1	100	0	0	0	0	0	0	0	0	0	0	-13.82	0.00	0.00	0.00	0	45.0
																						Total	54.1

See page 7 for definition of terms used in the above tables

Mitigated Noise Levels

NSR		Xr	Yr	Hr																			
9/3	Village houses S of Cheung Po	5344.0	1062.0	18.5																			
		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	196.4	0	0	25	-45.86	0.00	0.00	0.00	-0.57	-0.55	2.5	0	47.5
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1239.0	0	0	20	-61.86	0.00	0.00	0.00	-0.68	-3.47	2.5	0	28.5
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	438.5	0	0	10	-52.84	0.00	0.00	0.00	-0.25	-1.23	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	219.8	0	0	5	-46.84	0.00	0.00	0.00	-0.09	-0.62	2.5	-20	45.6
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	729.1	0	0	5	-57.26	0.00	0.00	0.00	-0.15	-2.04	2.5	-20	20.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	887.8	0	0	20	-58.97	0.00	0.00	0.00	-0.62	-2.49	2.5	-20	21.8
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	1027.3	0	0	5	-60.23	0.00	0.00	0.00	-0.16	-2.88	2.5	-20	24.0
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	67.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-13.80	0.00	0.00	0.00	0	53.3
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	55.5	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-10.58	0.00	0.00	0.00	0	45.0
																						Total	55.3

NSR		Xr	Yr	Hr																			
9/4	Village houses S of Tai Kek Tsuen	5082.0	950.0	14.9																			
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	240.8	0	0	5	-47.63	0.00	0.00	0.00	-0.10	-0.67	2.5	0	48.1
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1295.8	0	0	20	-62.25	0.00	0.00	0.00	-0.92	-3.63	2.5	0	27.7
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	515.9	0	0	5	-54.25	0.00	0.00	0.00	-0.20	-1.44	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	187.6	0	0	50	-45.47	0.00	0.00	0.00	-1.30	-0.53	2.5	-20	45.9
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	771.8	0	0	60	-57.75	0.00	0.00	0.00	-1.85	-2.16	2.5	-20	20.3
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	918.8	0	0	25	-59.26	0.00	0.00	0.00	-0.81	-2.57	2.5	-20	14.6
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1061.7	0	0	25	-60.52	0.00	0.00	0.00	-0.84	-2.97	2.5	-20	16.0
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	64.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-10.50	0.00	0.00	0.00	0	53.6
S9	Rolling Noise- Sidings (Soundplan Data)	0.0	0.0	0.0	55.6	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-9.85	0.00	0.00	0.00	0	45.8
																						Total	55.4

See page 7 for definition of terms used in the above tables

NSR 9/5	Kam Cheq Garden	Xr 5323.0	Yr 1666.0	Hr 19.2																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	516.2	0	0	70	-54.28	0.00	0.00	0.00	-2.16	-1.45	2.5	0	38.8
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	679.2	0	0	90	-56.64	0.00	0.00	0.00	-2.58	-1.90	2.5	0	33.4
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	262.7	0	0	50	-48.39	0.00	0.00	0.00	-1.50	-0.74	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	568.0	0	0	45	-55.09	0.00	0.00	0.00	-1.79	-1.59	2.5	-20	34.7
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	297.9	0	0	50	-49.48	0.00	0.00	0.00	-1.08	-0.83	2.5	-20	28.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	416.0	0	0	80	-52.38	0.00	0.00	0.00	-1.95	-1.18	2.5	-20	28.3
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	519.8	0	0	85	-54.31	0.00	0.00	0.00	-2.24	-1.45	2.5	-20	29.3
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	53.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-11.31	0.00	0.00	0.00	0	41.9
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	53.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-12.04	0.00	0.00	0.00	0	41.2
																						Total	46.1

NSR 9/6	Village houses to S of Kam Cheq Garden	Xr 5214.0	Yr 1640.0	Hr 18.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(inl)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	471.2	0	0	25	-53.46	0.00	0.00	0.00	-0.86	-1.32	2.5	0	38.9
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	651.5	0	0	80	-56.28	0.00	0.00	0.00	-2.27	-1.82	2.5	0	34.1
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	187.9	0	0	10	-45.48	0.00	0.00	0.00	-0.18	-0.53	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	516.1	0	0	15	-54.25	0.00	0.00	0.00	-0.39	-1.45	2 5	-20	37.1
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	200.6	0	0	10	-46.05	0.00	0.00	0.00	0.00	-0.56	2 5	-20	33 7
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	339.8	0	0	15	-50.83	0.00	0.00	0.00	0.00	-0.95	2.5	-20	32 2
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	461.7	0	0	20	-53.29	0.00	0.00	0.00	0.00	-1.29	2.5	-20	32.7
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	65.8	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-14.15	0.00	0.00	0.00	0	51.7
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	57.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-9.47	0.00	0.00	0.00	0	47 7
																						Total	53.6

See page 7 for definition of terms used in the above tables

Mitigated Noise Levels

NSR		Xr	Yr	Hr																			
9/7	Village house to N of Tin Sam (Kau Tsuen)	5193.0	1785.0	10.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	615.1	0	0	10	-55.78	0.00	0.00	0.00	-0.29	-1.72	2.5	0	38.7
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	511.2	0	0	50	-54.17	0.00	0.00	0.00	-0.79	-1.43	2.5	0	38.1
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	326.7	0	0	5	-50.28	0.00	0.00	0.00	-0.08	-0.91	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	657.6	0	0	5	-56.36	0.00	0.00	0.00	-0.11	-1.84	2.5	-20	34.8
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	175.5	0	0	0	-44.90	0.00	0.00	0.00	0.00	-0.49	2.5	-20	34.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	249.5	0	0	25	-47.95	0.00	0.00	0.00	-0.15	-0.70	2.5	-20	35.0
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	343.6	0	0	60	-50.72	0.00	0.00	0.00	-0.41	-0.96	2.5	-20	35.2
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	64.3	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-11.46	0.00	0.00	0.00	0	52.8
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	58.2	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-14.70	0.00	0.00	0.00	0	44.5
																						Total	53.9

NSR		Xr	Yr	Hr																			
10/8	Village house south of Shek Wu Tong	5080.0	2051.0	10.0																			
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	886.7	0	0	30	-58.96	0.00	0.00	0.00	-0.98	-2.48	2.5	0	32.1
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	223.9	0	0	0	-47.01	0.00	0.00	0.00	0.00	-0.63	2.5	0	46.9
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	596.4	0	0	0	-55.51	0.00	0.00	0.00	0.00	-1.67	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	922.6	0	0	20	-59.30	0.00	0.00	0.00	-0.47	-2.58	2.5	-20	30.8
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	334.8	0	0	0	-50.50	0.00	0.00	0.00	0.00	-0.94	2.5	-20	28.9
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	228.3	0	0	0	-47.18	0.00	0.00	0.00	0.00	-0.64	2.5	-20	38.0
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	163.2	0	0	0	-44.27	0.00	0.00	0.00	0.00	-0.46	2.5	-20	42.8
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	70.2	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-18.07	0.00	0.00	0.00	0	54.1
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	55.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-14.02	0.00	0.00	0.00	0	41.1
																						Total	55.4

NSR		Xr	Yr	Hr																		
10/9	Shek Wu Tong	5264.0	2146.0	16.5																		
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied							CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	979.6	0	0	80	-59.82	0.00	0.00	0.00	-2.55	-2.74	2.5	0	29.4
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	318.2	0	0	90	-50.05	0.00	0.00	0.00	-1.99	-0.89	2.5	0	41.6
S3	EMU Running Maintenance (North)	0.0	0.0	600.0	0.0	1	100	5160	1460	17	693.8	0	0	55	-56.83	0.00	0.00	0.00	-1.59	-1.94	2.5	-20	0.0
S4	EMU Running Maintenance (South)	0.0	80.0	4620.0	0.0	1	100	5135	1130	17	1024.2	0	0	50	-60.21	0.00	0.00	0.00	-1.61	-2.87	2.5	-20	28.5
S5	Locomotive Workshop	0.0	80.0	240.0	0.0	1	100	5030	1720	20	486.0	0	0	75	-53.73	0.00	0.00	0.00	-2.46	-1.36	2.5	-20	22.7
S6	Welding Plant	0.0	80.0	540.0	0.0	1	100	4955	1860	20	421.0	0	0	60	-52.49	0.00	0.00	0.00	-1.88	-1.18	2.5	-20	28.3
S7	Infrastructure and Building Maintenance	0.0	80.0	1200.0	0.0	1	100	4925	2000	20	369.1	0	0	70	-51.34	0.00	0.00	0.00	-2.09	-1.03	2.5	-20	32.8
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	61.1	1	100	0	0	0	0	0	0	0	0.00	0.00	0.00	-8.31	0.00	0.00	0.00	0	52.8
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	49.5	1	100	0	0	0	0	0	0	95	0.00	0.00	0.00	-11.06	0.00	0.00	0.00	0	38.5
																						Total	53.3

NSR		Xr	Yr	Hr																		
9/29	Kwan Tai Temple	5328.4	956.9	14.6																		
Plant Information		Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied							CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Catm	Cfac	Csrl	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	258.5	0	0	40	-48.25	0.00	0.00	0.00	-0.81	-0.72	2.5	0	44.7
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1334.4	0	0	5	-62.51	0.00	0.00	0.00	-0.22	-3.74	2.5	0	28.0
S3	EMU Running Maintenance (North)	0.0	80.0	600.0	0.0	1	100	5160	1460	17	529.9	0	0	15	-54.48	0.00	0.00	0.00	-0.57	-1.48	2.5	-20	27.7
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	258.1	0	0	5	-48.23	0.00	0.00	0.00	-0.15	-0.72	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	818.6	0	0	5	-58.26	0.00	0.00	0.00	-0.15	-2.29	2.5	-20	21.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1860	20	976.5	0	0	5	-59.79	0.00	0.00	0.00	-0.16	-2.73	2.5	-20	14.6
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	1117.7	0	0	5	-60.97	0.00	0.00	0.00	-0.16	-3.13	2.5	-20	16.0
S8	Rolling Noise - Main Line (Soundplan Data)	0	0.0	0.0	73.6	1	100	0	0	0	0	0	0	0	0	0.00	0.00	-13.83	0.00	0.00	0.00	0	59.8
S9	Rolling Noise- Sidings (Soundplan Data)	0	0.0	0.0	60.2	1	100	0	0	0	0	0	0	0	0	0.00	0.00	-14.75	0.00	0.00	0.00	0	45.4
																						Total	60.1

See page 7 for definition of terms used in the above tables

Mitigated Noise Levels

NSR		Xr	Yr	Hr																			
9/30	Sites for which building licences have been a	5360.3	1116.9	21.5																			
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Description	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri	dBA
S1	Train Wash	100.0	0.0	0.0	0.0	1	100	5180	1170	15	187.9	0	0	0	-45.48	0.00	0.00	0.00	0.00	-0.53	2.5	0	48.5
S2	Train Wash	100.0	0.0	0.0	0.0	1	100	4960	2240	18	1192.3	0	0	0	-61.53	0.00	0.00	0.00	0.00	-3.34	2.5	0	29.6
S3	EMU Running Maintenance (North)	0.0	80.0	800.0	0.0	1	100	5160	1460	17	397.3	0	0	0	-51.98	0.00	0.00	0.00	0.00	-1.11	2.5	-20	31.2
S4	EMU Running Maintenance (South)	0.0	0.0	4620.0	0.0	1	100	5135	1130	17	225.6	0	0	0	-47.07	0.00	0.00	0.00	0.00	-0.63	2.5	-20	0.0
S5	Locomotive Workshop	0.0	80.0	360.0	0.0	1	100	5030	1720	20	687.6	0	0	0	-58.75	0.00	0.00	0.00	0.00	-1.93	2.5	-20	23.4
S6	Welding Plant	0.0	80.0	120.0	0.0	1	100	4955	1880	20	846.5	0	0	0	-58.55	0.00	0.00	0.00	0.00	-2.37	2.5	-20	16.4
S7	Infrastructure and Building Maintenance	0.0	80.0	240.0	0.0	1	100	4925	2000	20	984.6	0	0	0	-59.87	0.00	0.00	0.00	0.00	-2.76	2.5	-20	17.7
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	68.3	1	100	0	0	0	0	0	0	0	0	0.00	0.00	-14.92	0.00	0.00	0.00	0	53.4
S9	Rolling Noise- Sidings (Soundplan Data)	0.0	0.0	0.0	56.1	1	100	0	0	0	0	0	0	0	0	0.00	0.00	-8.83	0.00	-0.04	0.00	0	47.2
																						Total	55.4

NSR		Xr	Yr	Hr																			
10/10	Village houses along Kam Sheung Road	4759.0	2492.0	16.6																			
	Plant Information	Basic Noise Level, dBA						Layout						Gnd Type	Corrections to be applied								CNL
Code	Decsription	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri	dBA
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	68.6	1	100	0	0	0	0.0	0	0	0	0	0.00	0.00	-14.10	0.00	0.00	0.00	0	54.5
																						Total	54.6

NSR		Xr	Yr	Hr																			
10/11	houses to the south of the proposed Kam Tin	4740.0	2510.0	18.8																			
	Plant Information	Basic Noise Level, dBA						Layout							Corrections to be applied								CNL
Code	Decsription	LWA	SPL(int)	S (sqm)	LAeq	No.	% on	Xs	Ys	Hs	Lsr	Lb	Hb	%Gnd Abs	CLsr	C%on	CNo	Cb	Cgnd	Calm	Clac	Csri	dBA
S8	Rolling Noise - Main Line (Soundplan Data)	0.0	0.0	0.0	71.6	1	100	0	0	0	0.0	0	0	0	0.00	0.00	0.00	-16.73	0.00	0.00	0	0	54.9
																						Total	55.1

See page 7 for definition of terms used in the above tables

Definition of Terms

SWL is the sound power level of a source, dBA
SPL is the internal sound pressure level within a building, dBA
S is the surface area of the wall of a building which faces the NSR, m^2
LAeq is the equivalent continuous noise level over a 30 minute period, dB
%ON is the assumed % on time of each source
No is the number of items of plant operating simultaneously.
Xr,Yr,Hr are the coordinates of the NSR, m
Xs,Ys,Hsare the coordinates of the source, m

Lsr is the horizontal distance between the source and NSR, m
Lb is the horizontal distance between the source and barrier, m
Hb is the height of the barrier above datum, m.
% Gnd Abs is the estimated % of soft ground between the source and receiver
CLsr is the correction for the slant distance between the source and the NSR, dB(A)
C%on is the correction due to the % on-time, dB(A)
CNo is the correction for plant numbers. Not applicable for travelling trains.

Cb is the barrier attenuation calculated using the CRN methodology (for rolling stock it is calculated by SoundPlan), dB(A)
Cgnd is the ground attenuation calculated using the CRN methodology, dB(A)
Catm is the air absorption calculated using CONCAWE methodology, dB(A)
Cfac is the facade correction, dB(A)
Csri is the sound reduction provided by the building envelope, dB(A)
CNL is the corrected noise level, LAeq (30 minutes), dB

See page 7 for definition of terms used in the above tables

Annex D

Noise Modelling Locations, Results and Mitigation Scheme for Operational Train Noise

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Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
1	18/72	815191.2	828407.3	6	60	B	55	Police Station - Not NSR	85.2	31.8	38.4	48.0	48.5	38.4	48.0	48.5
1.1	18/72	815191.2	828407.3	6	60	B	55	Police Station - Not NSR	85.2	31.9	38.5	48.1	48.6	38.5	48.1	48.6
1.2	18/72	815191.2	828407.3	6	60	B	55	Police Station - Not NSR	85.2	32.0	34.0	48.1	48.4	34.0	48.1	48.4
1a		815095	828876	12.4	88	B	55	Tai Hing Garden	294.6	33.0	36.8	43.1	44.3	36.8	43.1	44.3
1b		815130	828919	12.4	88	B	55	Tai Hing Garden	276.6	33.7	37.2	43.5	44.8	37.2	43.5	44.8
1c		815165	828768	5	50	B	55		195.8	34.6	39.8	43.6	45.5	39.8	43.6	45.5
1d		815177	828989	12.4	88	B	55	Tai Hing Garden	259.4	34.5	37.2	44.2	45.4	37.2	44.2	45.4
1e		815195	828948	12.4	88	B	55	Tai Hing Garden	227.2	34.9	38.3	44.4	45.7	38.3	44.4	45.7
2		815451.1	828412.1	5	20	B	55	Primary School	144.1	37.3	31.6	36.9	40.7	30.5	35.7	40.1
3		815438.2	828470.8	5	22	B	55	Wing Wai Building	117.8	38.9	33.4	38.9	42.5	32.3	37.3	41.7
4		815446.7	828497.7	5	22	B	55	Wing Wai Building	119.7	39.1	33.6	39.3	42.8	32.3	37.6	41.9
5	18/69	815443.2	828543	5	22	B	55	Koon Hing Building	105.7	40.2	34.7	40.5	43.9	33.3	38.5	42.9
6	18/68	815452	828572	5	22	B	55	Man Cheung Building	107.5	40.3	34.8	41.0	44.2	33.3	38.5	43.0
7	18/66	815462.9	828614.5	5	22	B	55	Tai Hing Building	108.1	40.5	35.0	41.7	44.6	33.3	39.1	43.3
8		815387.8	828646.2	5	25	B	55	Lui Ming Choi Secondary Tech. School	27.7	46.8	45.3	51.5	53.5	40.5	48.5	51.1
9	18/63	815414.1	828694.6	5	11	B	55	Lui Ming Choi Secondary Tech. School	41.9	45.3	38.3	38.7	46.8	36.1	37.3	46.4
10	18/64	815274	828716.4	5	90	B	55	Tung Ming Building	77.2	37.4	44.5	51.3	52.3	44.5	51.3	52.3
10.1	18/64	815274	828716.4	5	90	B	55	Tung Ming Building	77.2	37.9	45.0	48.5	50.4	45.0	48.5	50.4
10.2	18/64	815274	828716.4	5	90	B	55	Tung Ming Building	77.2	38.5	45.4	47.8	50.1	45.4	47.8	50.1
10.3	18/64	815274	828716.4	5	90	B	55	Tung Ming Building	77.2	38.8	45.7	47.0	49.8	45.7	47.0	49.8
11	18/60	815395.1	828735.5	5	19	B	55	Ho King Building	13.8	50.2	47.1	55.1	56.8	42.7	47.6	52.6
12	18/59	815404.7	828757.6	5	19	B	55	Mai Kei Building	17.8	49.6	46.0	54.9	56.4	42.7	48.2	52.5
13	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	39.8	46.4	47.8	50.5	45.6	47.8	50.3
13.1	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	40.5	47.2	48.5	51.3	46.3	48.5	51.0
13.2	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	41.3	48.0	49.2	52.0	46.3	49.2	51.4
13.3	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	42.1	49.0	49.9	52.9	47.0	49.9	52.2
13.4	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	43.0	45.4	50.1	52.0	43.9	50.1	51.7
13.5	18/57	815459.8	828805	5	134	C	60	Eldo Court	57.2	43.7	42.0	50.4	51.7	40.8	50.4	51.6
14	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	38.3	44.2	46.2	48.7	42.6	46.2	48.2
14.1	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	38.6	43.4	46.4	48.6	42.4	46.4	48.3
14.2	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	39.0	41.3	46.4	48.1	40.5	46.4	48.0
14.3	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	39.3	39.4	46.5	47.9	38.6	46.5	47.8
14.4	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	39.6	36.9	46.6	47.8	36.0	46.6	47.7
14.5	18/57	815555.3	828848.5	9	134	C	60	Eldo Court	133.9	39.7	35.2	46.3	47.4	34.4	46.1	47.2
15	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	39.7	45.6	47.5	50.1	45.2	47.5	49.9
15.1	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	40.4	46.2	48.0	50.6	45.5	48.0	50.4
15.2	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	41.1	46.8	48.6	51.2	46.1	48.6	51.0
15.3	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	41.9	47.5	49.1	51.8	46.1	49.1	51.4
15.4	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	42.7	47.5	49.0	51.9	46.6	49.0	51.6
15.5	18/58	815472.3	828859.3	9	134	C	60	Hong Lai Garden	52.2	43.5	42.4	49.0	50.8	41.6	49.0	50.7
16	18/49	815228.2	828883.5	12.4	88	B	55	Tai Hing Garden	172.2	35.8	40.3	45.2	46.8	40.3	45.2	46.8
16.1	18/49	815228.2	828883.5	12.4	88	B	55	Tai Hing Garden	172.2	36.0	40.4	45.1	46.7	40.4	45.1	46.7
16.2	18/49	815228.2	828883.5	12.4	88	B	55	Tai Hing Garden	172.2	36.2	40.4	44.6	46.4	40.4	44.6	46.4
16.3	18/49	815228.2	828883.5	12.4	88	B	55	Tai Hing Garden	172.2	36.3	40.0	43.1	45.4	40.0	43.1	45.4

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
17	18/49	815268.3	828925.4	12.4	88	B	55	Tai Hing Garden	150.8	36.6	40.6	45.9	47.4	40.6	45.9	47.4
17.1	18/49	815268.3	828925.4	12.4	88	B	55	Tai Hing Garden	150.8	36.9	40.6	45.7	47.3	40.6	45.7	47.3
17.2	18/49	815268.3	828925.4	12.4	88	B	55	Tai Hing Garden	150.8	37.1	40.5	45.6	47.2	40.5	45.6	47.2
17.3	18/49	815268.3	828925.4	12.4	88	B	55	Tai Hing Garden	150.8	37.2	40.5	43.5	45.9	40.5	43.5	45.9
18	18/50	815340.4	828936.9	8.5	20	C	60	Gov. Office - Not NSR	88.4	39.9	41.0	44.9	47.3	41.0	44.9	47.3
19	18/52	815579.1	828951.7	9	14	C	60	Tuen Mun Clinic	122.5	40.4	34.0	41.5	44.4	33.5	41.4	44.3
20	18/53	815545.8	828957.4	9	14	C	60	Tuen Mun Clinic	89.3	41.9	35.4	42.6	45.7	34.9	42.5	45.6
21	18/49	815281.1	828959.2	12.4	88	B	55	Tai Hing Garden	151.8	36.8	40.2	46.0	47.4	40.2	46.0	47.4
21.1	18/49	815281.1	828959.2	12.4	88	B	55	Tai Hing Garden	151.8	37.1	40.0	45.9	47.3	40.0	45.9	47.3
21.2	18/49	815281.1	828959.2	12.4	88	B	55	Tai Hing Garden	151.8	37.3	39.9	45.8	47.3	39.9	45.8	47.3
21.3	18/49	815281.1	828959.2	12.4	88	B	55	Tai Hing Garden	151.8	37.4	39.7	43.4	45.6	39.7	43.4	45.6
22	18/49	815262.9	828995.4	12.4	88	B	55	Tai Hing Garden	182.3	36.3	39.0	45.6	46.9	39.0	45.6	46.9
22.1	18/49	815262.9	828995.4	12.4	88	B	55	Tai Hing Garden	182.3	36.5	38.8	45.5	46.8	38.8	45.5	46.8
22.2	18/49	815262.9	828995.4	12.4	88	B	55	Tai Hing Garden	182.3	36.6	38.5	45.1	46.4	38.5	45.1	46.4
22.3	18/49	815262.9	828995.4	12.4	88	B	55	Tai Hing Garden	182.3	36.7	38.2	42.5	44.6	38.2	42.5	44.6
23		815698	829149.3	5.3	9	C	60	Petrol-station	161.5	39.0	32.8	40.2	43.1	32.5	40.2	43.1
24	18/45	815463.2	829160.8	14	100	C	60	Residential Development by Sun Hung Kai	59.3	40.4	47.3	51.3	53.0	47.3	51.3	53.0
24.1	18/45	815463.2	829160.8	14	100	C	60	Residential Development by Sun Hung Kai	59.3	41.2	48.2	52.1	53.8	48.2	52.1	53.8
24.2	18/45	815463.2	829160.8	14	100	C	60	Residential Development by Sun Hung Kai	59.3	42.0	49.1	53.0	54.7	49.1	53.0	54.7
24.3	18/45	815463.2	829160.8	14	100	C	60	Residential Development by Sun Hung Kai	59.3	42.9	50.0	53.8	55.6	50.0	53.8	55.6
24.4	18/45	815463.2	829160.8	14	100	C	60	Residential Development by Sun Hung Kai	59.3	43.6	43.0	54.3	54.9	43.0	54.3	54.9
25	18/33	815524.7	829282.6	6.7	110	C	60	Affluence Garden	37.7	40.8	48.4	52.2	53.9	48.4	52.2	53.9
25.1	18/33	815524.7	829282.6	6.7	110	C	60	Affluence Garden	37.7	41.7	49.4	53.1	54.9	49.4	53.1	54.9
25.2	18/33	815524.7	829282.6	6.7	110	C	60	Affluence Garden	37.7	42.8	50.5	54.2	56.0	50.5	54.2	56.0
25.3	18/33	815524.7	829282.6	6.7	110	C	60	Affluence Garden	37.7	43.9	51.8	55.3	57.1	51.8	55.3	57.1
25.4	18/33	815524.7	829282.6	6.7	110	C	60	Affluence Garden	37.7	45.2	52.3	56.5	58.1	52.3	56.5	58.1
26	18/34	815677.2	829336.9	5.3	25	B	55	Prevocational school	91.9	41.3	39.0	51.7	52.3	38.9	51.7	52.3
27	18/33	815544.2	829360.8	10.5	110	C	60	Affluence Garden	38.8	40.3	47.9	51.9	53.6	47.9	51.9	53.6
27.1	18/33	815544.2	829360.8	10.5	110	C	60	Affluence Garden	38.8	41.1	48.8	52.7	54.4	48.8	52.7	54.4
27.2	18/33	815544.2	829360.8	10.5	110	C	60	Affluence Garden	38.8	42.0	49.8	53.6	55.3	49.8	53.6	55.3
27.3	18/33	815544.2	829360.8	10.5	110	C	60	Affluence Garden	38.8	43.1	51.0	54.7	56.4	51.0	54.7	56.4
27.4	18/33	815544.2	829360.8	10.5	110	C	60	Affluence Garden	38.8	44.3	52.0	55.8	57.5	52.0	55.8	57.5
28	18/33	815557.8	829403	6.7	110	C	60	Affluence Garden	36.4	40.2	47.9	51.9	53.6	47.9	51.9	53.6
28.1	18/33	815557.8	829403	6.7	110	C	60	Affluence Garden	36.4	41.1	48.8	52.8	54.5	48.8	52.8	54.5
28.2	18/33	815557.8	829403	6.7	110	C	60	Affluence Garden	36.4	42.0	49.8	53.7	55.4	49.8	53.7	55.4
28.3	18/33	815557.8	829403	6.7	110	C	60	Affluence Garden	36.4	43.1	51.0	54.8	56.5	51.0	54.8	56.5
28.4	18/33	815557.8	829403	6.7	110	C	60	Affluence Garden	36.4	44.3	52.1	55.9	57.6	52.1	55.9	57.6
29	18/32	815567.9	829469	6.8	75	C	60	Staff Quarter (TM Hospital)	43.4	41.2	49.0	53.0	54.7	49.0	53.0	54.7
29.1	18/32	815567.9	829469	6.8	75	C	60	Staff Quarter (TM Hospital)	43.4	42.2	50.0	54.0	55.7	50.0	54.0	55.7
29.2	18/32	815567.9	829469	6.8	75	C	60	Staff Quarter (TM Hospital)	43.4	43.2	50.9	55.0	56.6	50.9	55.0	56.6
30	18/32	815589.7	829507.1	6.8	75	C	60	Staff Quarter (TM Hospital)	32.1	41.3	49.1	53.2	54.8	49.1	53.2	54.8
30.1	18/32	815589.7	829507.1	6.8	75	C	60	Staff Quarter (TM Hospital)	32.1	42.4	50.3	54.3	56.0	50.3	54.3	56.0
[illegible]	[illegible]	[illegible]	[illegible]	6.8	75	C	60	Staff Quarter (TM Hospital)	32.1	43.7	51.6	55.6	57.3	51.6	55.6	57.3
31	18/32	[illegible]	[illegible]	6.8	[illegible]	[illegible]	[illegible]	Staff [illegible] (TM [illegible])	[illegible]	41.3	49.2	53.2	54.9	[illegible]	[illegible]	54.9

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	MPS Inboard Plenum Gap, Leq	MPS Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
31.1	18/32	815604.4	829540.3	6.8	75	C	60	Staff Quarter (TM Hospital)	26.3	42.5	50.4	54.4	56.1	50.4	54.4	56.1
31.2	18/32	815604.4	829540.3	6.8	75	C	60	Staff Quarter (TM Hospital)	26.3	43.9	51.8	55.8	57.5	51.8	55.8	57.5
32	17/27	815631.6	829663.5	6.8	30	C	60	Tuen Mun Hospital	31.4	43.8	51.7	55.5	57.2	51.7	55.5	57.2
33	17/27	815657.2	829753	8.2	30	C	60	Tuen Mun Hospital	29.6	44.1	52.1	55.6	57.4	52.1	55.6	57.4
34	17/26	815904.7	829827	13.1	40	C	60	Brilliant Garden	167.0	37.3	35.6	48.3	48.8	35.5	48.3	48.8
34.1	17/26	815904.7	829827	13.1	40	C	60	Brilliant Garden	167.0	37.5	34.2	47.3	47.9	34.1	47.3	47.9
35	17/27	815672.1	829841.3	8.2	30	C	60	Tuen Mun Hospital	41.3	43.6	51.5	54.2	56.3	51.5	54.2	56.3
36	17/26	815918.3	829853.9	9.1	40	C	60	Brilliant Garden	166.2	37.2	35.1	48.0	48.5	35.0	48.0	48.5
36.1	17/26	815918.3	829853.9	9.1	40	C	60	Brilliant Garden	166.2	37.3	33.6	46.6	47.3	33.6	46.6	47.3
37	17/25	815732.5	830048.9	12.5	25	C	60	Tuen Mun Gov. Primary School	70.1	41.0	43.0	48.6	50.2	43.0	48.6	50.2
38	17/22	815945.9	830050.7	5.5	9	C	60	Village House	104.6	37.5	33.7	41.1	43.2	33.6	41.1	43.2
39	17/18	815737.3	830111.2	8	79.6	C	60	Siu Hong Court	91.0	38.3	46.0	47.5	50.1	46.0	47.5	50.1
39.1	17/18	815737.3	830111.2	8	79.6	C	60	Siu Hong Court	91.0	38.8	44.0	47.4	49.4	44.0	47.4	49.4
39.2	17/18	815737.3	830111.2	8	79.6	C	60	Siu Hong Court	91.0	39.3	41.5	47.2	48.8	41.5	47.2	48.8
40		816008.2	830117.5	9.6	4	C	60	Village House	145.2	36.4	32.3	39.3	41.6	32.1	39.2	41.6
41	17/18	815763.7	830155	8	79.6	C	60	Siu Hong Court	79.7	37.9	45.6	48.1	50.3	45.6	48.1	50.3
41.1	17/18	815763.7	830155	8	79.6	C	60	Siu Hong Court	79.7	38.5	44.8	47.3	49.6	44.8	47.3	49.6
41.2	17/18	815763.7	830155	8	79.6	C	60	Siu Hong Court	79.7	38.9	41.7	47.1	48.7	41.7	47.1	48.7
42		816022.2	830191.9	8	79.6	C	60	Residential uses in Fu Tei	139.1	36.5	38.8	45.1	46.5	38.7	45.1	46.5
43	17/18	815774.6	830196.5	12	90	C	60	Siu Hong Court	80.3	36.9	44.6	48.0	49.9	44.6	48.0	49.9
43.1	17/18	815774.6	830196.5	12	90	C	60	Siu Hong Court	80.3	37.4	45.0	47.4	49.6	45.0	47.4	49.6
43.2	17/18	815774.6	830196.5	12	90	C	60	Siu Hong Court	80.3	37.8	42.2	47.1	48.7	42.1	47.1	48.7
43.3	17/18	815774.6	830196.5	12	90	C	60	Siu Hong Court	80.3	38.2	40.3	46.8	48.1	40.3	46.8	48.1
44	17/18	815784.9	830231.6	8	79.6	C	60	Siu Hong Court	79.6	36.7	44.3	47.8	49.6	44.3	47.8	49.6
44.1	17/18	815784.9	830231.6	8	79.6	C	60	Siu Hong Court	79.6	37.1	43.4	47.3	49.1	43.3	47.3	49.0
44.2	17/18	815784.9	830231.6	8	79.6	C	60	Siu Hong Court	79.6	37.5	40.3	47.1	48.3	40.3	47.1	48.3
45	17/16	816029	830329.1	10.8	6	C	60	Village House	109.7	38.9	34.7	39.6	43.0	34.5	39.5	42.9
46	17/15	816012.5	830357.7	7.6	10	C	60	WSD Quarter	86.2	40.1	36.1	42.3	45.0	35.9	42.3	44.9
47	17/14	816071.2	830391.4	15	10	C	60	Village House	133.9	39.1	34.8	41.5	44.0	34.5	41.4	43.9
48		815833.1	830406.3	8	79.6	C	60	Siu Hong Court	79.0	35.2	42.0	49.9	50.7	41.9	49.9	50.7
48.1		815833.1	830406.3	8	79.6	C	60	Siu Hong Court	79.0	35.4	41.8	48.8	49.8	41.8	48.8	49.8
48.2		815833.1	830406.3	8	79.6	C	60	Siu Hong Court	79.0	35.6	38.9	48.7	49.3	38.8	48.6	49.2
49	17/13	816034.1	830427.5	15	10	C	60	Village House	88.8	41.0	37.6	42.5	45.6	37.5	42.4	45.5
50		815842	830451.7	8	79.6	C	60	Siu Hong Court	82.3	35.2	42.0	50.3	51.0	41.9	50.3	51.0
50.1		815842	830451.7	8	79.6	C	60	Siu Hong Court	82.3	35.5	40.4	48.7	49.5	40.4	48.7	49.5
50.2		815842	830451.7	8	79.6	C	60	Siu Hong Court	82.3	35.7	38.2	48.5	49.1	38.2	48.4	49.0
51		815867	830502	8	10	C	60	Village House	71.5	36.9	35.1	46.5	47.2	35.0	46.5	47.2
52		815807.1	830538	8	79.6	C	60	Siu Hong Court	139.0	34.7	37.4	47.2	47.8	37.3	47.1	47.8
52.1		815807.1	830538	8	79.6	C	60	Siu Hong Court	139.0	34.9	35.9	46.9	47.5	35.8	46.8	47.4
52.2		815807.1	830538	8	79.6	C	60	Siu Hong Court	139.0	35.0	34.3	46.4	46.9	34.2	46.4	46.9
53		816150.1	830573.2	6	6	C	60	Village House	161.3	40.3	33.8	37.7	42.8	33.5	37.4	42.7
54	17/12	815828.2	830632.6	12.7	25	C	60	Y.T.T.M College	150.5	35.4	32.7	45.1	45.8	32.5	45.0	45.7
55		815842.1	830763.7	5.4	8	C	60	Village House (San Hing Tsuen)	192.7	35.3	30.5	39.8	41.5	30.1	39.7	41.4
56	17/7	816031.7	830794.2	7	3	C	60	Village House (San Hing Tsuen)	34.6	43.2	34.3	44.7	47.3	34.1	44.6	47.2

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
57		815966.2	830818.8	7	3	C	60	Village House (San Hing Tsuen)	104.3	38.4	32.8	41.0	43.3	32.5	40.9	43.2
58		815946.8	830853.9	7	3	C	60	Village House (San Hing Tsuen)	136.9	37.4	32.3	40.6	42.7	31.9	40.4	42.6
59		815980	830866.8	7	5	C	60	Village House (San Hing Tsuen)	112.5	38.4	33.2	41.5	43.6	32.8	41.3	43.5
60		815888.1	830874.8	7	3	C	60	Village House (San Hing Tsuen)	198.9	35.8	30.5	39.7	41.5	30.0	39.5	41.4
61		815897.1	830891.6	7	3	C	60	Village House (San Hing Tsuen)	198.0	36.0	30.6	39.8	41.7	30.1	39.6	41.5
62	17/5	816240.1	830891.8	4.5	9	C	60	Village House (San Hing Tsuen)	107.7	43.1	36.6	40.1	45.5	36.2	39.9	45.4
63	17/1	816228.4	830968.7	7	3	C	60	Chik Yuen Garden	63.6	45.9	38.9	41.0	47.7	38.7	40.9	47.7
64		815991.3	831021.3	9	3	C	60	Village House (San Hing Tsuen)	168.7	37.4	32.7	41.4	43.3	32.2	41.2	43.1
65		816283.9	831069	6.5	11	C	60	Building next to Tuen Mun San Tsuen	66.8	45.9	40.4	43.7	48.7	40.2	43.5	48.6
66		816315.6	831073.4	7	9	C	60	Tuen Mun San Tsuen	92.8	44.4	38.7	42.3	47.2	38.4	42.0	47.0
67		816194.3	831083.6	6.7	5	C	60	Premises to the west of Tuen Mun San Tsuen	15.0	48.3	39.8	45.8	50.6	39.6	45.8	50.6
69		816013	831095.4	7	6	C	60	Premises to the North of San Hing Tsuen	181.5	37.4	32.7	41.5	43.3	32.3	41.3	43.2
70		816303.9	831124.2	8.1	6	C	60	Premises to the north of Tuen Mun San Tsuen	58.7	46.5	40.6	43.1	48.8	40.4	42.9	48.8
71		816148.2	831132.9	6.7	3	C	60	Premises to the west of Tuen Mun San Tsuen	78.8	41.5	35.5	44.4	46.6	35.2	44.3	46.5
72		816045	831160.7	7.2	3	C	60	Premises to the south of Tuen Tsz Wai	183.0	37.7	32.8	41.3	43.3	32.3	41.1	43.1
73	16/22	816346.7	831182	10.6	9	C	60	Nei Ming	69.7	45.7	40.9	44.9	49.1	40.6	44.6	48.9
73a		816233.4	831189.9	7	9	C	60	Premises to the south of Tsing Chuen Wai	30.0	46.0	40.3	48.2	50.7	40.1	48.1	50.6
74		816117.5	831195.4	7	9	C	60	Premises to the south of Tuen Tsz Wai	135.1	39.3	34.6	43.7	45.4	34.2	43.5	45.3
75	16/23	816202.2	831210.2	7	3	C	60	Lee Ka Yuen	67.0	42.6	36.9	45.0	47.4	36.6	44.9	47.3
76	16/20	816444.5	831251.3	10.6	25	C	60	Lau Kam Lung Secondary School	123.9	43.1	39.8	47.1	49.1	39.1	46.2	48.5
76a		816325.7	831256	8.5	9	C	60	Premises to the south of Tsing Chuen Wai	16.6	52.1	46.0	47.1	54.0	46.0	47.1	54.0
76b		816351.6	831293.8	8.5	9	C	60	Premises to the south of Tsing Chuen Wai	21.9	50.9	45.7	47.7	53.4	45.5	47.6	53.3
76c		816380	831351	8.5	9	C	60	Premises to the south of Tsing Chuen Wai	20.4	51.2	46.2	49.0	54.0	46.1	48.8	54.0
78		816398	831387	8.5	3	C	60	Premises next to Sing Sing Metal	19.5	51.4	43.8	44.6	52.8	43.6	44.4	52.8
79		816365.5	831444.2	8	6	C	60	Kan Tak Storage	31.5	47.4	41.7	48.5	51.5	41.5	48.5	51.5
80	16/17	816508	831459.3	8.5	12	C	60	Lei Yuen	84.9	45.0	40.7	46.7	49.5	39.7	45.9	49.0
81	16/16	816507.9	831496.4	8.5	10	C	60	Hing Tak School	68.8	46.0	41.6	47.4	50.4	40.6	46.6	49.9
81a		816348.2	831510.4	9.1	9	C	60	Tsing Chuen Wai	76.9	43.6	39.2	48.2	49.9	38.8	48.0	49.7
82	16/18	816317.2	831529.5	9.5	9	B	55	Tsing Chuen Wai	113.1	41.9	37.5	46.5	48.2	36.8	46.2	47.9
82a		816377.5	831592.4	8.2	9	C	60	Tsing Chuen Wai	85.8	43.4	39.0	47.7	49.5	38.4	47.5	49.3
83	16/18	816289.9	831621.8	8	9	B	55	Tsing Chuen Wai	177.7	40.0	35.3	44.2	46.0	34.3	43.7	45.6
83a		816429.6	831641.1	8	9	B	55	Tsing Chuen Wai	58.2	45.4	41.1	49.6	51.4	40.6	49.4	51.2
84		816529.8	831661.1	8	9	B	55	Premises to the west of Ken Yuen	21.4	50.9	47.9	53.9	56.3	44.5	49.9	54.0
84a		816504.1	831588.9	8.5	9	B	55	Premises to the west of Ken Yuen	27.0	50.0	46.4	52.0	54.8	45.0	50.9	54.1
85		816567.7	831691.9	8	9	B	55	Premises to the west of Ken Yuen	43.6	47.9	44.2	50.4	53.0	41.0	46.9	50.9
86		816386.4	831728	8.8	3	B	55	Premises to the north of Tsing Chuen Wai	132.8	41.7	36.9	45.0	47.1	35.9	44.4	46.6
86a		816480.8	831730.3	8.5	9	B	55	Premises to the north of Tsing Chuen Wai	47.3	46.3	42.7	51.4	53.0	42.2	51.2	52.8
87		816672.1	831767.9	8.5	9	B	55	Premises to the west of Yee Kee Yuen	108.5	43.8	39.4	46.3	48.8	36.4	42.8	46.8
87a		816609.8	831769.1	8.5	9	B	55	Premises to the south-west of Yick Yuen Tsuen	51.1	47.1	43.6	50.5	52.7	40.0	46.5	50.3
88		816481.5	831774.6	10	3	B	55	Premises to the north of Tsing Chuen Wai	64.6	45.0	40.6	48.2	50.4	39.6	47.7	50.0
89		816530.6	831807.5	10	3	B	55	Premises to the north of Tsing Chuen Wai	32.9	48.1	43.7	50.8	53.2	42.9	50.3	52.8
90	16/11	816697.1	831837.9	8	12	B	55	Church	103.2	44.0	40.1	47.5	49.6	36.7	43.5	47.2
90a		816644	831881.1	8	3	B	55	Premises to the south-west of Yick Yuen Tsuen	37.2	48.6	43.7	48.8	52.3	40.2	45.5	50.7
90b		816[illegible]	8318[illegible]	[illegible]	[illegible]	[illegible]	55	Prem[illegible]he so[illegible]t of Y[illegible]n Ts[illegible]	[illegible]6	49.1	44.0	50.3	53.3	42.5	49.2	52.6

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
91		816485.8	831944.4	12.1	3	B	55	Premises to the south-west of Yick Yuen Tsuen	129.1	42.2	38.2	46.2	48.1	36.4	44.5	46.9
92		816678.2	831957.4	8.8	9	B	55	Premises to the south of Yick Yuen Tsuen	37.7	48.4	45.9	53.4	55.1	41.9	49.0	52.2
92a		816724	832064	8.8	9	B	55	Yick Yuen Tsuen	36.6	48.5	46.1	53.9	55.5	41.7	48.7	52.0
93		816599.4	831967.7	10	6	B	55	Premises to the south of Yick Yuen Tsuen	34.6	48.1	45.1	53.3	54.9	41.9	49.8	52.4
93a		816575.6	832043.5	12	9	B	55	Premises to the south-west of Yick Yuen Tsuen	86.9	44.2	41.1	49.8	51.3	38.4	46.5	48.9
96		816640.4	832072.8	9	3	B	55	Premises to the south-west of Yick Yuen Tsuen	39.4	47.8	43.4	50.1	52.7	40.0	46.8	50.7
96b		816653.9	832091.4	8.6	9	B	55	Premises to the south-west of Yick Yuen Tsuen	34.6	48.3	45.9	54.5	55.9	41.7	50.1	52.7
97		816733.1	832101.4	8.8	6	B	55	Yick Yuen Tsuen	29.8	49.5	46.2	52.9	55.1	41.5	47.4	52.0
99		816739.1	832142.9	8.8	9	B	55	Yick Yuen Tsuen	18.6	51.3	50.8	62.4	63.0	44.3	51.6	54.9
100a		816665.1	832184	8.6	6	B	55	Premises to the west of Yick Yuen Tsuen	61.6	46.0	42.3	49.6	51.7	39.1	45.8	49.3
102		816817.3	832192.4	8.8	6	B	55	Yick Yuen Tsuen	70.2	45.8	41.6	48.7	51.0	38.3	45.2	48.9
102a		816693.1	832227.6	8.6	9	B	55	Premises to the west of Yick Yuen Tsuen	53.7	46.7	43.6	51.7	53.4	40.1	47.2	50.4
104a		816902.6	832397.7	8.7	6	B	55	Premises to the north of Wing Fat Fishery	65.4	46.1	42.1	49.2	51.5	39.4	46.3	49.6
105		816645.6	832408.4	9	3	B	55	Premises o the north-west of Siu Kwong Yuen	170.1	41.6	37.7	44.5	46.9	35.2	42.2	45.4
105a		816911.7	832443.4	8.5	3	B	55	Premises to the north of Yick Yuen Tsuen	55.3	46.8	42.2	48.6	51.4	39.0	45.2	49.5
106a		816908.3	832465	8.7	6	B	55	Premises to the north of Wing Fat Fishery	43.5	47.9	44.1	51.2	53.4	40.4	47.0	50.9
106b		816923.4	832490.4	8.7	6	B	55	Premises to the north of Wing Fat Fishery	47.1	47.5	43.7	50.8	53.0	39.9	46.3	50.4
106c		816948.4	832509.8	8.7	6	B	55	Premises to the north of Wing Fat Fishery	62.1	46.3	42.3	49.4	51.7	38.5	45.0	49.1
109a		816978.6	832558.8	9	6	B	55	Premises to the south-west of Tin Sam	70.0	45.8	41.7	49.0	51.2	37.9	44.4	48.6
110a		816788.5	832571.1	9	3	B	55	Village House	104.9	43.9	39.9	46.5	49.0	37.1	43.4	47.1
111a		816994	832605.6	9	9	B	55	Premises to the south-west of Tin Sam	65.2	46.1	42.6	50.6	52.4	38.3	44.8	48.9
114a		817001.4	832635.8	8.4	10	B	55	Premises to the south-west of Tin Sam	59.8	46.4	43.1	51.3	53.0	38.6	45.2	49.2
115a		816799.6	832679.3	8.4	3	B	55	Premises to the south-west of Tin Sam	138.4	42.7	38.3	45.0	47.6	36.1	42.4	46.0
118a		816847.5	832699.7	8.4	3	B	55	Premises to the south-west of Tin Sam	102.8	44.1	39.6	46.3	48.9	37.3	43.7	47.4
118b		817021.4	832727.4	7.9	9	B	55	Premises to the south-west of Tin Sam	41.2	48.1	44.9	52.9	54.6	39.7	46.3	50.7
118c		816858.8	832734.2	8.4	3	B	55	Premises to the south-west of Tin Sam	106.4	43.9	39.5	46.1	48.7	37.4	43.8	47.3
120		817100	832763	7.8	6	B	55	Premises to the south-west of Tin Sam	98.7	44.2	39.6	47.0	49.3	36.4	43.1	47.1
122		817039.6	832770.4	7.8	6	B	55	Premises to the south-west of Tin Sam	40.5	48.2	44.1	51.1	53.4	39.6	45.8	50.5
122a		816881.1	832773.7	8.6	3	B	55	Premises to the west of Tin Sam	101.9	44.1	39.8	46.4	49.0	37.9	44.6	47.8
123a		816929.4	832817.1	8.6	3	B	55	Premises to the west of Tin Sam	75.2	45.5	41.1	47.6	50.2	39.4	46.3	49.4
125		816933.7	832866.7	9	3	B	55	Premises to the west of Tin Sam	91.3	44.7	40.4	46.9	49.5	38.8	45.6	48.7
126		817181.6	832867.3	8.1	6	B	55	Tin Sam Tsuen	131.3	43.0	37.9	45.7	48.0	35.4	43.1	46.4
127		816941.9	832903.3	9	3	B	55	Premises to the west of Tin Sam	98.6	44.4	40.0	46.6	49.2	38.5	45.2	48.3
128	15/7	817183.4	832908	7.1	10	B	55	Tin Sam Tsuen	116.6	43.5	38.9	46.9	49.0	36.7	44.5	47.4
128a		817198.2	832925.2	7	10	B	55	Tin Sam Tsuen	123.2	43.3	38.6	46.6	48.7	36.5	44.5	47.3
129a		817002.8	832947.3	8.8	9	B	55	Premises to the west of Tin Sam	60.5	46.6	44.3	51.2	53.1	42.5	49.7	52.0
129b		816969.7	832955.1	7.1	3	B	55	Premises to the west of Tin Sam	94.0	44.7	39.9	46.1	49.0	38.3	44.6	48.1
130		817026.7	832960.6	8	9	B	55	Premises to the west of Tin Sam	44.0	48.2	45.7	52.4	54.4	43.4	50.2	52.8
132		817037.6	833003.1	8.2	3	B	55	Premises to the north-west of Tin Sam	51.2	47.6	42.6	48.3	51.6	40.4	46.0	50.3
133a		817171.3	833036.8	6.7	6	B	55	Premises to the north of Tin Sam	53.5	47.0	41.9	48.7	51.5	40.7	47.8	50.9
134		817206.1	833040.7	8	3	B	55	Premises to the north of Tin Sam	83.8	45.1	39.7	46.7	49.5	38.4	45.7	48.8
134a		817072.6	833045.1	6.8	9	B	55	Premises to the north of Tin Sam	36.1	48.9	45.4	51.7	54.2	42.4	48.4	52.2
135	15/5	817097.7	833067.4	6.7	6	B	55	Premises to the north of Tin Sam	22.1	51.0	45.9	50.5	54.4	42.6	47.5	53.0
135a		817185.9	833096.1	7.5	3	B	55	Premises to the west of San Lee Uk Tsuen	42.5	48.2	42.3	48.3	51.8	41.5	47.8	51.5

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
136		817214.3	833099.9	7.5	3	B	55	Premises to the west of San Lee Uk Tsuen	66.6	46.2	40.6	47.2	50.2	39.7	46.5	49.8
136a		817268.2	833109.9	6.7	6	B	55	Premises to the north of Tin Sam	110.3	44.0	38.6	46.1	48.6	37.6	45.4	48.2
136b		817127.8	833114.8	6	9	B	55	Premises to the south of San Sang Tsuen	14.1	52.9	48.8	53.4	56.9	44.8	49.4	54.9
138a		817147.7	833159.2	6.5	9	B	55	Premises to the north-west of San Sang Tsuen	15.4	53.2	48.9	53.7	57.1	45.2	49.3	55.0
139		817154	833176.4	6.5	6	B	55	Premises to the south of San Sang Tsuen	17.7	52.6	46.2	49.6	55.0	43.7	47.0	54.1
139a		817162.6	833189.8	6.5	9	B	55	Premises to the north-west of San Sang Tsuen	16.3	52.8	48.5	53.0	56.7	45.5	49.5	55.0
139b		817166.6	833212.1	6.5	9	B	55	Premises to the north-west of San Sang Tsuen	23.5	51.4	46.9	51.9	55.3	44.6	49.3	54.0
140		817149.1	833224.7	6.5	9	B	55	Premises to the south of San Sang Tsuen	45.0	48.4	44.1	49.9	52.8	42.3	47.7	51.6
141	15/4	817179.7	833293.6	5.8	9	B	55	Galore Garden	53.8	47.7	43.1	48.6	51.8	42.1	47.7	51.3
141a		817324.9	833319.8	5.5	9	B	55	Premises to the east of San Sang Tsuen	46.4	47.7	42.0	49.1	51.9	41.7	48.9	51.8
142		817324.5	833351.8	5.5	9	B	55	Premises to the east of San Sang Tsuen	26.5	50.2	44.0	50.0	53.6	43.9	49.9	53.6
143		817173	833376.5	6	9	B	55	San Sang Tsuen	105.3	44.5	39.9	45.9	48.9	39.0	45.2	48.4
144	15/2	817382.4	833422.1	5.5	9	B	55	Premises to the north-east of San Sang Tsuen	25.3	50.2	43.7	49.5	53.4	43.6	49.4	53.3
145a		817343.6	833448.4	5.4	9	B	55	Premises to the north-east of San Sang Tsuen	15.8	53.3	45.8	47.2	54.8	45.8	47.2	54.8
146	15/2	817417.1	833472.4	5.4	9	B	55	Premises to the north-east of San Sang Tsuen	15.7	52.2	44.6	49.0	54.4	44.5	48.9	54.3
147		817191.8	833491.2	6.2	9	B	55	Premises to the north-east of San Sang Tsuen	159.3	42.6	38.0	44.0	47.0	37.2	43.4	46.6
148		817448.1	833500.5	5.5	9	B	55	Premises to the west of Shek Po Tsuen	17.1	51.5	44.0	48.6	53.8	43.9	48.5	53.7
149		817476.8	833502.3	5.5	9	B	55	Premises to the west of Shek Po Tsuen	35.3	48.4	41.9	48.2	51.8	41.8	48.1	51.7
150a		817388.5	833501.6	5	9	B	55	Premises to the west of Shek Po Tsuen	19.5	52.7	45.0	46.2	54.1	45.0	46.2	54.1
151		817493	833525	5.4	9	B	55	Premises to the west of Shek Po Tsuen	29.0	49.1	42.4	48.0	52.1	42.2	47.9	52.0
152		817507.4	833533.5	5.4	9	B	55	Premises to the west of Shek Po Tsuen	31.9	48.7	42.0	47.9	51.8	41.9	47.8	51.8
152a		817721.3	833553.4	5	9	B	55	Shek Po Tsuen	141.2	41.3	34.8	43.0	45.6	34.5	42.8	45.5
153	15/1	817643.4	833556.4	5.5	9	B	55	Shek Po Tsuen	96.3	43.4	37.0	45.0	47.7	36.7	44.9	47.6
154	15/1	817671.4	833567.1	5	9	B	55	Shek Po Tsuen	103.0	42.9	36.4	44.4	47.1	36.1	44.2	47.0
153a		817620	833572	5	9	B	55	Shek Po Tsuen	70.2	44.8	38.5	45.8	48.8	38.4	45.7	48.7
154a		817538.6	833575.3	5.4	9	B	55	Premises to the west of Shek Po Tsuen	70.2	44.8	38.5	45.8	48.8	38.4	45.7	48.7
155		817673.8	833609.9	5	9	B	55	Shek Po Tsuen	68.2	44.6	38.2	45.2	48.4	38.0	45.0	48.2
155a		817542.9	833634.2	5	9	B	55	Shek Po Tsuen	18.0	52.2	43.5	43.4	53.2	43.5	43.4	53.2
157	14/12	817629.7	833757.2	4.5	9	C	60	Village house	72.0	45.0	38.7	42.5	47.5	38.7	42.5	47.5
160		817875.3	833888.5	3.2	7	C	60	Premises to the east of Sha Chau Lei Tsuen	78.2	43.1	37.8	41.6	46.1	37.8	41.6	46.1
161		817680.6	833914.5	5.5	9	C	60	Sha Chau Lei Tsuen	185.8	40.1	35.3	39.8	43.6	35.3	39.8	43.6
161a		817940.7	833941.6	4.6	9	C	60	Premises to the east of Sha Chau Lei Tsuen	97.9	42.1	38.4	42.4	46.1	38.4	42.4	46.1
161b		817894.4	833946.7	4.6	9	C	60	Premises to the east of Sha Chau Lei Tsuen	122.5	41.2	36.9	40.8	44.8	36.9	40.8	44.8
162	14/10	817711.4	833972.8	5.8	9	C	60	Home for aged	224.9	39.1	34.7	39.1	42.8	34.7	39.1	42.8
162a		818244.2	834029.9	3.1	9	C	60	Premises to the south-west of Tin Yiu Estate	22.3	49.3	43.3	40.5	50.7	43.3	40.5	50.7
164	14/C2	818330.2	834189.1	11.2	25	C	60	Proposed school	81.3	42.6	47.8	49.0	52.0	47.8	49.0	52.0
165	14/C1	818295.9	834268.9	10.9	110	C	60	HOS development	148.7	38.3	43.9	47.4	49.4	43.9	47.4	49.4
165.1	14/C1	818295.9	834268.9	10.9	110	C	60	HOS development	148.7	38.5	43.4	47.4	49.2	43.4	47.4	49.2
165.2	14/C1	818295.9	834268.9	10.9	110	C	60	HOS development	148.7	38.7	43.2	47.5	49.3	43.2	47.5	49.3
165.3	14/C1	818295.9	834268.9	10.9	110	C	60	HOS development	148.7	38.9	43.0	47.4	49.2	43.0	47.4	49.2
165.4	14/C1	818295.9	834268.9	10.9	110	C	60	HOS development	148.7	39.0	42.8	46.7	48.7	42.8	46.7	48.7
166	14/6	818559.6	834281.5	7.2	25	B	55	School	17.2	45.0	46.3	51.9	53.6	46.3	51.9	53.6
[illegible]	[illegible]	[illegible]	[illegible]	8.8	25	B	55	School	60.9	38.6	41.6	50.4	51.2	41.6	50.4	51.2
168	14/7	[illegible]	[illegible]	8.8	[illegible]	[illegible]	55	Sc[illegible]	55.7	38.5	41.7	50.7	51.4	41.7	50.7	51.4

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
169	14/5	818570.2	834423.2	8.5	110	B	55	Tin Yiu Estate	49.7	37.1	44.4	51.4	52.3	44.4	51.4	52.3
169.1	14/5	818570.2	834423.2	8.5	110	B	55	Tin Yiu Estate	49.7	37.3	44.7	52.0	52.9	44.7	52.0	52.9
169.2	14/5	818570.2	834423.2	8.5	110	B	55	Tin Yiu Estate	49.7	37.6	44.9	52.5	53.3	44.9	52.5	53.3
169.3	14/5	818570.2	834423.2	8.5	110	B	55	Tin Yiu Estate	49.7	37.9	43.7	51.2	52.1	43.7	51.2	52.1
169.4	14/5	818570.2	834423.2	8.5	110	B	55	Tin Yiu Estate	49.7	38.2	42.2	50.5	51.3	42.2	50.5	51.3
170	14/3	818723.3	834425.9	3.1	3	B	55	Village house	40.6	45.1	36.6	35.4	46.1	36.6	35.4	46.1
171	14/5	818572.1	834478.8	8.5	110	B	55	Tin Yiu Estate	85.7	36.7	44.0	51.0	51.9	44.0	51.0	51.9
171.1	14/5	818572.1	834478.8	8.5	110	B	55	Tin Yiu Estate	85.7	36.9	44.1	50.4	51.5	44.1	50.4	51.5
171.2	14/5	818572.1	834478.8	8.5	110	B	55	Tin Yiu Estate	85.7	37.1	42.9	49.6	50.6	42.9	49.6	50.6
171.3	14/5	818572.1	834478.8	8.5	110	B	55	Tin Yiu Estate	85.7	37.3	42.0	48.9	49.9	42.0	48.9	49.9
171.4	14/5	818572.1	834478.8	8.5	110	B	55	Tin Yiu Estate	85.7	37.4	41.1	48.0	49.1	41.1	48.0	49.1
172	14/3	818812.3	834489	4.7	6	B	55	Village house	53.6	45.9	37.7	37.7	47.0	37.7	37.7	47.0
173	14/5	818628.2	834518.3	8.5	110	B	55	Tin Yiu Estate	71.5	37.2	44.6	51.9	52.8	44.6	51.9	52.8
173.1	14/5	818628.2	834518.3	8.5	110	B	55	Tin Yiu Estate	71.5	37.5	44.9	52.4	53.2	44.9	52.4	53.2
173.2	14/5	818628.2	834518.3	8.5	110	B	55	Tin Yiu Estate	71.5	37.9	45.2	50.5	51.8	45.2	50.5	51.8
173.3	14/5	818628.2	834518.3	8.5	110	B	55	Tin Yiu Estate	71.5	38.2	43.1	49.2	50.4	43.1	49.2	50.4
173.4	14/5	818628.2	834518.3	8.5	110	B	55	Tin Yiu Estate	71.5	38.4	41.7	47.8	49.1	41.7	47.8	49.1
174	14/3	818848.8	834536.8	4.7	9	B	55	Village house	34.2	48.2	39.7	39.1	49.2	39.7	39.1	49.2
175	14/2	818692.4	834588.8	8.5	110	B	55	Tin Yiu Court	79.4	37.9	45.5	52.5	53.4	45.5	52.5	53.4
175.1	14/2	818692.4	834588.8	8.5	110	B	55	Tin Yiu Court	79.4	38.3	45.9	53.0	53.9	45.9	53.0	53.9
175.2	14/2	818692.4	834588.8	8.5	110	B	55	Tin Yiu Court	79.4	38.8	45.0	50.0	51.4	45.0	50.0	51.4
175.3	14/2	818692.4	834588.8	8.5	110	B	55	Tin Yiu Court	79.4	39.2	43.1	48.5	50.0	43.1	48.5	50.0
175.4	14/2	818692.4	834588.8	8.5	110	B	55	Tin Yiu Court	79.4	39.5	41.6	46.9	48.6	41.6	46.9	48.6
175a		818711.5	834630.4	4.5	30	B	55	Commercial Complex - Not NSR	100.7	39.0	40.4	45.5	47.4	40.4	45.5	47.4
176a		819150.1	834685.3	9	6	B	55	Premises to the south of Ha Mei San Tsuen	23.6	48.3	39.1	41.3	49.5	39.1	41.3	49.5
176b		819164.5	834565.9	8	6	B	55	Premises to the south of Ha Mei San Tsuen	84.9	44.4	37.3	40.8	46.5	37.3	40.8	46.5
177	13/72	819207.9	834618.5	6.4	6	B	55	Premises to the south of Ha Mei San Tsuen	28.8	49.1	40.1	41.9	50.3	40.1	41.9	50.3
178		819223.5	834663.2	8	6	B	55	Premises to the south of Ha Mei San Tsuen	9.4	52.0	39.4	41.9	52.6	39.4	41.9	52.6
179	13/72	819248.1	834629.1	6.9	6	B	55	Premises to the south of Ha Mei San Tsuen	12.1	52.8	41.7	42.7	53.5	41.7	42.7	53.5
180		819281.6	834674	9	6	B	55	Premises to the south of Ha Mei San Tsuen	32.1	47.7	39.5	42.8	49.4	39.5	42.8	49.4
181	13/72	819284.8	834654.3	8	6	B	55	Premises to the south of Ha Mei San Tsuen	14.0	50.7	39.9	41.9	51.5	39.8	41.9	51.5
183		819316.5	834665	9.5	6	B	55	Premises to the south of Ha Mei San Tsuen	33.3	46.9	39.3	43.0	48.9	39.3	43.0	48.9
184		819328.6	834580.9	7	6	B	55	Premises to the south of Ha Mei San Tsuen	37.7	46.7	38.9	42.1	48.5	38.9	42.1	48.5
184a		819333	834644.5	7	6	B	55	Premises to the south of Ha Mei San Tsuen	19.1	48.9	39.1	41.2	50.0	39.0	41.2	49.9
185		819346.5	834637.9	10.5	6	B	55	Premises to the south of Ha Mei San Tsuen	17.5	49.3	40.3	42.6	50.6	40.3	42.6	50.6
185a		819349.9	834594.9	10.5	6	B	55	Premises to the south of Ha Mei San Tsuen	17.3	49.6	41.0	43.2	51.0	41.0	43.2	51.0
186		819386	834576.9	11.3	6	B	55	Premises to the south of Ha Mei San Tsuen	21.1	48.7	40.8	43.7	50.4	40.8	43.7	50.4
187		819387.6	834632.7	11.4	6	B	55	Premises to the south of Ha Mei San Tsuen	27.3	47.4	40.0	43.5	49.4	40.0	43.5	49.4
187a		819404.7	834570.3	12	6	B	55	Premises to the south of Ha Mei San Tsuen	20.3	48.9	41.0	44.1	50.6	41.0	44.1	50.6
188		819407.8	834614	13	6	B	55	Premises to the south of Ha Mei San Tsuen	17.4	49.3	41.3	44.1	50.9	41.3	44.1	50.9
189		819413	834639.4	14	3	B	55	Premises to the south of Ha Mei San Tsuen	44.8	45.3	38.8	43.2	47.9	38.8	43.2	47.9
189a		819439.5	834537.7	20	6	B	55	Premises to the south of Ha Mei San Tsuen	37.5	46.2	41.8	48.6	51.1	41.8	48.6	51.1
189b		819441.1	834612.4	14	3	B	55	Premises to the south of Ha Mei San Tsuen	28.4	47.2	39.8	43.2	49.2	39.8	43.2	49.2
189c		819477.5	834584	14	6	B	55	Premises to the south of Ha Mei San Tsuen	15.7	49.9	42.2	44.8	51.6	42.2	44.8	51.6

Annex_D

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
189d		819480.8	834529.7	14	3	B	55	Premises to the south of Ha Mei San Tsuen	29.5	47.1	39.8	43.9	49.3	39.8	43.9	49.3
189e		819501.1	834582.1	14	6	B	55	Premises to the south of Ha Mei San Tsuen	22.7	48.4	41.6	45.1	50.6	41.5	45.1	50.6
190	13/71	819508	834482.4	19.7	6	B	55	Shing Tak School	63.2	43.8	39.4	46.8	49.1	39.4	46.8	49.1
191	13/71	819510.9	834479	19.7	6	B	55	Shing Tak School	65.3	43.6	39.2	46.7	48.9	39.2	46.7	48.9
193		819526.5	834524.6	15	3	B	55	Premises to the west of Wing Ning Tsuen	17.2	49.3	41.3	44.5	51.0	41.3	44.5	51.0
193a		819536.2	834575.6	15	6	B	55	Premises to the west of Wing Ning Tsuen	29.8	47.2	41.4	45.9	50.2	41.3	45.9	50.2
194		819590.8	834485.3	12	3	B	55	Wing Ning Tsuen	29.6	46.8	39.4	43.7	49.0	39.4	43.7	49.0
196		819611	834571.4	15.5	3	B	55	Wing Ning Tsuen	53.8	44.6	38.9	43.9	47.9	38.8	43.9	47.9
197		819637.7	834533.9	13	3	B	55	Wing Ning Tsuen	29.1	47.3	40.2	43.6	49.4	40.1	43.6	49.4
198		819653.2	834417.8	8.9	3	B	55	Wing Ning Tsuen	68.8	43.0	36.4	42.3	46.2	36.4	42.3	46.2
199		819676.7	834529.7	15.5	3	B	55	Wing Ning Tsuen	39.7	46.0	40.1	44.9	49.1	40.1	44.9	49.1
200		819689	834433.8	8	6	B	55	Wing Ning Tsuen	40.7	45.3	38.5	43.8	48.1	38.5	43.8	48.1
201		819692.4	834457.3	10	3	B	55	Wing Ning Tsuen	17.6	48.7	39.9	43.1	50.2	39.9	43.1	50.2
202	13/70	819693.1	834510	15	3	B	55	Wing Ning Tsuen	27.6	47.6	41.3	45.2	50.2	41.3	45.2	50.2
203		819713	834449.8	10	3	B	55	Wing Ning Tsuen	16.8	48.9	40.0	43.2	50.4	40.0	43.2	50.4
204		819715.5	834509.8	15	3	B	55	Wing Ning Tsuen	35.7	46.4	40.6	45.1	49.4	40.5	45.1	49.4
205		819731.9	834499.9	14.5	3	B	55	Wing Ning Tsuen	32.7	46.8	40.8	45.0	49.6	40.7	45.0	49.6
206		819751.3	834487.2	14	3	B	55	Wing Ning Tsuen	28.2	47.5	41.2	45.0	50.0	41.2	45.0	50.0
209		819776.7	834422.4	9	3	B	55	Wing Ning Tsuen	18.4	48.4	39.7	43.2	50.0	39.7	43.2	50.0
210		819796.7	834421.7	9	3	B	55	Wing Ning Tsuen	11.7	50.1	40.1	42.9	51.2	40.1	42.9	51.2
212		819818.8	834469.7	10.6	9	B	55	Wing Ning Tsuen	37.1	46.3	41.3	46.6	50.1	41.2	46.6	50.1
213		819819.1	834416.1	9	3	B	55	Wing Ning Tsuen	8.5	51.1	40.1	42.7	52.0	40.1	42.7	52.0
213a		819836.6	834388.6	8	3	B	55	Wing Ning Tsuen	27.4	46.5	38.7	43.3	48.7	38.7	43.3	48.7
216		819866	834387.5	8.2	3	B	55	Wing Ning Tsuen	17.5	48.2	39.5	43.2	49.8	39.5	43.2	49.8
216a		819885.3	834439.4	8.2	3	B	55	Wing Ning Tsuen	33.9	46.6	39.4	42.3	48.5	39.2	42.3	48.5
217		819916.9	834424.1	10	3	B	55	Wing Ning Tsuen	31.6	47.0	40.2	43.2	49.1	40.0	43.2	49.1
218		819926.5	834413.1	11	3	B	55	Wing Ning Tsuen	24.9	48.0	41.2	43.9	50.0	41.1	43.9	50.0
219		819951.3	834403.6	15	3	B	55	Wing Ning Tsuen	25.4	48.0	42.7	46.6	51.1	42.5	46.6	51.0
220		820005.1	834324.9	9.1	9	B	55	Premises to the west of Shui Tin Tsuen	23.6	46.1	41.1	48.3	50.8	41.1	48.3	50.8
221	13/68	820035.4	834304.2	9.1	9	B	55	Premises to the west of Shui Tin Tsuen	31.5	44.7	39.8	47.7	49.9	39.8	47.7	49.9
223		820080.9	834274.7	6.6	9	B	55	Premises to the south of Fung Chi Tsuen	42.9	43.5	37.8	45.5	48.1	37.8	45.5	48.1
223a		820091.9	834355.2	8	9	B	55	Premises to the west of Shui Tin Tsuen	32.1	47.7	41.7	44.5	50.1	41.3	44.4	50.0
225	13/68	820113.3	834288.7	8	9	B	55	Fung Chi Tsuen	19.0	47.5	40.8	47.0	50.7	40.8	47.0	50.7
225e		820126.5	834368.3	8	9	B	55	Fung Chi Tsuen	55.7	45.4	39.5	43.1	48.1	38.8	42.9	47.9
227		820144.4	834335.9	8	9	B	55	Fung Chi Tsuen	37.3	48.3	42.0	44.2	50.4	41.2	43.9	50.2
229		820162.7	834265	8	9	B	55	Premises to the south of Shui Tin Tsuen	27.1	45.1	39.3	46.5	49.3	39.3	46.5	49.3
229a		820171	834280	8	9	B	55	Shui Tin Tsuen	10.3	49.1	40.5	45.1	51.0	40.5	45.1	51.0
229b		820175	834308	8	9	B	55	Shui Tin Tsuen	11.3	52.6	44.6	43.5	53.7	43.4	43.1	53.5
229c		820176.1	834319.7	8	9	B	55	Premises to the west of Shui Tin Tsuen	22.9	49.6	42.8	43.8	51.3	41.6	43.3	51.0
230		820221.5	834251.1	5.4	3	B	55	Monastery	25.7	44.5	36.0	41.0	46.5	36.0	41.0	46.5
231		820241.7	834307.2	7	6	B	55	Shui Tin Tsuen	25.0	49.7	41.2	40.5	50.7	39.4	39.9	50.5
232	13/63	820298.9	834359.1	5	25	B	55	Pok Oi Hospital Tang Pui King Memorial College	85.2	43.3	39.5	44.2	47.5	37.7	43.5	47.0
[illegible]	13/65	820300.6	834205.8	8.3	25	B	55	Fook Shun Building	54.9	40.2	40.1	50.6	51.3	40.1	50.6	51.3
[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	[illegible]	55	Ne[illegible]et Pin[illegible]	31.1	47.6	45.7	47.5	51.8	41.2	46.1	50.5

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Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
234	13/63	820315	834353.6	5	25	B	55	Pok Oi Hospital Tang Pui King Memorial College	81.7	43.3	39.6	44.1	47.5	37.8	43.4	46.9
235		820346.5	834307.1	5	60	B	55	Yuet Ping House	38.4	44.3	52.2	50.9	55.0	47.2	50.9	53.1
235.1		820346.5	834307.1	5	60	B	55	Yuet Ping House	38.4	45.5	48.0	48.2	52.2	42.8	48.2	50.8
235.2		820346.5	834307.1	5	60	B	55	Yuet Ping House	38.4	46.3	42.2	43.3	49.1	39.3	42.9	48.5
236		820378.4	834386.4	5.1	88	B	55	Hay Ping House	119.6	40.0	42.6	46.6	48.7	40.2	46.6	48.2
236.1		820378.4	834386.4	5.1	88	B	55	Hay Ping House	119.6	40.4	41.0	46.5	48.3	39.1	46.5	48.0
236.2		820378.4	834386.4	5.1	88	B	55	Hay Ping House	119.6	40.6	39.3	46.1	47.8	37.8	45.5	47.2
236.3		820378.4	834386.4	5.1	88	B	55	Hay Ping House	119.6	40.8	37.7	43.2	45.9	36.6	42.9	45.6
237		820400.7	834228.3	4.3	23	C	60	Fook Cheong House	20.6	41.9	42.8	49.3	50.8	42.8	49.3	50.8
238	13/60	820426.8	834227.9	8.3	25	C	60	Lung Fat House	19.1	40.9	45.4	50.1	51.7	45.4	50.1	51.7
239		820444.5	834228.1	4.6	68	C	60	Hong Wah House	18.0	38.1	45.6	54.3	54.9	45.6	54.3	54.9
239.1		820444.5	834228.1	4.6	68	C	60	Hong Wah House	18.0	39.1	46.7	55.4	56.0	46.7	55.4	56.0
239.2		820444.5	834228.1	4.6	68	C	60	Hong Wah House	18.0	40.5	45.2	50.0	51.6	45.2	50.0	51.6
240	13/58	820492.5	834223.6	8.7	55	C	60	Fu Loy Garden	21.2	38.1	45.6	54.1	54.8	45.6	54.1	54.8
240.1	13/58	820492.5	834223.6	8.7	55	C	60	Fu Loy Garden	21.2	39.0	46.6	51.9	53.2	46.6	51.9	53.2
241		820505	834312.3	4.7	60	C	60	Hor Ping House	47.0	41.8	49.0	47.6	51.8	48.4	47.6	51.5
241.1		820505	834312.3	4.7	60	C	60	Hor Ping House	47.0	42.7	43.9	47.1	49.8	43.3	46.9	49.5
241.2		820505	834312.3	4.7	60	C	60	Hor Ping House	47.0	43.2	39.2	42.6	46.8	38.4	42.5	46.6
242		820532.2	834221.9	4.7	54.6	C	60	Fu Loy Garden	22.7	38.6	46.2	53.6	54.4	46.2	53.6	54.4
242.1		820532.2	834221.9	4.7	54.6	C	60	Fu Loy Garden	22.7	39.7	47.4	52.2	53.6	47.4	52.2	53.6
243	13/50	820581.6	834191.7	8.6	12	C	60	Chun Kwong Primary School	52.7	39.2	35.4	41.6	44.2	35.4	41.6	44.2
244		820589.1	834339.2	4.7	60	C	60	Hor Ping House	74.1	39.2	41.8	47.9	49.3	41.3	47.8	49.1
244.1		820589.1	834339.2	4.7	60	C	60	Hor Ping House	74.1	39.6	39.6	47.4	48.6	39.2	47.3	48.5
244.2		820589.1	834339.2	4.7	60	C	60	Hor Ping House	74.1	39.8	36.2	42.7	45.1	35.6	42.6	45.0
245		820616.5	834381.5	4.5	25	C	60	Leung Sing Tak School	116.5	37.8	36.2	45.6	46.7	35.8	45.6	46.6
248a	12/48	820786.1	834221	4.3	3	C	60	Tai Kiu	22.7	45.9	35.9	34.0	46.6	35.9	34.0	46.6
250		820818.2	834177.7	4.3	3	C	60	Tai Kiu	65.9	41.7	33.7	35.4	43.1	33.7	35.4	43.1
251		820867.7	834150.5	4	6	C	60	Tai Kiu	92.9	40.4	33.2	36.3	42.4	33.2	36.3	42.4
251a		820895.8	834182.9	4	45	C	60	Yuen Long Estate	60.5	41.9	42.9	45.8	48.6	42.9	45.8	48.6
253	12/40	820965.9	834215	4.3	45	C	60	Yuen Long Estate	28.0	44.5	52.3	49.3	54.5	52.3	49.3	54.5
253.1	12/40	820965.9	834215	4.3	45	C	60	Yuen Long Estate	28.0	45.9	44.5	45.9	50.3	44.5	45.9	50.3
255		821027.2	834215	4.3	45	C	60	Yuen Long Estate Block 5	24.2	45.8	53.8	53.7	57.1	53.8	53.7	57.1
255.1		821027.2	834215	4.3	45	C	60	Yuen Long Estate Block 5	24.2	47.7	46.7	47.8	52.2	46.7	47.8	52.2
258		821140.9	834189.5	4.3	60	C	60	Wing Wai Centre	19.1	44.0	52.0	55.4	57.2	52.0	55.4	57.2
258.1		821140.9	834189.5	4.3	60	C	60	Wing Wai Centre	19.1	46.1	54.1	57.0	59.0	54.1	57.0	59.0
258.2		821140.9	834189.5	4.3	60	C	60	Wing Wai Centre	19.1	48.4	45.6	49.8	53.0	45.6	49.8	53.0
259	12/31	821161	834132.8	8	60	C	60	Tai Hing Building	61.7	41.3	48.0	51.6	53.4	48.0	51.6	53.4
259.1	12/31	821161	834132.8	8	60	C	60	Tai Hing Building	61.7	42.0	43.3	51.4	52.4	43.3	51.4	52.4
259.2	12/31	821161	834132.8	8	60	C	60	Tai Hing Building	61.7	42.4	40.2	47.2	49.0	40.2	47.2	49.0
259a		821167.8	834245.3	4	3	C	60	Village House	35.0	45.0	36.3	38.9	46.4	36.3	38.9	46.4
260		821200.8	834216	4	12	C	60	Kwan Lok San Tsuen	23.7	46.7	39.8	42.8	48.8	39.8	42.8	48.8
261	12/29	821223.3	834118.5	4.2	12	C	60	Rainbow Mansion	45.1	42.8	36.6	43.2	46.5	36.6	43.2	46.5
262		821236.6	834107.7	4	17	C	60	Victory Building	48.4	42.3	37.9	45.9	47.9	37.9	45.9	47.9
263	12/18	821236.8	834190.1	4	12	C	60	Low rise houses	19.2	47.4	40.5	42.9	49.3	40.5	42.9	49.3

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	Multi-Plenum System (MPS) Inboard Plenum Gap, Leq	Multi-Plenum System (MPS) Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
264		821258.4	834089.5	4	18	C	60	Kin On Building	54.1	41.5	38.5	46.0	47.9	38.5	46.0	47.9
265		821320.5	834039.1	4	11.2	C	60	Wing Fat Building	70.9	39.7	34.6	40.9	43.9	34.6	40.9	43.9
266		821332.5	834162.6	3	3	C	60	Sai Pin Wai	37.1	46.1	37.0	37.6	47.1	37.0	37.6	47.1
266a		821333.8	834221.2	3	3	C	60	Sai Pin Wai	91.8	41.7	34.2	37.7	43.7	34.2	37.7	43.7
267		821357.1	834008.4	4	11.2	C	60	Lee Kwan Building	86.2	38.4	34.0	40.0	42.9	34.0	40.0	42.9
268	12/16	821357.4	834132.7	4.1	3	C	60	Nam Pin Wai	17.1	49.0	38.6	37.8	49.7	38.6	37.8	49.7
269		821367	833983.6	4	69	C	60	Wai Fai Building	107.0	37.0	39.4	47.0	48.1	39.4	47.0	48.1
269.1		821367	833983.6	4	69	C	60	Wai Fai Building	107.0	37.2	37.8	46.6	47.6	37.8	46.6	47.6
269.2		821367	833983.6	4	69	C	60	Wai Fai Building	107.0	37.4	35.7	43.9	45.3	35.7	43.9	45.3
271		821451.6	833860.7	4	63.2	C	60	Far East Consortium Yuen Long Building	211.8	34.7	33.7	43.5	44.4	33.6	43.5	44.4
271.1		821451.6	833860.7	4	63.2	C	60	Far East Consortium Yuen Long Building	211.8	34.7	32.7	42.6	43.6	32.6	42.6	43.6
271.2		821451.6	833860.7	4	63.2	C	60	Far East Consortium Yuen Long Building	211.8	34.7	31.3	38.6	40.6	31.3	38.5	40.6
272	12/16	821464.1	834128.4	4.1	12	C	60	Nam Pin Wai	34.6	46.0	39.3	40.3	47.7	39.3	40.3	47.7
272a	12/15	821484	834109	4.1	12	C	60	Nam Pin Wai	16.9	48.7	41.2	40.2	49.9	41.2	40.2	49.9
274		821519.1	834156	3	3	C	60	Nam Pin Wai	65.0	42.0	34.5	36.9	43.7	34.5	36.9	43.7
275		821522.2	833877.7	4	63.2	C	60	Premises next to Wai Fai Building	191.4	35.0	34.5	43.9	44.8	34.5	43.9	44.8
275.1		821522.2	833877.7	4	63.2	C	60	Premises next to Wai Fai Building	191.4	35.1	33.2	43.6	44.5	33.2	43.6	44.5
275.2		821522.2	833877.7	4	63.2	C	60	Premises next to Wai Fai Building	191.4	35.1	31.7	39.2	41.2	31.6	39.2	41.1
276		821543.2	834202.6	3	3	C	60	Premises to the south of Yuen Long Kau Hui	111.7	39.3	32.7	36.7	41.8	32.7	36.7	41.8
277		821620	834213	3	9	C	60	Premises to the west of Tung Tau Tsuen	122.2	37.8	33.0	38.1	41.6	32.9	38.1	41.6
278	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	37.0	44.1	49.0	50.4	44.1	49.0	50.4
278.1	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	37.4	44.6	49.6	51.0	44.6	49.6	51.0
278.2	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	38.0	45.2	50.2	51.6	45.2	50.2	51.6
278.3	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	38.7	46.1	51.0	52.4	46.1	51.0	52.4
278.4	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	39.7	47.2	52.0	53.4	47.2	52.0	53.4
278.5	12/13	821640.4	834049.8	19	120	C	60	Sun Yuen Long Centre	19.1	41.2	49.0	52.6	54.4	49.0	52.6	54.4
279		821679.6	834221.6	3	9	C	60	Tung Tau Tsuen	130.9	36.8	32.5	38.2	41.2	32.4	38.2	41.2
280		821775.4	834213	3.1	9	C	60	Tsoi Uk Tsuen	122.5	36.0	32.2	38.6	41.1	32.2	38.6	41.1
281	12/9	821854.7	834171.8	3.2	9	C	60	Ying Lung Wai	81.4	36.5	32.9	39.3	41.7	32.8	39.3	41.7
282	12/8	821933.3	834155.8	3	9	C	60	Tai Wai Tsuen	65.5	37.9	33.9	40.3	42.9	33.9	40.3	42.9
283		821973.4	834029.2	4	3	C	60	Premises to the south of Tai Wai Tsuen	39.4	44.3	36.1	36.0	45.4	36.0	36.0	45.4
284	12/8	821973.7	834131.9	3	9	C	60	Premises to the south of Tai Wai Tsuen	41.6	40.1	35.3	40.9	44.1	35.3	40.9	44.1
287a		822088	834155.8	2.2	9	C	60	Tai Wai Tsuen	65.7	40.0	34.6	40.6	43.9	34.6	40.6	43.9
289		822116	834176.6	2.2	9	C	60	Tai Wai Tsuen	86.5	39.2	33.6	40.2	43.2	33.5	40.2	43.2
290		822148.2	834180.7	3.9	9	C	60	Tai Wai Tsuen	90.5	39.2	33.6	40.5	43.4	33.6	40.5	43.4
291	12/5	822206	834038.6	4	3	C	60	Sz Tsz Uk	44.2	45.9	35.8	36.5	46.7	35.7	36.5	46.7
292		822212.1	834171.4	4	9	C	60	West of Small Traders New Village	79.2	40.1	33.9	40.0	43.6	33.9	40.0	43.6
293	12/6	822252.2	834129.3	4.7	6	C	60	Small Traders New Village	35.1	43.4	35.6	41.7	46.1	35.6	41.7	46.1
293a		822280.9	834131.2	4.7	6	C	60	Small Traders New Village	35.3	43.9	35.2	42.8	46.7	35.2	42.8	46.7
296	12/6	822303.9	834144.1	4.7	6	C	60	Small Traders New Village Public School	46.8	42.9	34.3	42.9	46.2	34.3	42.9	46.2
298		822330.5	834061.8	5	6	C	60	Premises next to the Public School of Smalle Traders New Village	32.4	50.0	36.4	37.2	50.4	36.4	37.1	50.4
298a		822347.5	834130.2	5	6	C	60	Small Traders New Village Public School	30.3	45.0	34.9	44.3	47.9	34.9	44.3	47.9
299	12/3	822351.7	834083.2	5	24	C	60	Pok Oi Hospital	12.3	53.9	44.1	48.3	55.3	44.1	48.3	55.3
[illegible]	12/[illegible]	822[illegible]	8341[illegible]	[illegible]	8	[illegible]	55	Small Traders New Village Public School	56.4	42.4	33.3	40.0	44.7	33.3	40.0	44.7

Annex D

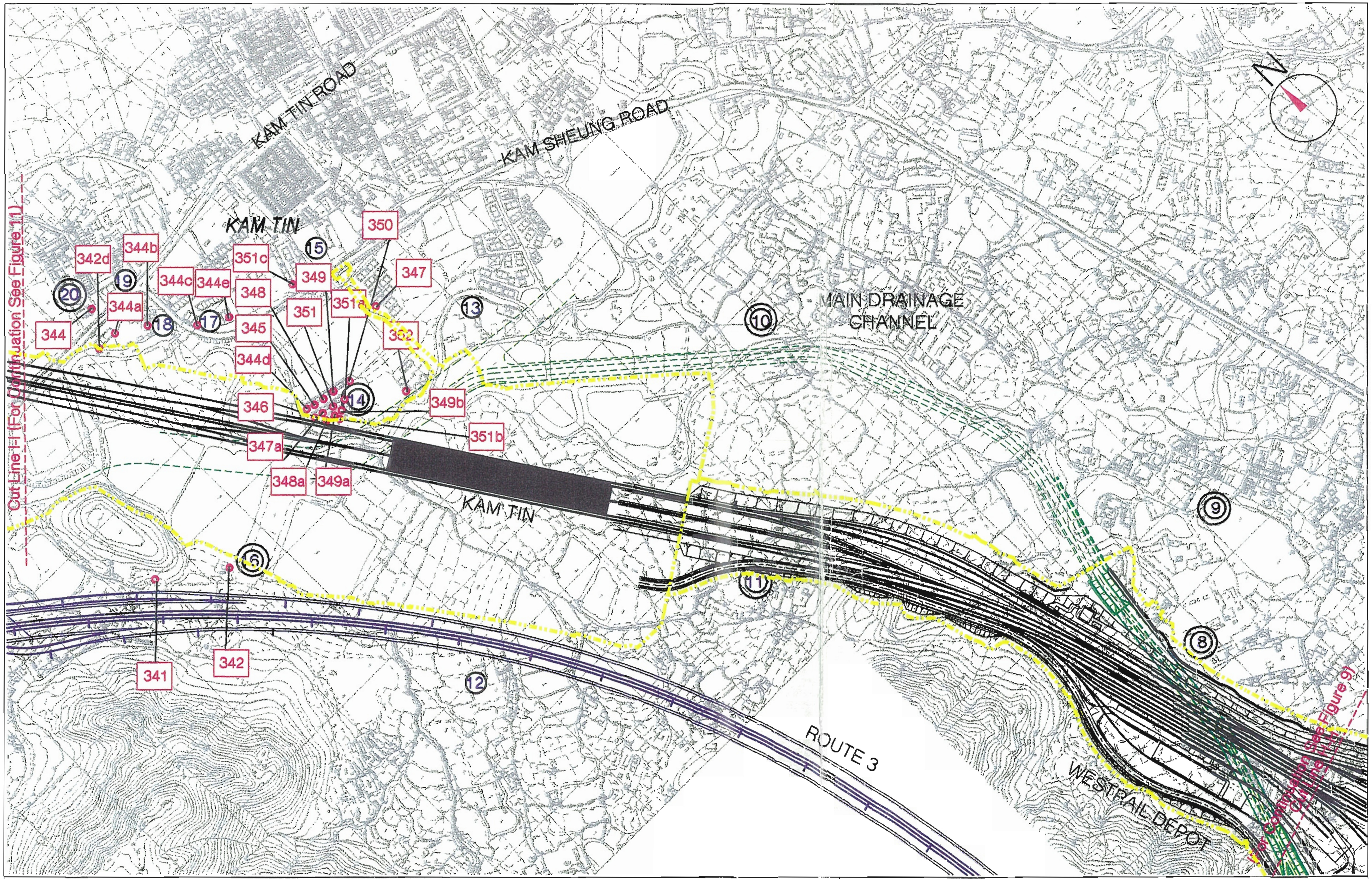
West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	MPS Inboard Plenum Gap, Leq	MPS Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
301		822358.8	834157.5	4.8	4	B	55	Premises to the east of Pok Oi Hospital	56.9	42.4	33.3	40.0	44.7	33.3	40.0	44.7
302		822367.4	834113.9	5.7	6	B	55	Premises to the east of Pok Oi Hospital	12.9	48.3	37.5	47.5	51.1	37.5	47.5	51.1
303		822424.9	834085.8	5	6	B	55	Premises to the east of Pok Oi Hospital	14.1	56.2	38.2	39.3	56.4	38.2	39.3	56.4
304		822471.2	834091.1	4	6	B	55	Premises to the east of Pok Oi Hospital	11.6	55.8	40.4	42.0	56.1	40.4	42.0	56.1
305		822472.3	834119.2	3	6	B	55	Premises to the east of Pok Oi Hospital	11.9	54.6	36.9	43.0	55.0	36.9	43.0	55.0
305a		816181	831085	6.7	5	C	60	Site/Premises to the west of Lam Tei	27.4	45.9	39.1	46.4	49.6	38.9	46.4	49.6
306		822490.5	834091.1	4	6	B	55	Premises to the east of Pok Oi Hospital	12.8	55.7	40.4	42.1	56.0	40.4	42.1	56.0
307		822543.6	834071.4	5	6	B	55	Premises to the east of Pok Oi Hospital	35.6	48.1	39.8	41.2	49.4	39.8	41.2	49.4
308		822574.9	834073.3	6.3	9	B	55	Premises to the east of Pok Oi Hospital	35.5	48.2	41.0	43.1	50.0	40.9	43.0	49.9
309a		822590.5	834081.8	3.5	5	B	55	Premises to the east of Pok Oi Hospital	28.0	48.9	39.8	40.9	50.0	39.7	40.8	50.0
309b		822601.7	834135.5	3.5	9	B	55	Premises to the east of Pok Oi Hospital	20.4	47.9	38.9	44.0	49.8	38.9	44.0	49.8
311a		822602.8	834095.7	4	9	B	55	Premises to the east of Pok Oi Hospital	14.9	51.5	41.7	42.7	52.4	41.7	42.7	52.4
311b		822626.1	834096.5	4	9	B	55	Premises to the west of Tung Shing Lei	15.5	51.4	41.8	42.8	52.4	41.7	42.8	52.4
312a		822681.8	834070.5	5	9	B	55	Tung Shing Lei	44.9	47.4	40.2	43.0	49.3	40.1	42.8	49.3
313	11/27	822726.7	834139.9	4.6	9	B	55	Tung Shing Lei	16.2	49.7	40.2	44.6	51.2	40.2	44.6	51.2
314	11/27	822736.7	834136.8	4.6	9	B	55	Tung Shing Lei	12.2	50.7	40.3	44.1	51.9	40.3	44.1	51.9
314a		822749.2	834143.9	4.6	9	B	55	Tung Shing Lei	18.0	49.2	40.0	44.5	50.8	40.0	44.5	50.8
314b		822776.3	834160	4.6	9	B	55	Tung Shing Lei	31.0	46.9	39.0	44.6	49.3	39.0	44.6	49.3
314c		822762	834152	4.6	9	B	55	Tung Shing Lei	24.7	47.9	39.5	44.6	50.0	39.5	44.6	50.0
315		822744.4	834108.5	6	9	B	55	Tung Shing Lei	12.2	52.9	43.2	43.2	53.7	43.1	43.1	53.7
316		822780.4	834101.1	7	9	B	55	Tung Shing Lei	23.5	50.0	42.5	44.4	51.6	42.2	44.3	51.6.
317		822784.5	834144.1	4.6	9	B	55	Tung Shing Lei	14.3	49.8	40.0	44.2	51.2	40.0	44.2	51.2
317a		822802.8	834146.3	4.6	9	B	55	Tung Shing Lei	14.2	49.8	39.9	44.1	51.2	39.9	44.1	51.2
317b		822819.4	834146.1	6.5	9	B	55	Tung Shing Lei	11.9	50.7	40.8	44.6	52.0	40.8	44.6	52.0
318		822822	834076.3	12	9	B	55	Tung Shing Lei	53.1	46.5	40.9	45.7	49.7	40.5	45.3	49.5
319		822832.8	834153.9	7	9	B	55	Tung Shing Lei	17.8	49.2	40.7	45.4	51.1	40.7	45.4	51.1
319a		822850	834146.1	7.5	9	B	55	Tung Shing Lei	7.9	52.3	41.2	44.7	53.3	41.2	44.7	53.3
320a		822863	834150.3	7.5	9	B	55	Tung Shing Lei	10.4	51.3	41.1	44.8	52.5	41.1	44.8	52.5
321a		822876.2	834125.5	10	9	B	55	Tung Shing Lei	11.3	53.2	44.8	45.2	54.3	44.0	44.8	54.2
324a		822899.2	834122.8	14	9	B	55	Tung Shing Lei	16.9	51.6	46.2	49.2	54.3	44.9	47.5	53.6
324b		822900.9	834161.3	8.9	6	B	55	Tung Shing Lei	16.6	49.5	40.0	44.3	51.0	40.0	44.3	51.0
325a		822910.7	834168.5	8.9	6	B	55	Tung Shing Lei	22.7	48.4	39.8	44.5	50.3	39.8	44.5	50.3
325b		822915.7	834122.2	16	9	B	55	Tung Shing Lei	19.4	51.1	46.8	51.4	55.0	44.9	48.9	53.8
326a		822928.6	834165	13.5	9	B	55	Tung Shing Lei	17.3	49.9	44.1	50.0	53.5	44.1	50.0	53.5
328		822941.1	834066.9	23	9	C	60	Tung Shing Lei	77.0	45.3	41.1	48.4	50.6	40.3	47.1	49.8
329		823040.1	834229.9	10	9	C	60	Premises to the east of Tung Shing Lei	77.5	43.8	37.7	44.7	47.7	37.7	44.7	47.7
330	11/26	823122.9	834050.3	7.1	9	C	60	Premises to the east of Au Tau	91.5	44.1	37.4	42.1	46.8	37.1	42.0	46.7
332	11/26	823186.5	834068.4	7.1	9	C	60	Premises to the east of Au Tau	64.0	45.2	38.2	42.5	47.6	38.1	42.4	47.6
334	11/26	823246.7	834106.3	4.2	9	C	60	Premises to the east of Au Tau	16.2	49.8	39.6	41.8	50.8	39.5	41.8	50.8
335		823257	834077	4.2	9	C	60	Premises to the east of Au Tau	43.2	46.5	38.5	41.7	48.2	38.3	41.6	48.2
336	11/24	823599.1	834204.3	4	6	B	55	Premises to the south of Cheung Chun San Tsuen	143.0	42.0	34.9	38.7	44.2	34.9	38.7	44.2
337a		823892.6	833630	5	9	B	55	Premises to the north of Ko Po Tsuen	137.7	40.0	35.3	40.0	43.7	35.3	40.0	43.7
337b		823950.1	833593.7	5	9	B	55	Premises to the north of Ko Po Tsuen	109.4	40.4	35.9	40.6	44.2	35.8	40.6	44.2
337c		823957	833574	5	9	B	55	Premises to the north of Ko Po Tsuen	114.4	40.1	35.8	40.5	44.0	35.8	40.5	44.0

Annex D

West Rail - Modelling Locations, Representative NSRs and Results (LAeq, 30min - Night-time) for Design Year (12 car Train)

Modelling Location No.	Reference No. in Annex A (Fig. no./NSR)	Easting (m)	Northing (m)	Datum Level (m)	Max. Building Height (m)	ASR	Criterion (Leq,30min dB(A))	Description	Horizontal Distance to Nearest Track (m)	Structure-Borne, Leq	Multi-Plenum System (MPS) Outboard Plenum Gap, Leq	MPS Inboard Plenum Gap, Leq	MPS Total, Leq	MPS + Additional Barriers Outboard Plenum Gap, Leq	MPS + Additional Barriers Inboard Plenum Gap, Leq	MPS + Additional Barriers Total, Leq
338	11/24	823636.2	834264.9	4	3	B	55	Premises to the south of Cheung Chun San Tsuen	211.6	40.0	33.4	37.7	42.6	33.4	37.7	42.6
339	11/24	823647	834237.1	4.2	6	B	55	Premises to the south of Cheung Chun San Tsuen	188.3	40.7	34.0	38.4	43.3	34.0	38.4	43.3
340a		823999.6	833877.9	5.5	4	B	55	Village House	77.6	45.3	37.6	39.7	46.9	37.6	39.7	46.9
340b		824001.5	833900.8	5.5	4	B	55	Village House	94.4	44.4	37.0	39.2	46.1	37.0	39.2	46.1
340c		824085.3	833510	4.1	3	B	55	Premises to the north of Ko Po Tsuen	42.0	43.5	37.4	42.4	46.6	37.4	42.4	46.6
341	10/16	824140.9	833131.4	12	3	C	60	Premises to the south-east of Ko Po Tsuen	See No. 342							
342	10/16	824230	833046.2	5	12	C	60	Premises to the south-east of Ko Po Tsuen	170.8	35.1	38.0	40.6	43.2	38.0	40.6	43 2
342a		824271.6	833614.9	5.8	4	B	55	Village House	149.8	41.2	35.3	38.1	43.6	35.3	38.1	43.6
342b		824297.7	833594.1	5.8	4	B	55	Village House	160.0	40.8	35.1	38.3	43.4	35.1	38.3	43.4
342c		824314	833568.5	4.9	4	B	55	Village House	159.5	40.7	35.1	38.4	43.4	35.1	38.4	43.4
342d		824321.5	833369.4	5.7	4	B	55	Village House	55.6	44.8	38.4	40.2	46.8	38.4	40.2	46.8
343a		824333	833576	5	4	B	55	Village House	179.4	40.1	34.8	38.7	43.2	34.8	38.7	43.2
344	10/20	824338.5	833423.5	5	4	B	55	Kam Tin Mung Yeung Public School	99.6	42.3	36.2	38.0	44.4	36.2	38.0	44.4
344a		824343.8	833369.6	5.7	4	B	55	Village House	74.2	43.4	37.1	38.6	45.3	37.1	38.6	45.3
344b		824382.4	833347.8	5.4	4	B	55	Village House	93.9	41.9	36.1	38.6	44.3	36.1	38.6	44.3
344c		824430.9	833297.7	6.3	4	B	55	Village House	104.1	40.8	35.8	39.8	44.0	35.8	39.8	44.0
344d		824458	833117	3.8	9	B	55	Low rise development to the north of Kam Tin Station	20.5	47.3	39.2	41.7	48.9	39.2	41.7	48.9
344e		824464.4	833275.4	6.3	4	B	55	Village House	118.0	40.0	35.8	40.6	44.0	35.8	40.6	44.0
345	10/14	824469	833114	3.8	9	B	55	Low rise development to the north of Kam Tin Station	27.9	45.9	38.6	40.5	47.6	38.6	40.5	47.6
346	10/14	824456	833102	3.8	9	B	55	Low rise development to the north of Kam Tin Station	10.5	51.5	42.3	44.5	52.7	42.3	44.5	52.7
347	10/14	824616.5	833151.5	4	9	B	55	Low rise development to the north of Kam Tin Station	171.6	45.8	36.7	43.0	47.9	36.7	43.0	47.9
347a		824468	833099	3.8	9	B	55	Low rise development to the north of Kam Tin Station	18.7	49.6	40.8	41.6	50.7	40.8	41.6	50.7
348	10/14	824485.1	833109.1	3.8	9	B	55	Low rise development to the north of Kam Tin Station	38.6	49.3	37.6	40.0	50.0	37.6	40.0	50.0
348a		824465	833088	3.8	9	B	55	Low rise development to the north of Kam Tin Station	10.2	52.3	41.7	44.3	53.3	41.7	44.3	53.3
349	10/14	824496	833106.7	3.8	9	B	55	Low rise development to the north of Kam Tin Station	46.3	49.0	37.5	39.6	49.7	37.5	39.6	49.7
349a	10/14	824477	833085	3.8	9	B	55	Low rise development to the north of Kam Tin Station	18.5	50.7	40.4	41.4	51.5	40.4	41.4	51.5
349b	10/14	824488	833083	3.8	9	B	55	Low rise development to the north of Kam Tin Station	26.6	45.9	38.7	40.8	47.7	45.9	38.7	40.8
350	10/14	824519.4	833101.1	3.8	9	B	55	Low rise development to the north of Kam Tin Station	62.8	51.6	37.5	41.7	52.2	37.5	41.7	52.2
351	10/14	824483.8	833094.6	3.8	9	B	55	Low rise development to the north of Kam Tin Station	29.5	52.2	38.6	40.5	52.6	38.6	40.5	52 6
351a		824495.9	833091.7	3.8	9	B	55	Low rise development to the north of Kam Tin Station	38.0	51.9	38.4	39.9	52.4	38.4	39.9	52 4
351b		824479	833076	3.8	9	B	55	Low rise development to the north of Kam Tin Station	15.2	54.6	40.5	41.8	55.0	40.5	41 8	55 0
351c		824557.5	833245.3	7.4	4	B	55	Village House	175.6	37.8	36.0	41.9	44.1	36.0	41 9	44 1
352	10/14	824565.6	833042	4	9	B	55	Low rise development to the north of Kam Tin Station	68.9	40.5	38.3	43.3	46.0	38.3	43.3	46 0



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Operational Noise Modelling Locations

Boundary of the Scheme

NOISE RECEIVER LOCATIONS
- KAM TIN (KAT) (2 OF 3)

SCALE: 1/5,000

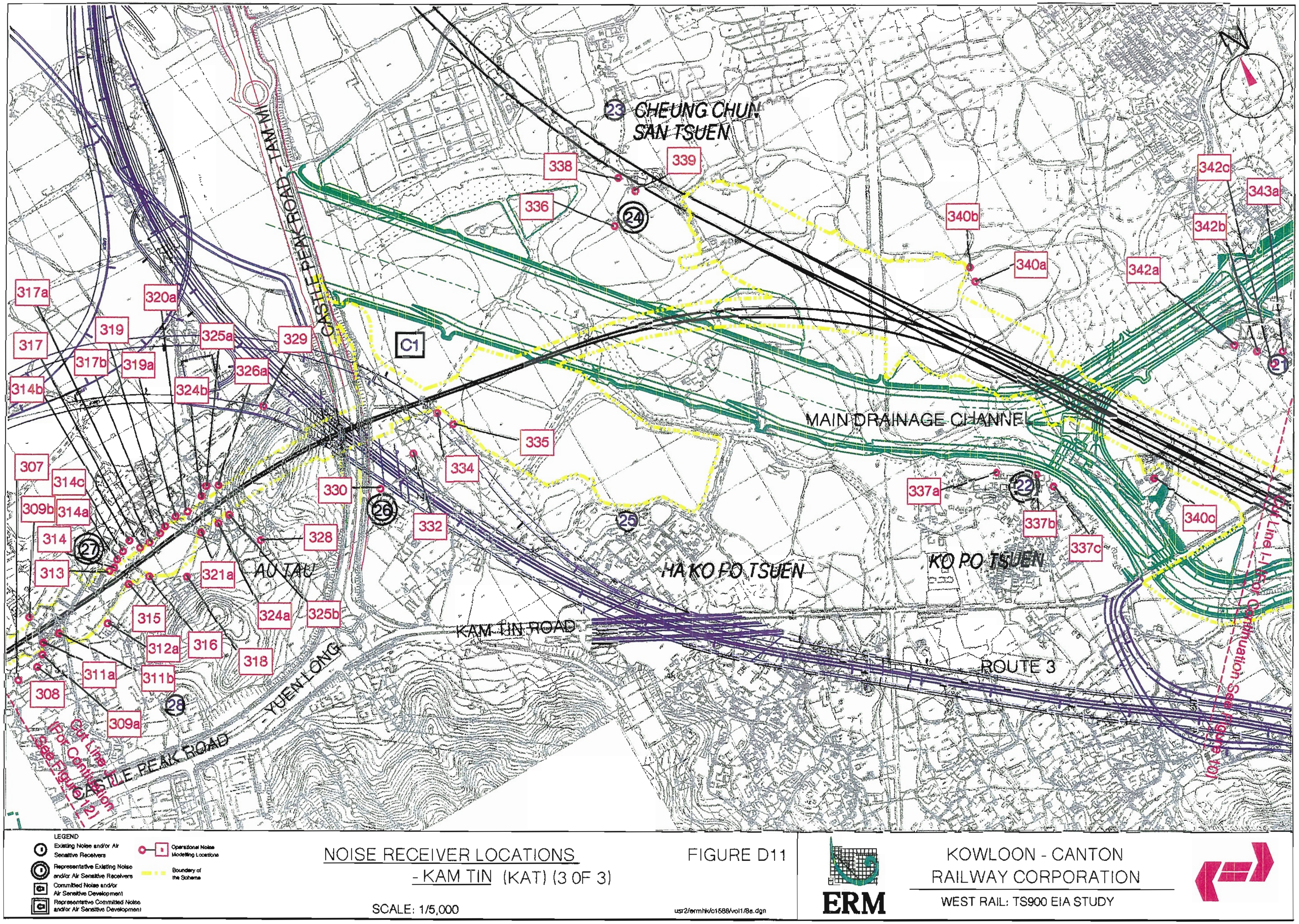
FIGURE D10

usr2/ermhk/c1588 rol/9a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOISE RECEIVER LOCATIONS - KAM TIN (KAT) (3 OF 3)

FIGURE D11

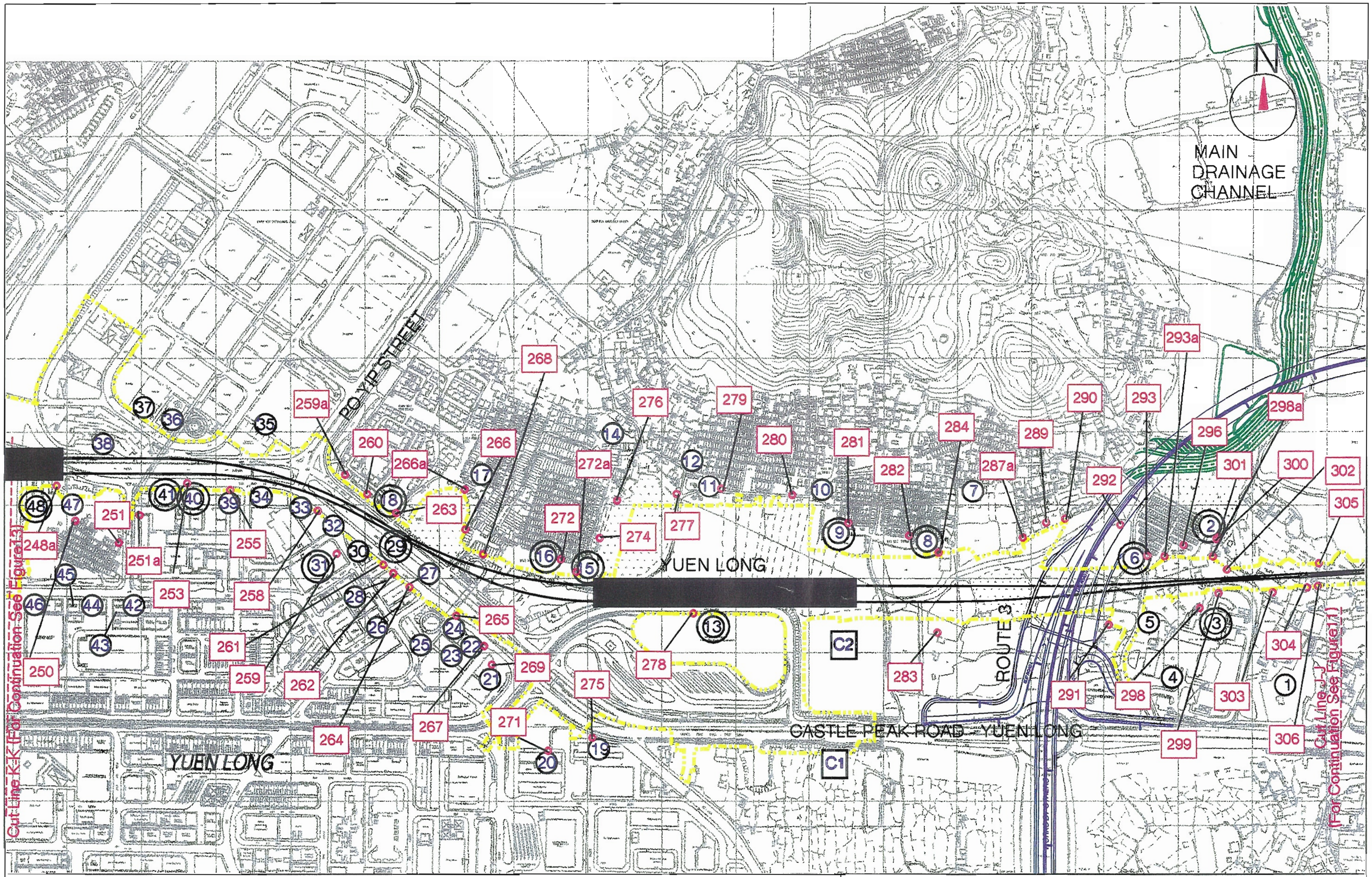
SCALE: 1/5,000

usr2/ermhk/c1588/vol1/8a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Operational Noise Modelling Locations
- Boundary of the Scheme

NOISE RECEIVER LOCATIONS - YUEN LONG (YUL) (1 OF 2)

FIGURE D12

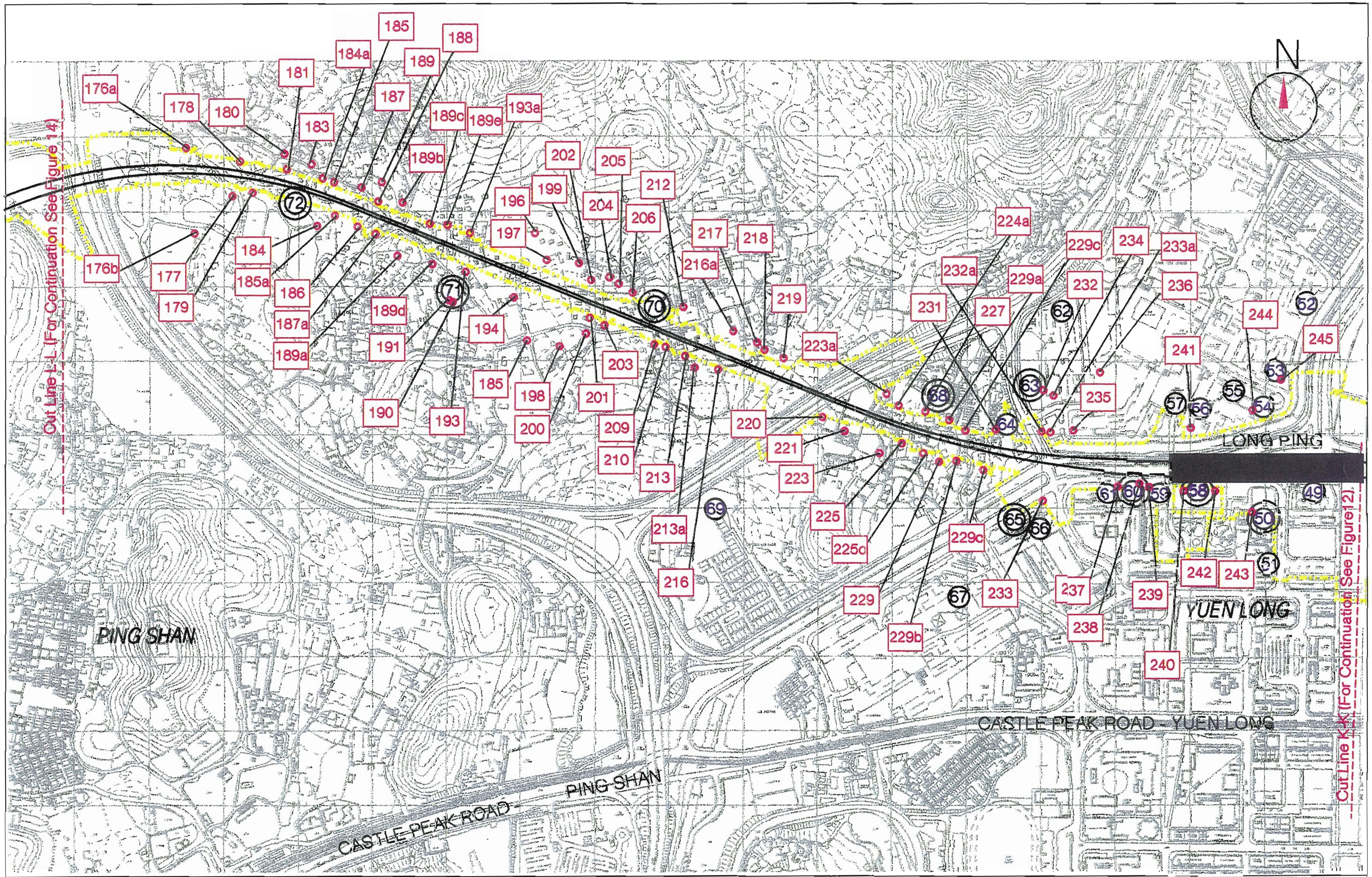
SCALE: 1/5,000

usr2/ermhk/c1588/vol1/2a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Development
- Operational Noise Modelling Locations
- Boundary of the Scheme

NOISE RECEIVER LOCATIONS
- YUEN LONG (YUL) (2 OF 2)

SCALE: 1/5,000

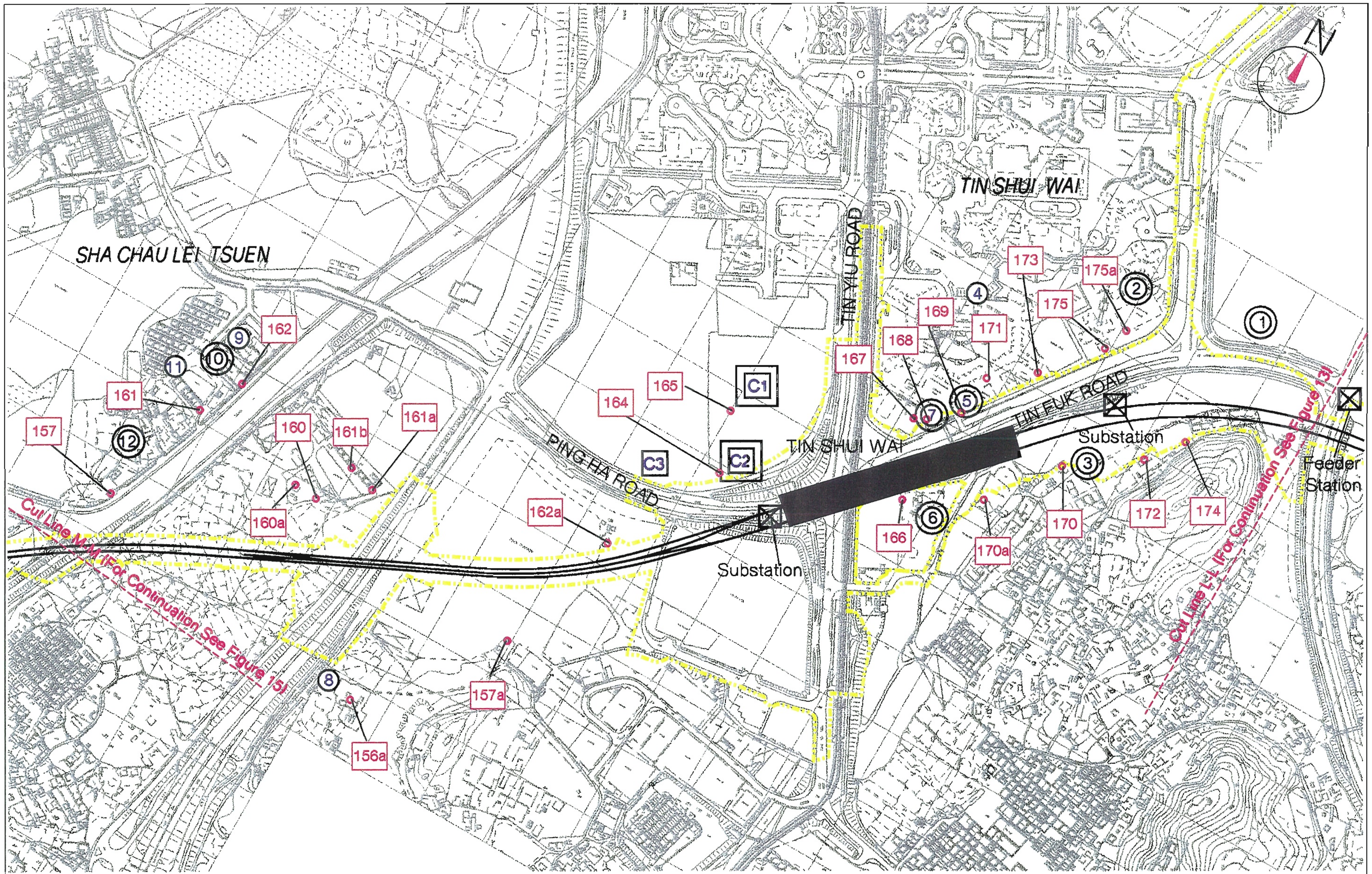
FIGURE D13

usr2/ermhk/c1588/vol1/1a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Operational Noise Modelling Locations
- Boundary of the Scheme

NOISE RECEIVER LOCATIONS - TIN SHUI WAI (TIS)

SCALE: 1/5,000

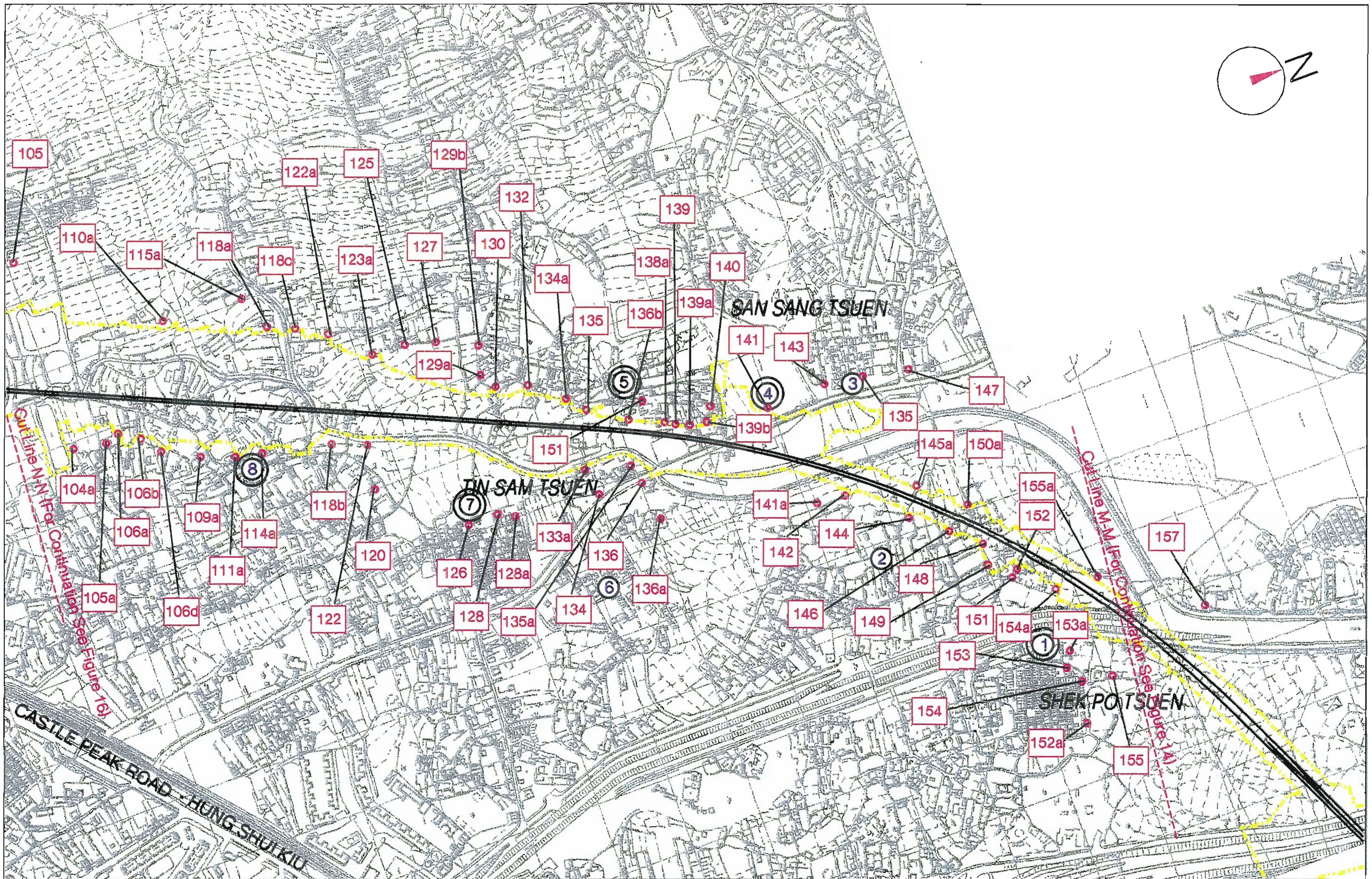
FIGURE D14

usr2/ermhk/c1588/vol7a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Operational Noise Modelling Locations
- Boundary of the Scheme

NOISE RECEIVER LOCATIONS
- TUEN MUN NORTH (TMN) (1 OF 2)

FIGURE D15

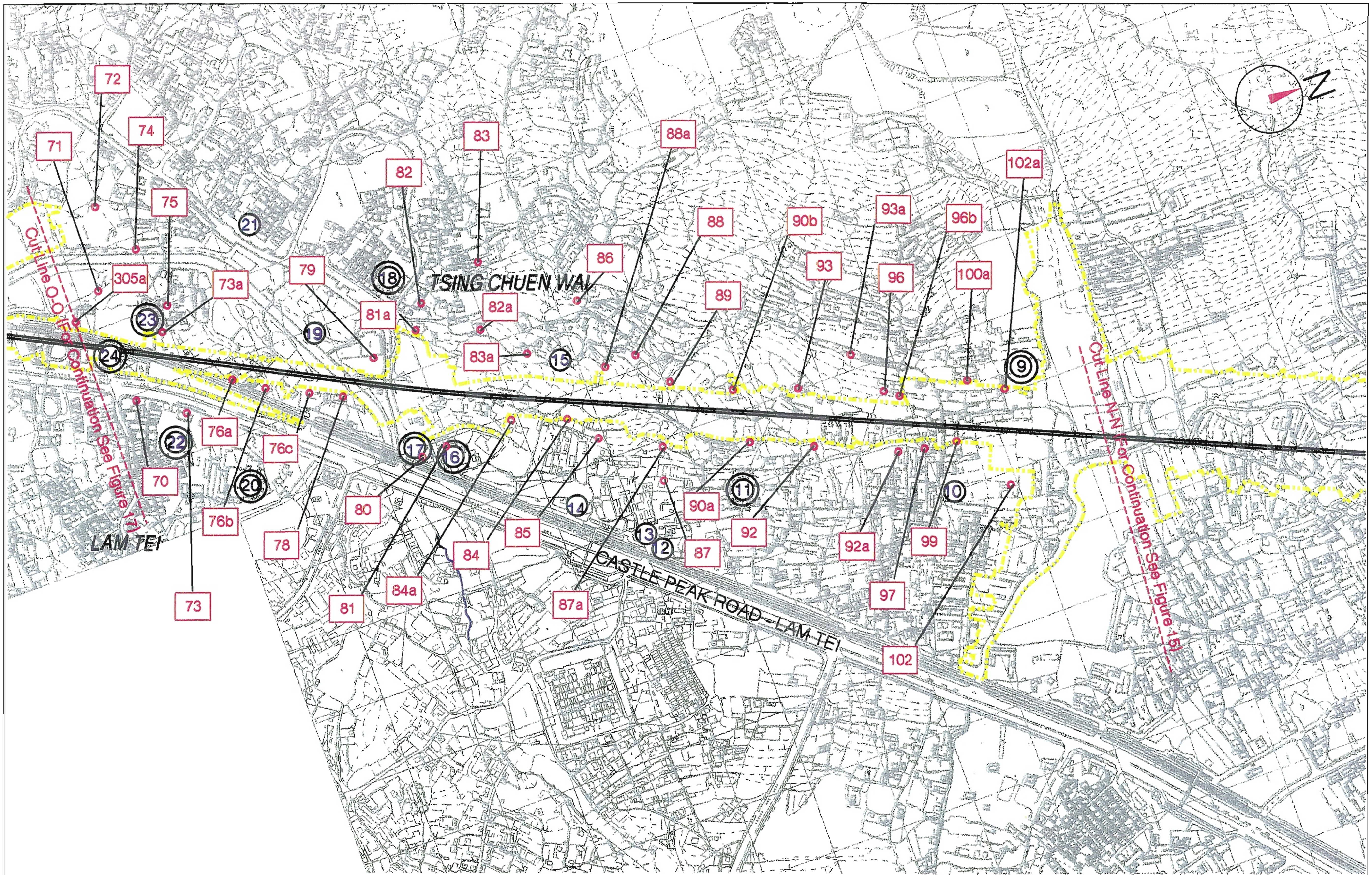
SCALE: 1/5,000

ermhk/c1588/vol1/6a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Operational Noise Modelling Locations

Boundary of the Scheme

NOISE RECEIVER LOCATIONS - TUEN MUN NORTH (TMN) (2 OF 2)

FIGURE D16

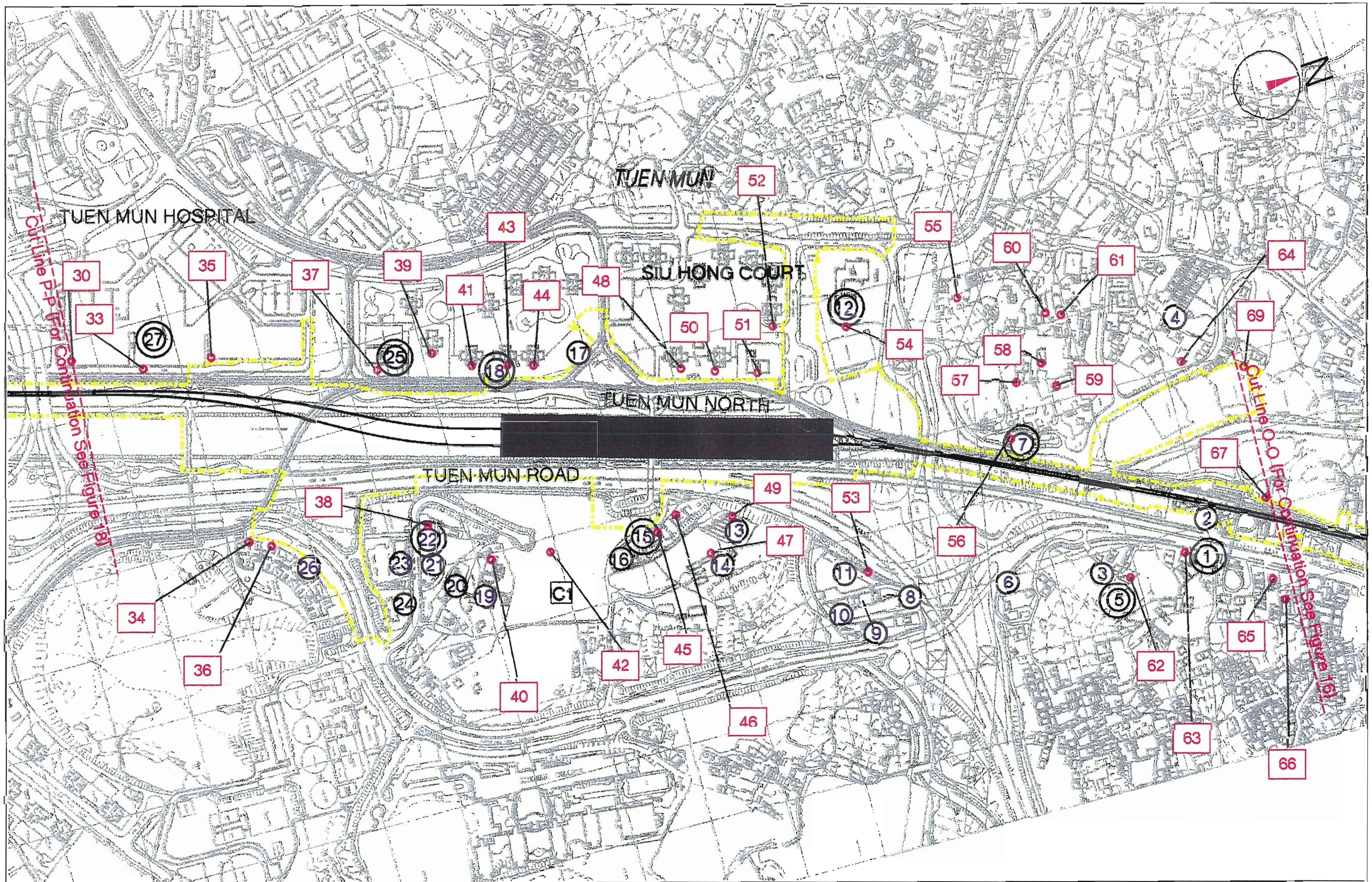
SCALE: 1/5,000

ermhk/c1588/vol1/5a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Operational Noise Modelling Locations

Boundary of the Scheme

NOISE RECEIVER LOCATIONS
- TUEN MUN CENTRE (TMC) (1 OF 2)

SCALE: 1/5,000

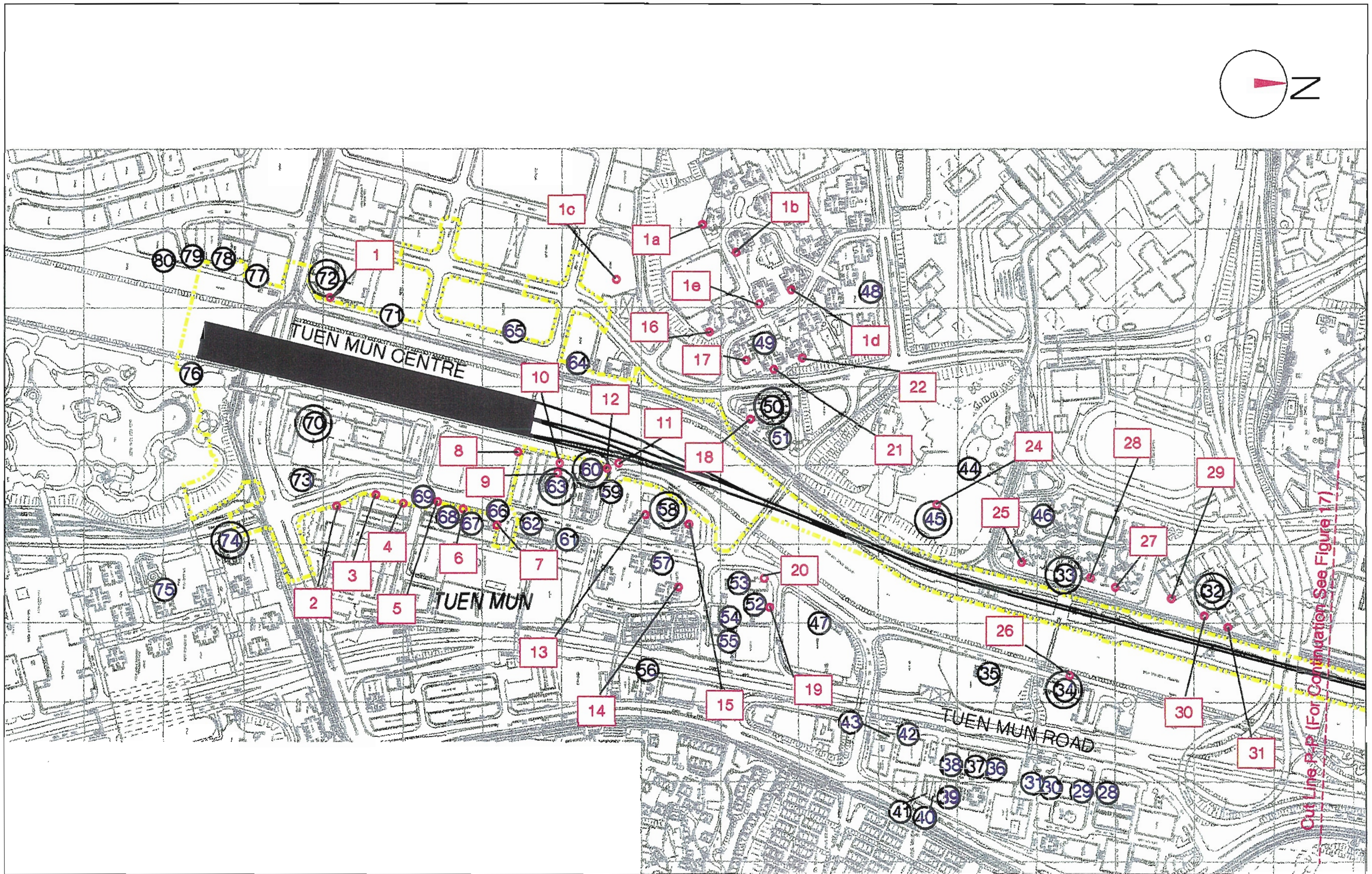
FIGURE D17

ermhk/c1588/vol1/4a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
Existing Noise and/or Air Sensitive Receivers
Representative Existing Noise and/or Air Sensitive Receivers
Committed Noise and/or Air Sensitive Development
Representative Committed Noise and/or Air Sensitive Development
Operational Noise Modelling Locations
Boundary of the Scheme

NOISE RECEIVER LOCATIONS - TUEN MUN CENTRE

SCALE: 1/5,000

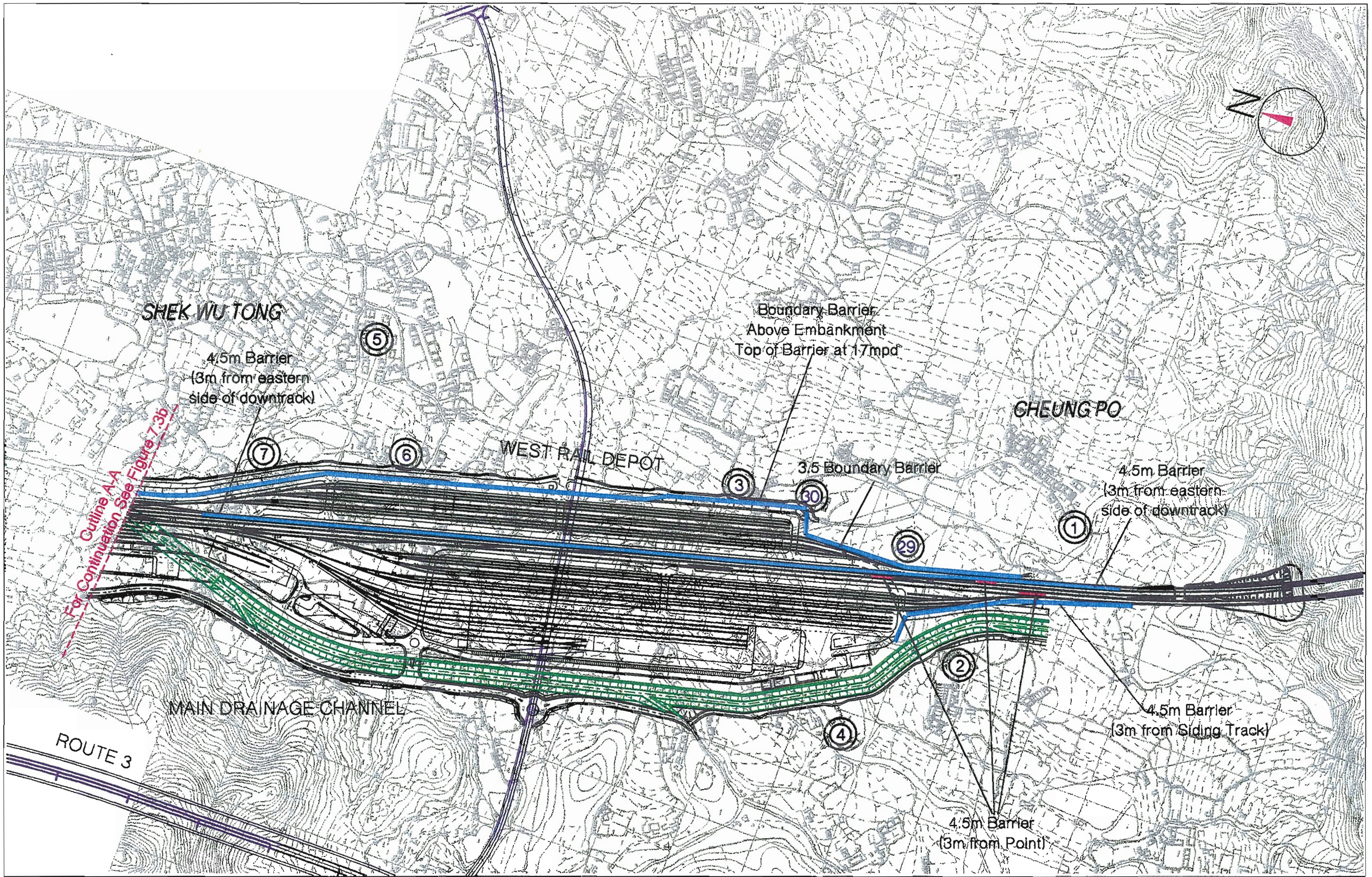
FIGURE D18 (TMC) (2 OF 2)

ermhk/C1688/vol1/3a.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND
- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Trackside and Boundary Barrier
- Additional Barrier At Point

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- WEST RAIL DEPOT

SCALE: 1/5,000

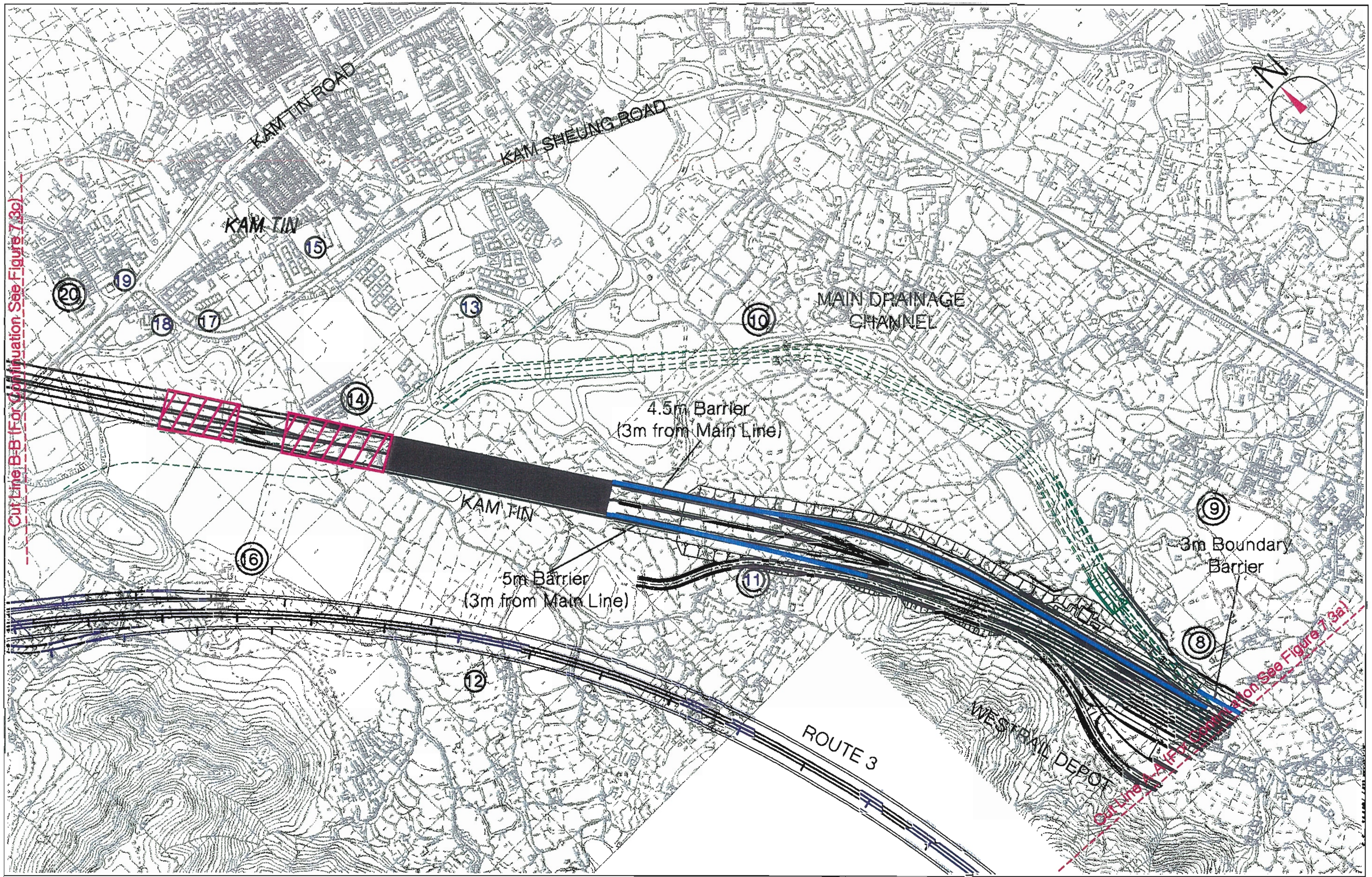
FIGURE 7.3a

ermhk/o1588/noise/10barn.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Enclosure

Trackside Noise Barrier

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- KAM TIN

SCALE: 1/5,000

FIGURE 7.3b

usr2/ermhk/c1586/vol/9mitn.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- KAM TIN

SCALE: 1/5,000

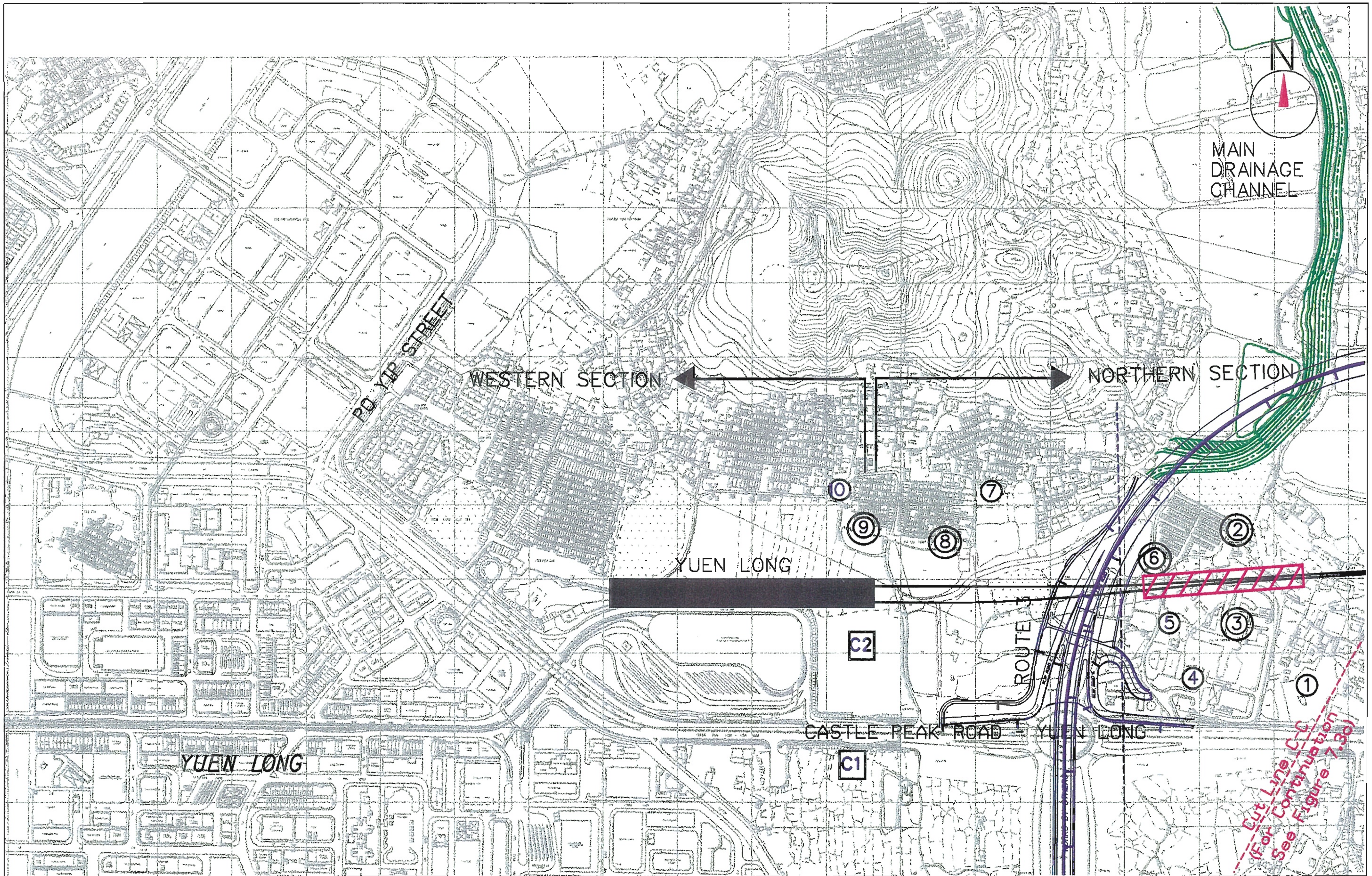
FIGURE 7.3c

usr2/ermhk/c1588/formit/8mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

Existing Noise and/or Air Sensitive Receivers

Representative Existing Noise and/or Air Sensitive Receivers

Committed Noise and/or Air Sensitive Development

Representative Committed Noise and/or Air Sensitive Development

Enclosure

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- YUEN LONG

SCALE: 1/5,000

FIGURE 7.3d

usr2/ermhk/o1588/formit/llmit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

LEGEND

1 Existing Noise and/or Air Sensitive Receivers

1 Representative Existing Noise and/or Air Sensitive Receivers

C1 Committed Noise and/or Air Sensitive Development

C1 Representative Committed Noise and/or Air Sensitive Development

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- YUEN LONG

SCALE: 1/5,000

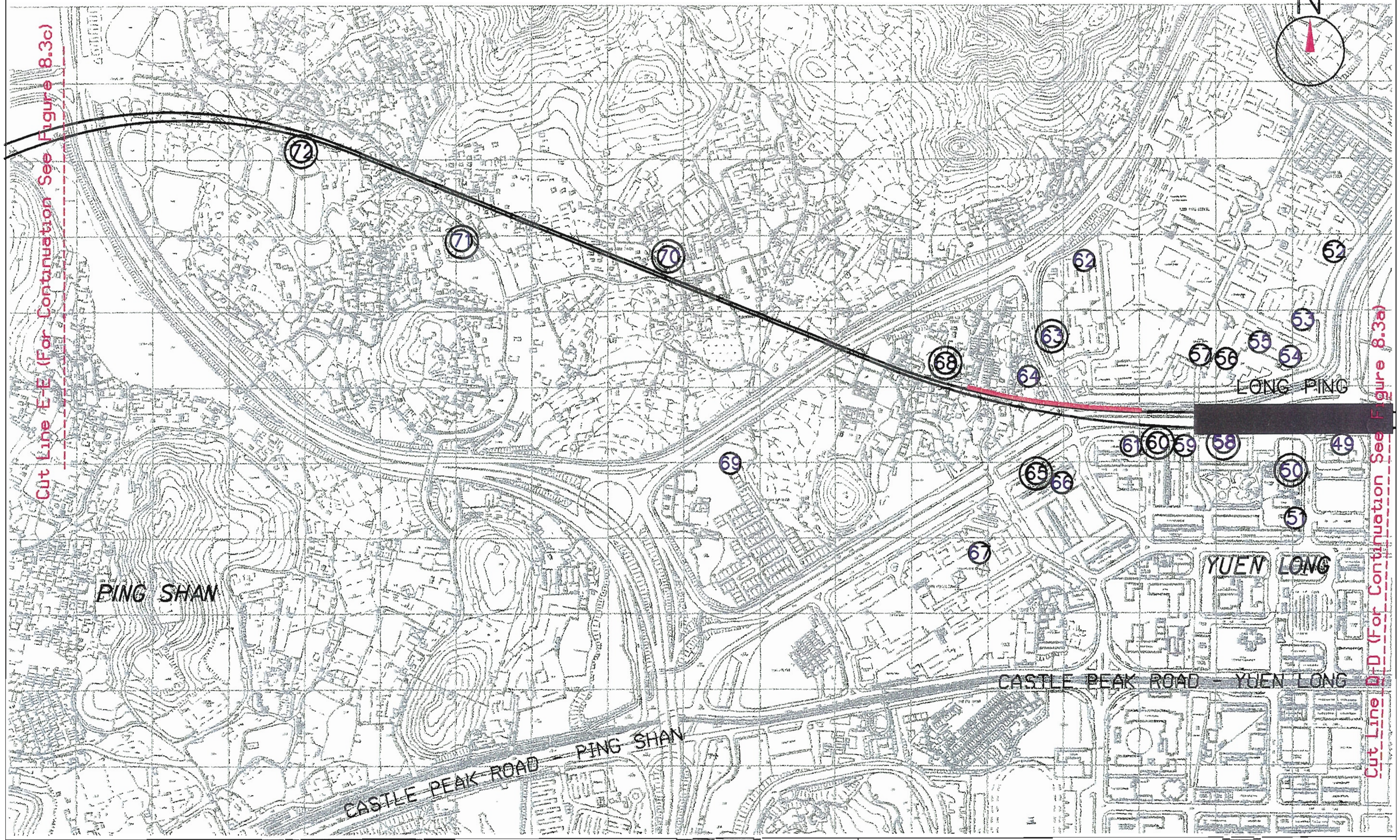
FIGURE 8.3a

usr2/ermhk/c1588/formit/2mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Development
- Additional 1.5m Barrier

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- YUEN LONG

SCALE: 1/5,000

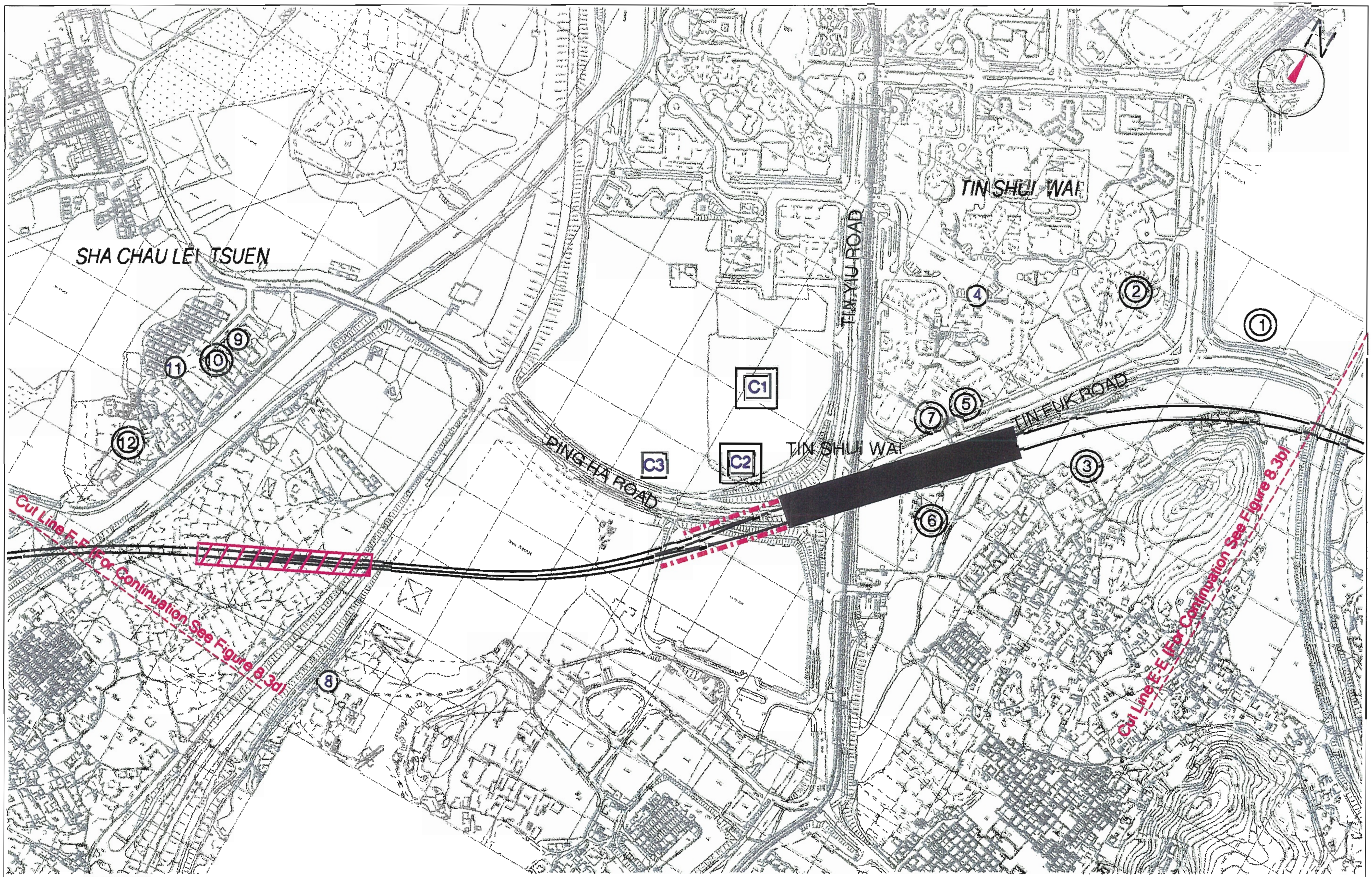
FIGURE 8.3b

usr2/ermhk/o1588/farmit/lmit.dgn

ERM

KOWLOON - CANTON
RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Enclosure
- Additional 1m Barrier

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- TIN SHUI WAI

SCALE: 1/5,000

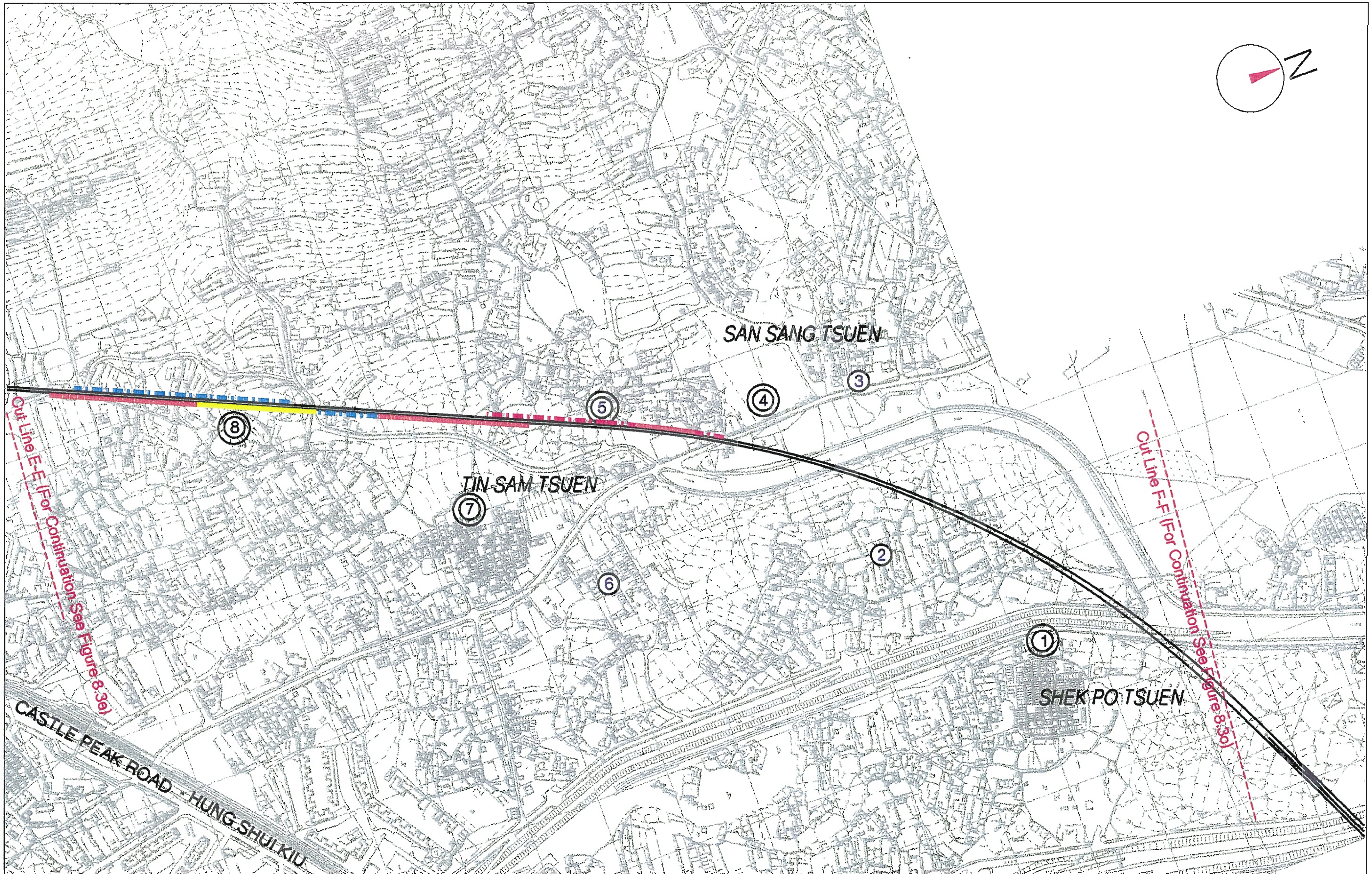
FIGURE 8.3c

usr2/ermhk/c1588/farmit/7mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Additional 1m Barrier
- Additional 1.5m Barrier
- Additional 2m Barrier
- Additional 2.5m Barrier

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- TIN SAN TSUEN

SCALE: 1/5,000

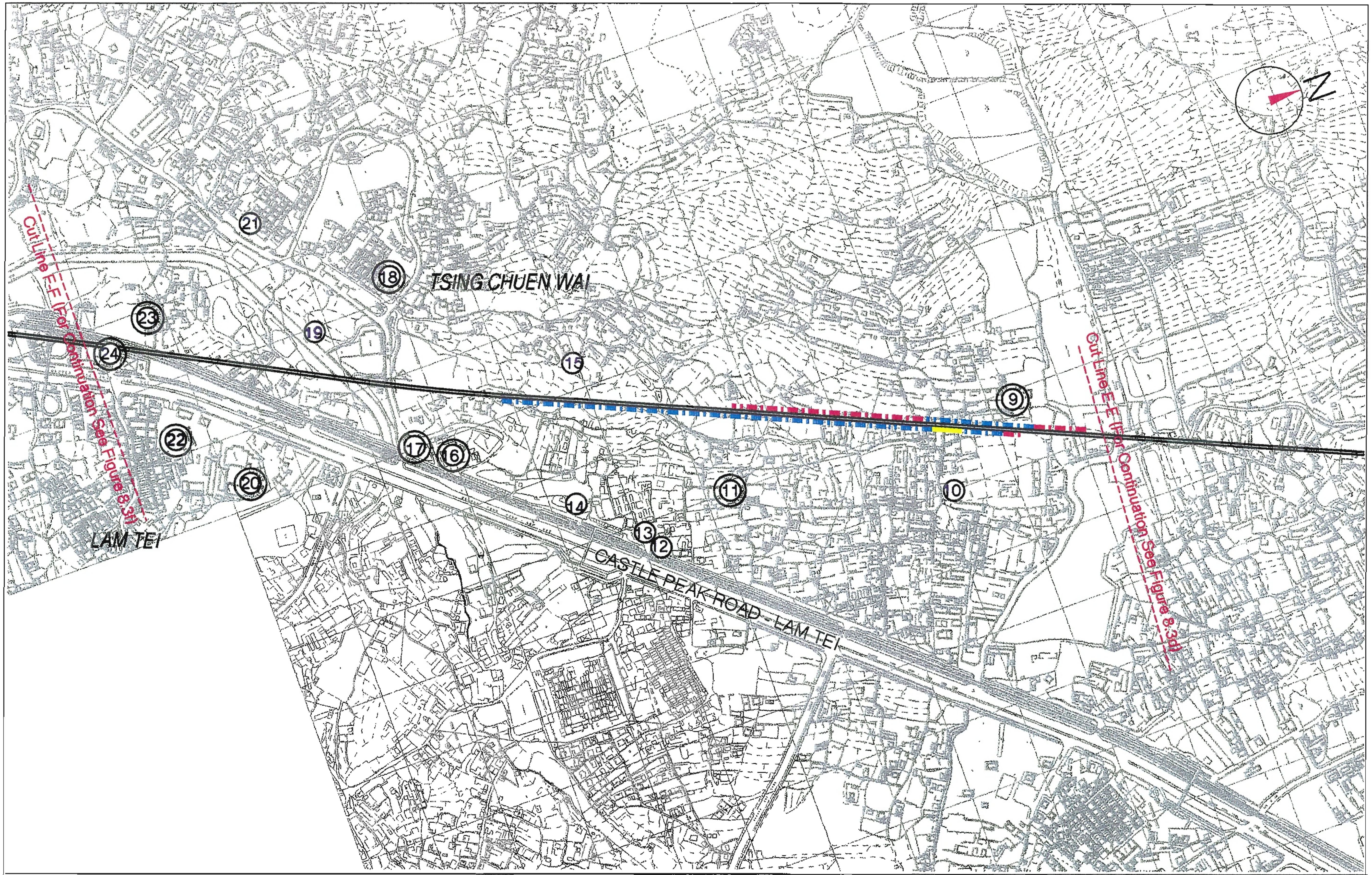
FIGURE 8.3d

ermhk/c1588/farmit/6mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Additional 1m Barrier
- Additional 2m Barrier
- Additional 2.5m Barrier

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- TUEN MUN NORTH

SCALE: 1/5,000

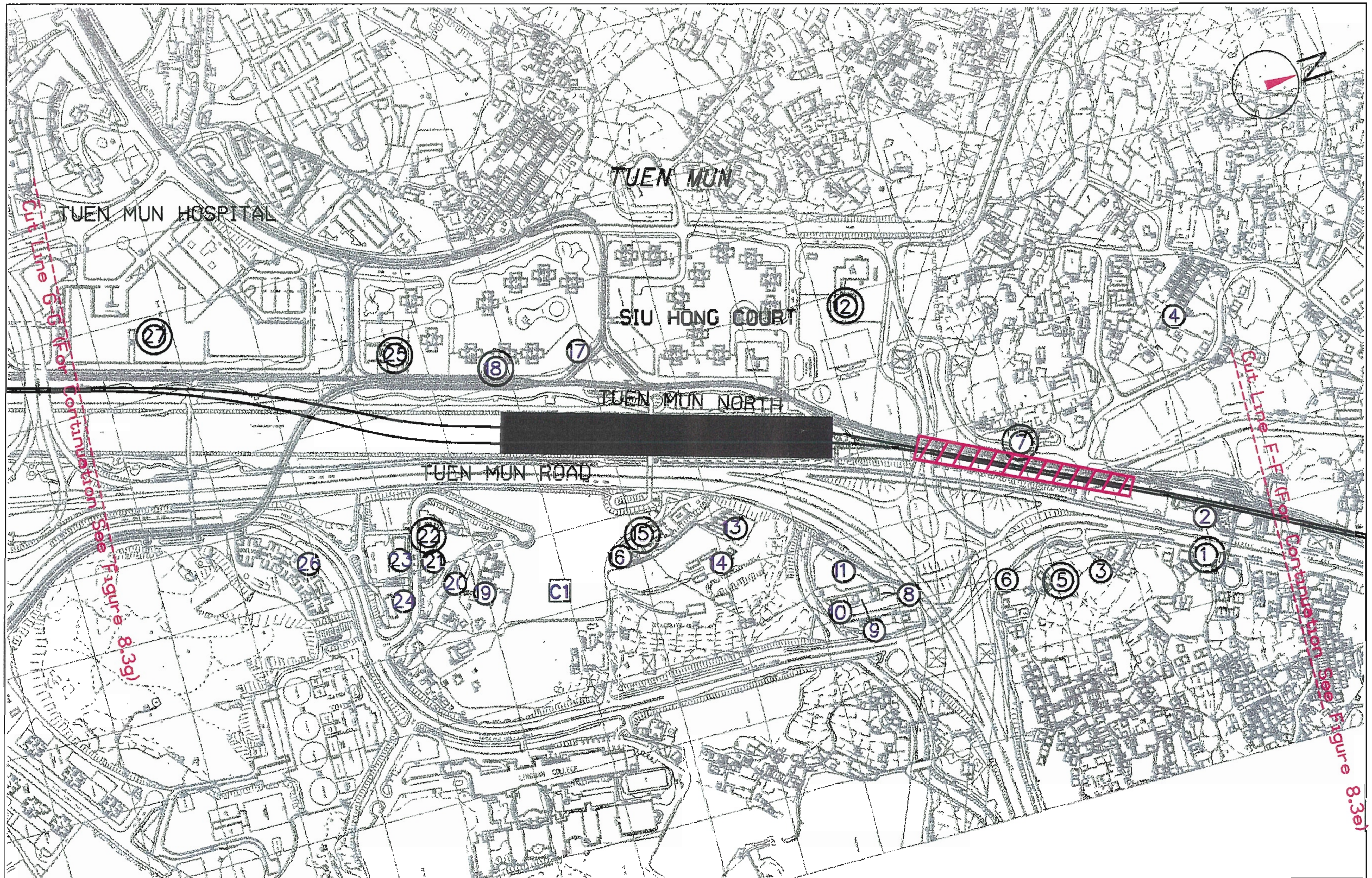
FIGURE 8.3e

erm/hk/c1588/farmit/5mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Enclosure

SCHEMATIC NOISE MITIGATION
(based on night-time criteria)
- TUEN MUN NORTH
SCALE: 1/5,000

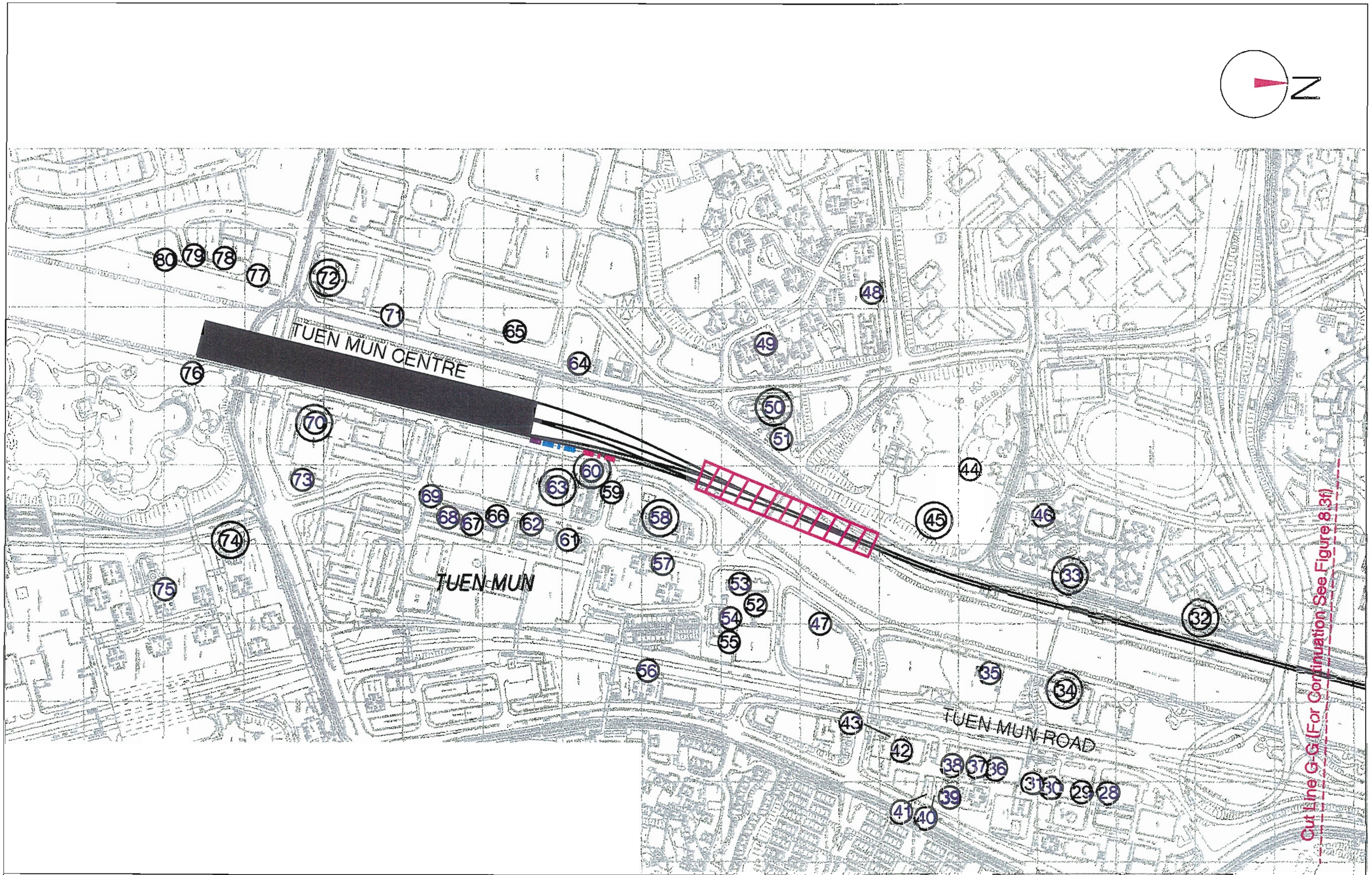
FIGURE 8.3f

ermhk/c1588/farmit/4mit.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LEGEND

- Existing Noise and/or Air Sensitive Receivers
- Representative Existing Noise and/or Air Sensitive Receivers
- Committed Noise and/or Air Sensitive Development
- Representative Committed Noise and/or Air Sensitive Development
- Enclosure
- Additional 1m Barrier
- Additional 2m Barrier
- Additional 3m Barrier

SCHEMATIC NOISE MITIGATIONS
(based on night-time criteria)
-TUEN MUN CENTRE

SCALE: 1/5,000

FIGURE 8.3g

ermhk/C1688/vol1/3mil.dgn

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

Annex E

Technical Papers on Structure-Borne Noise and the Multi-Plenum System

West Rail

Concept Specification and Noise Evaluation
of the
Multi-Plenum Model
For
Train Noise Attenuation of West Rail

1. INTRODUCTION

This report presents an analysis of the wayside noise from EMU traffic along elevated sections of the proposed West Rail and has been prepared in support of the operational noise assessment being undertaken by ERM-Hong Kong as part of the West Rail EIA Study.

The Multi-plenum Model evaluated in this report was conceived by an Operational Noise Working Group, established by the Kowloon-Canton Railway Corporation (KCRC), which included in its membership: Vic McNally, KCRC's West Rail Environmental Manager; John Carlisle, KCRC's West Rail Permanent Way Manager; Jon Pyke and Rob Bullen of ERM; George Wilson and Alan Crockett of Wilson, Ihrig and Associates and Rupert Taylor of Rupert Taylor Ltd..

The evaluation presented in this report focusses on the wayside noise from the train (direct noise) and not that which is radiated from the structure (re-radiated noise). Control of re-radiated noise is discussed in a separate report. Direct noise mitigation alternatives are put forward and evaluated regarding the reduction of wayside noise and compliance with the targeted wayside noise level.

Initially, Wilson, Ihrig and Associates, Inc. (WIA) was requested by ERM-Hong Kong to examine the issue of structure radiated noise from a viaduct structure with full enclosure. The main issue at that time was to determine the kind of trackform that would be needed for adequate reduction of the vibration transmitted from the rail into the structure which would then, in turn, be radiated from the structure as (wayside) noise. It was later decided on account of safety, costs, aesthetics, ventilation and engineering concerns that the search for solutions to the wayside noise problem be widened to include consideration of an open viaduct utilizing noise mitigation measures other than full enclosure. One solution suggested was to place tall sound barrier walls on the edge of the viaduct, possibly with sound absorption and cantilevered overhang.

After discussing and establishing the target wayside noise level and the reference (unmitigated) direct train noise level, this report presents an evaluation of the edge wall noise mitigation solution.

Consideration of the noise projections resulting from the ongoing evaluations led to the Operational Noise Working Group defining a design enhancement based on creating cascading noise plena located beneath the train and beneath the safety walkways aimed at reducing source noise levels. This double plenum, which is supplemental to edge barrier walls, is considered necessary to achieve compliance with the targeted wayside noise levels.

1.1 The Target Wayside Noise Level

The reference wayside noise level assumed for the KCRC West Rail Project is 88 dBA at 25 m for a 12-car train passby at 130 km/h. ERM-Hong Kong has determined, in discussion with the Environmental Protection Department (EPD) and members of the Operational Noise Working Group, that for the passenger train service (EMU) on the elevated line, the total wayside noise target could be expressed as a maximum level of 64 dBA for the same passby conditions. This target refers to the total wayside noise, which is the energetic sum of the direct noise from the train plus the structure radiated noise.

Preliminary indications are that it will not be possible to reduce the structure radiated noise much more than a few dBA below the target. This implies the direct noise component must be of comparable magnitude or less, otherwise the two will sum to more than 64 dBA. If the structure radiated noise and the direct train noise spectra were identical, the maximum overall A-weighted level of either would be 61 dBA.

When considering *only* the direct train noise component of the total wayside noise, it is therefore more realistic to establish the target maximum level below 64 dBA. Given the similarity of the direct (after mitigation) and structure radiated noise projections in the 1/3 Octave band levels having significant effect on determining the overall A-weighted levels (300-630 Hz), a level of 61 dBA as opposed to 64 dBA is probably a more appropriate target maximum level for direct noise *only* during passbys.

1.2 Reference Spectrum

Wayside noise measurements were taken on the BART system during train passbys on an unmitigated concrete viaduct with a concrete deck (Ref. 1,2). These data were averaged and then corrected to KCRC conditions (Ref. 3); namely, 12-car trains traveling at 130 km/h and 25 m distance. The overall A-weighted level under these conditions comes out to be 88 dBA, the agreed upon reference level for West Rail. This spectrum is therefore taken as reference. A very similar reference spectrum was also assumed for the MTR Tsing Ma Bridge pre-construction noise evaluation study.

1.3 Measurement Based Projections Of Edge Wall Noise Reduction

The first estimates of the mitigation provided by the edge barriers were strictly empirical and based on noise measurement data collected on a number of transit viaduct structures with edge walls (Ref. 1-2, 4-7). The wall height of these barriers ranges from 1-1.5 m.

A summary of the observed overall A-weighted noise reductions with indication of the presence of sound absorption is presented in Table 1. The best performance observed is the 12 dBA reduction achieved at BART by a wall (approx. vehicle floor height) placed 200 mm from the vehicle, just outside the kinematic envelope, with a 100 mm layer of fibreglass attached for sound absorption. The average noise reduction achieved by sound walls without absorption is 7.5 dBA, whereas with absorption, it is 9.5 dBA.

TABLE 1 MEASURED NOISE REDUCTION FROM EDGE WALLS PLACED ON CONCRETE VIADUCTS

Transit System	Sound Absorption	Noise Reduction (dBA)
BART	No	6
MARTA	No	9
MARTA	Yes	8
BART	Yes	8
Miami/Dade	Yes	10
WMATA	Yes	10
BART	Yes	12

In the initial analysis of the effectiveness of edge wall noise barriers performed by WIA (Ref. 8), it was assumed that a higher wall placed farther from the vehicle could not, in practice, do much better than this, so 12 dBA was chosen as the maximum limit for edge wall effectiveness. Assuming a reference level of 88 dBA at 25 m from track center for a 12-car train traveling at 130 km/h, this would produce a wayside noise level of 76 dBA. If the train speed were reduced to 100 km/h, the wayside level would become 73 dBA, which is the greatest noise reduction reported in Ref. 8 for any wall height examined including the tall edge wall with cantilevered overhang.

After further consideration, it was decided that WIA's empirical approach may have been overly conservative regarding the performance of tall edge walls. A new analysis of the edge barrier sound reduction was performed based on the modified theory of Maekawa as described below, with source height above rail adjusted so that low barrier predictions were consistent with the measured attenuations presented in Table 1.

1.4 Maekawa Analysis Of Edge Wall Noise Reduction

1.4.1 Model Description and Theoretical Basis

In this model, sound barrier wall attenuations were calculated with a modified version of the analytic expression provided by Kurze and Anderson (Ref. 11), which closely fits (within +/- 1 dB) the experimental results obtained by Maekawa (Ref. 12). The analytic expression developed by them which determines the excess attenuation of noise from a point source provided by thin barriers with no noise absorption applied is:

$$\Delta L_{barrier} = 5\ \text{dB} + 20\log\left(\frac{(2\pi N)^{1/2}}{\tanh(2\pi N)^{1/2}}\right)\text{dB}$$

where N, the Fresnel number, is defined as:

$$N = \frac{2}{\lambda}(\text{P.L.D.})$$

and where P.L.D. is the Path Length Difference between the direct and diffracted sound paths. As the attenuation calculated by this equation is dependent on frequency, all calculations were made in 1/3 octave bands (using the centre frequency of the band) and the A-weighted values were derived from these spectra.

Since in this study the receptor locations are 25 m distance from the track centers, a 12 car long train appears as a line source. The attenuation equation presented above must therefore be modified to correct for the difference (decrease) in attenuation between a point and a line source. By integrating a point source along a line, Beranek (Ref. 13) shows the difference in barrier attenuation between an infinite line source and a point source as a function of the maximum Fresnel Number (Fig. 7.9, pps 178-180 of Ref. 13). This relation or correction, which is utilized in this model, is identified as the function, PL(N).

In Table 1, the average attenuation of walls with no absorption is 7.5 dBA, whereas with absorption, it is 9.5 dBA. An increase of 2 dBA is therefore assumed as the increase in barrier attenuation due to the application of sound absorption on the source side of the wall.

Adding 2 dBA for applied sound absorption to, and subtracting the point to line source correction function from the above attenuation equation, yields the resulting equation which is valid for line sources where adequate sound absorption has been placed on the source side of the wall.

$$\Delta L_{barrier} = 7\ \text{dB} + 20\log\left(\frac{(2\pi N)^{1/2}}{\tanh(2\pi N)^{1/2}}\right)\text{dB - PL(N)}$$

This equation is assumed valid up to the point where the scattering effects on the volume of air above the barrier being insonified by the source limit the performance of a sound barrier wall to approximately 21 dB (Ref. 9).

1.4.1.1 Model Assumptions

In calculating the attenuation due to sound barrier walls only on the edge of the viaduct. the following assumptions were made:

> Source height = 7.9 m (0.9 over top of rail). source location = 0.5 m in from the vehicle shell
>
> Attenuation limit = 21 dB
>
> Receiver heights of 1.5, 7, 12, 17 and 22 m from ground level. These correspond to edge wall heights of 1.2, 2.5, 4.2. 5.4 m, respectively, above the safety walk, and 2.9, 4.2, 5.9 and 7.1 m, respectively, above the deck.
>
> Sound absorption 45mm thick placed on the interior side of the walls - Pyrok at a minimum.

The (line) source location from a modeling standpoint is not well defined because a number of car and track components radiate noise, namely, the rail, the wheels and the trucks. The location of 0.9 m above the rail was determined by matching the model prediction with the average taken from Table 1 (9.5 dBA) of the low barrier wall measurement data with absorption (See third entry in Table 3).

1.4.2 Wayside Noise Level Predictions for the Edge Wall Model

The wayside noise levels (L_{max}) shown in Table 2 are predicted at ten receptor locations adjacent to the open viaduct with edge barriers and sound absorption applied. The top of rail is assumed to be 7 m above the ground. Five receptors are located at 25 m distance from the track centerline on each side of the viaduct, totaling ten receptors. The outboard side is defined as that adjacent to the track carrying the train, whereas the inboard side is defined as that opposite. The receptors are located 1.5, 7, 12, 17, and 22 m, respectively, above the ground on each side. Edge barriers of heights of 1.2, 2.5, 4.2 and 5.4 m above the safety walkway are considered. Measured from the deck, these barrier heights would be 2.9, 4.2, 5.9 and 7.1 m, respectively.

TABLE 2 NOISE LEVELS (L_{max}) PREDICTED AT THE TEN NOISE RECEPTORS FOR EDGE BARRIERS ONLY WITH ABSORPTION LOCATED 25 m FROM THE TRACK CENTERLINE AND WITH LINE OF SITE (los) INDICATED AT VARIOUS HEIGHTS ABOVE GROUND - re: 130 km/h, 12 car

RECEPTOR LOCATION (Height Above Ground)	NO NOISE MITIGATION (dBA)	1.2 m (2.9 m) EDGE BARRIER (dBA)	2.5 m (4.2 m) EDGE BARRIER (dBA)	4.2 m (5.9 m) EDGE BARRIER (dBA)	5.4 m (7.1 m) EDGE BARRIER (dBA)
OUTBOARD					
1. 1.5 m	88	71.3	68.5	67.6	67.5
2. 7 m (tor)	88	73.4	69.5	67.8	67.6
3. 12 m	88	76.1	71.1	68.4	67.8
4. 17 m	88	79.3	73.1	69.5	68.3
5. 22 m	88	83.5	75.6	71.2	69.4
INBOARD					
6. 1.5 m	88	71.7	69.3	67.9	67.6
7. 7 m (tor)	88	75.7	71.8	68.9	68.0
8. 12 m	88	81.5	75.4	70.9	69.2
9. 17 m	88	88.4 los	81.1	74.4	71.4
10. 22 m	88	88.5 los	88.3 los	78.8	75.0

Cantilevering the tops of the sound walls is not considered as either a practical or effective means of enhancing the attenuation performance of the sound walls because:

1) cantilevering is only possible for very tall walls because of the catenary system spatial requirements;

2) the attenuation of sound barriers is limited to about 21 dBA maximum and walls high enough to rise above the catenary system have reached this performance limit; and

3) the cantilevering makes no difference for receptors located on the inbound side.

For 130 km/h train passbys. no barrier of any height considered provides sufficient attenuation to reduce the wayside noise to either the target level of 64 dBA for the total wayside noise or of 61 dBA for the direct train noise only. At the top of rail receptor height. the 5.4 m wall provides the best performance of 68 dBA. Among the more constructable and aesthetically palatable alternatives, the noise level for the 2.5 m wall is about 72 dBA. If the train speed is reduced to 100 km/h, these levels become 65 and 69 dBA, respectively. which is still significantly higher than the target 61-64 dBA levels.

1.5 Multi-Plenum Noise Reduction System

Since the performance of edge noise barriers by themselves appears inadequate, even if constructed to be very tall with cantilevering and utilizing sound absorption, it was decided to evaluate the effectiveness of combining edge wall noise barriers with added source reduction achieved by constructing noise plena in the space beneath and adjacent to the transit car.

The proposed noise reduction system, called the Multi-plenum system, consists of three components: an undercar sound absorbing plenum; under walkway sound absorbing plena on either side of the vehicle; and edge walls with sound absorption applied. A representative cross section of the two (tangent) track viaduct is shown in Figure 2, and is dimensioned in Figure 3. A superelevated depiction is shown in Figure 4, whereas the single (tangent) track viaduct is shown in Figure 5.

The undercar plenum is created by installing vehicle skirts on the sides of the cars, particularly over the trucks and by installation of noise absorption on the bottom side of the floor within two meters of the bolsters and on the interior facing of the skirts. The plenum outlet is formed between the bottom of the skirts and the top of the derailment constraint. The noise reduction effectiveness of this undercar plenum is in part determined by the size of the outlet gap, with smaller being better. It is probable that this gap can be limited to a maximum size of 250 mm.

The under walkway plenum on the outside of the viaduct is bounded by the edge wall, the deck, the safety walkway and the vehicle. Sound absorption is to be placed on the edge wall and the underside of the safety walkway. The outlet of the plenum is the gap between the safety walkway and the vehicle required by the kinematic and curvature envelopes, again with smaller being better. It is probable that this gap can be limited to a maximum of 250 mm on tangent track and 350-400 mm on curves. Approximately 60% of the proposed West Rail is tangent track and 40% is curved. Derailment safety requires that the vehicle can move laterally by 600 mm during derailment implying that part of the walkway be frangible.

The under walkway plenum at the center of the viaduct is bounded by the median wall, the deck, the safety walk and the vehicle. Because of geometric considerations, the volume of this plenum is not as large as that beneath the edge walkway and therefore will not be as effective attenuating noise. The median wall must also be constructed strong enough so that a contained derailment will not send pieces of it onto the other track.

The use of any of these noise attenuation systems by themselves is not unprecedented: (low) edge noise barriers are commonly installed on viaducts: the under walkway plenum (or under station platform) with median noise barrier between tracks has been installed in stations; and vehicle skirts with undercar sound absorption has been tested on transit vehicles and is in service on some "people movers". What is unprecedented is the use of all three components together in a fully integrated direct noise attenuation system. Such a system can always outperform the edge wall only noise attenuation solution because this system can accommodate any edge wall design, supplemented by the Multi-plenum source attenuation.

1.5.1 Model Description and Theoretical Basis

The model for the edge wall noise attenuation is the same as that described above, except the source is relocated to a position on the car body just above the under walkway plenum outlet (8.1 meters above the ground or 0.1 m higher than the platform).

The plenum attenuation achieved by this system was estimated by means of the Plenum Chamber Transmission Loss equations as described by Beranek (Ref. 13) and ASHRAE (Ref. 14):

$$TL = -10\log\left\{S_{out}\left[\left(\frac{Q\cos\theta}{2\pi r^2}\right)+\left(\frac{1-\alpha_A}{S\alpha_A}\right)\right]\right\}$$

where

S_{out}	=	area created by the gap between the bottom of the skirt and the derailment constraint for the undercar plenum or that between the vehicle and the platform for the under walkway plena
r	=	distance between inlet and outlet of plenum = 0.9m for undercar plenum; 2m for under platform plenum
Q	=	directivity factor = 2
α_A	=	average absorption coefficient for the lining
θ	=	angle between the source and outlet = 0 for undercar plenum; = 80 for under platform plenum

The levels predicted by this equation are conservative by about 5 dB at low frequencies due to the fact that the size of the plena is comparable with the wavelength of the sound at those frequencies. To determine the surface area of the gap under the vehicle skirts and between the vehicle and the walkway, a characteristic length of 4 meters was assumed.

The sound absorption coefficients versus frequency for each of the candidate materials recommended is shown in Figure 6.

1.5.2 Airborne Noise Attenuation Created by the Plena

Figure 7 shows the attenuation calculated for the undercar (primary) plenum system in 1/3 octave bands.

Figure 8 shows the attenuation calculated for the wayside (secondary) plena in 1/3 octave bands. The higher attenuation predicted for the under platform plenum is due to the larger interior lined surface area (and therefore higher net sound energy absorbed). However, the attenuation introduced by this plenum is significantly limited by the close proximity of the gap under the skirt and that between the vehicle and the walkway.

Figure 9 shows the total attenuation introduced by the combination of the primary and secondary plena.

1.5.3 Calibration of Model Components with Measurement Data

The basic components of the model were calibrated by comparing predicted results with actual measurement data obtained at BART and other systems and the results are shown in Table 3.

TABLE 3 COMPARISON OF THE MULTI-PLENUM ATTENUATION MODEL PREDICTIONS AND MEASUREMENT DATA

	MEASUREMENT DATA (dBA)	MODEL PREDICTION (dBA)
Vehicle Skirts and Undercar Absorption (BART)	3.0	2.9
4 ft Close-in Barrier With 8 in Gap and 4 in Fiberglass Absorption (BART)	12	11.2
Low Edge Barrier With Absorption	9.5	9.5

The effects of undercar absorption and vehicle skirts were calibrated by adjusting the distance (r) in the plenum equation so that a mitigation of approximately 3 dBA was predicted by the model when the gap under the skirt was 600 mm. This prediction closely agrees with the attenuation measured at BART.

Similarly, the combined effect of the undercar absorption, skirts and under platform plenum was calibrated by adjusting the distance (r) between the skirt gap and the gap between the vehicle and the walkway until the predicted attenuation obtained was similar to that measured during another BART test. In this test an absorbent close-in barrier was located 8 inches away from the vehicle and the noise level was measured before and after the installation of this barrier.

1.5.4 Model Sensitivity

The sensitivity of the model to different gap sizes between the bottom of the skirt and the top of the derailment restraint is shown in Table 4. The level of noise exiting the plenum is proportional to:

$$L \approx 10\log_{10}\left(S_{out}\right)$$

TABLE 4 NOISE REDUCTION SENSITIVITY TO THE CLEARANCE BETWEEN THE BOTTOM OF THE SKIRT AND THE TOP OF THE DERAILMENT RESTRAINT

GAP SIZE (mm)	NOISE REDUCTION (dBA)
250	6.7
300	5.9
400	4.7
600	2.9

The sensitivity due to different gap sizes between the vehicle and walkway (or between the vehicle and the median) is also proportional to the surface area of the gap and shown in Table 5. For the undercar plenum, a variation of outlet gap size from 250-600 mm produces a change in noise reduction of 3.8 dBA. For the under walkway plenum, a variation of outlet gap size from 250-400 mm produces a change in noise reduction of 2 dBA.

TABLE 5 NOISE REDUCTION SENSITIVITY TO THE CLEARANCE BETWEEN THE VEHICLE AND WALKWAY

KINEMATIC ENVELOPE PLUS CURVATURE (mm)	NOISE REDUCTION (dBA)
250	12.7
300	11.9
350	11.3
400	10.7

Different sound absorbent materials produce minor variations on the A-weighted sound reduction. Table 6 compares the degree of noise reduction predicted for the secondary plenum under the walkway for three alternate lining materials.

TABLE 6 NOISE REDUCTION SENSITIVITY OF THE UNDER WALKWAY PLENUM TO THE TYPE OF ABSORPTION MATERIAL APPLIED

ABSORPTION MATERIAL	NOISE REDUCTION (dBA)
50 mm Fiberglass	12.7
2.5 mm Almute With 50 mm Honeycomb Backing	12.4
45 mm Pyrok	12.1

1.5.5 Wayside Noise Level Predictions for the Multi-plenum Model

The wayside noise levels (L_{max}) shown in Table 7 are predicted at ten receptor locations adjacent to the open viaduct with the Multi-plenum system. In this analysis, the plenum gaps are assumed to be 250 mm. A diagram displaying the barrier heights and the receptor locations appears in Figure 10. In the interest of comparison, the geometry of the viaduct, the height of the top of rail, the positions of the receptors and the edge wall heights are the same as what was considered for the edge barrier only model.

TABLE 7 NOISE LEVELS (L_{max}) PREDICTED FOR THE MULTI-PLENUM MODEL AT THE TEN NOISE RECEPTORS LOCATED 25.m FROM THE TRACK CENTERLINE AND WITH LINE OF SITE (los) INDICATED AT VARIOUS HEIGHTS ABOVE GROUND - re: 130 km/h, 12 car

RECEPTOR LOCATION (Height Above Ground)	NO NOISE MITIGATION (dBA)	1.2 m (2.9 m) EDGE BARRIER (dBA)	2.5 m (4.2 m) EDGE BARRIER (dBA)	4.2 m (5.9 m) EDGE BARRIER (dBA)	5.4 m (7.1 m) EDGE BARRIER (dBA)
OUTBOARD					
1. 1.5 m	88	53.8	50.6	49.4	49.3
2. 7 m (tor)	88	55.8	51.5	49.6	49.3
3. 12 m	88	58.2	53.0	50.2	49.6
4. 17 m	88	61.4	54.9	51.2	50.1
5. 22 m	88	63.4 los	57.2	52.8	51.1
INBOARD					
6. 1.5 m	88	58.1	55.5	53.8	53.4
7. 7 m (tor)	88	62.0	58.0	54.9	53.9
8: 12 m	88	67.7	61.6	56.9	55.1
9. 17 m	88	74.2 los	67.0	60.2	57.3
10. 22 m	88	74.2 los	74.0 los	64.3	60.5

For 130 km/h train passbys, the results show that at least one of the configurations provides sufficient attenuation for reduction of the wayside noise to the more restrictive target level of 61 dBA. At receptor heights of 1.5, 7, 12, 17 and 22 m above the ground, edge wall heights of 1.2, 2.5, 4.2, 4.2 and 5.4 m, respectively, provide adequate noise reduction. If the train speed is reduced to 100 km/h, edge wall heights of 1.5, 1.5, 2.5, 4.2 and 4.2 m, respectively provide adequate noise reduction, again for the more restrictive target of 61 dBA. The projections for the Multi-plenum system improve the attenuation performance of the edge wall barriers only by 15-20 dBA on the outboard side and 10-15 dBA on the inboard side. These estimates not only indicate that the target direct noise level can be met, but it can be met with a reasonable allowance for error in the prediction.

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2. SUMMARY AND DISCUSSION

This report presents an analysis of the wayside noise from EMU traffic along the proposed West Rail Viaduct. Direct noise mitigation alternatives are put forward and evaluated regarding the reduction of wayside noise and compliance with the targeted wayside noise level, which is expressed as a maximum noise level of 64 dBA at 25 m for a 12-car train passby at 130 km/h. If the direct noise from the train only is considered, and not the total wayside noise which includes the structure radiated noise, a maximum target noise level of 61 dBA is suggested. The reference wayside noise level assumed for West Rail is 88 dBA at 25 m for a 12-car train passby at 130 km/h. Consideration is given to the effect of limiting train speed to 100 km/h which would reduce the reference (unmitigated) level to 85 dBA.

One of the solutions evaluated, places tall sound barrier walls on the edge of the viaduct, possibly with sound absorption and cantilevered overhang. Consideration of the noise projections led to an enhancement of the edge wall only design based on creating cascading noise plena located beneath the train and beneath the safety walkways aimed at reducing source noise levels.

The first estimates of the mitigation provided by edge barriers only were strictly empirical and based on noise measurement data collected on a number of transit concrete viaduct structures with edge walls. The best performance observed is a 12 dBA reduction. The average noise reduction achieved by sound walls without absorption is 7.5 dBA, whereas with absorption, it is 9.5 dBA. Assuming a reference level of 88 dBA at 25 m from track center for a 12-car train traveling at 130 km/h, this would produce a wayside noise level of 76 dBA. If the train speed were reduced to 100 km/h, the wayside level would become 73 dBA.

After further consideration, it was decided that WIA's empirical approach may have been overly conservative regarding the performance of tall edge walls. A new analysis of the edge barrier sound reduction was, therefore, undertaken based on the modified theory of Maekawa adjusted for (line) source geometry and applied sound absorption. Wayside noise levels were predicted with the new model at ten receptor locations adjacent to the open viaduct. For 130 km/h train passbys, no barrier of any height considered provides sufficient attenuation to reduce the wayside noise to either the target level of 64 dBA for the total wayside noise or of 61 dBA for the direct train noise only. At the top of rail receptor height, the 5.4 m wall provides the best performance of 68 dBA. Among the more constructable and aesthetically palatable alternatives, the noise level for the 2.5 m wall is about 72 dBA. If the train speed is reduced to 100 km/h, these levels become 65 and 69 dBA, respectively, which is still significantly higher than the target 61-64 dBA levels. Cantilevering the tops of the sound walls is not considered as either a practical or effective means of enhancing the attenuation performance of the sound walls.

Since the performance of edge noise barriers by themselves appeared inadequate. the effectiveness was evaluated of combining edge wall noise barriers with added source reduction achieved by constructing noise plena in the space beneath and adjacent to the transit car. The proposed noise reduction system, called the Multi-plenum system. consists of three components: an undercar sound absorbing plenum; under walkway sound absorbing plena on either side of the vehicle; and edge walls with sound absorption applied. Such a system can always outperform the edge wall only noise attenuation solution because this system can accommodate any edge wall design, supplemented by the Multi-plenum source attenuation.

The wayside noise levels for the Multi-plenum system were predicted at ten receptor locations adjacent to the viaduct. The projections for the Multi-plenum system improve the attenuation performance of the edge wall barriers only by 15-20 dBA on the outboard side and 10-15 dBA on the inboard side. For 130 km/h train passbys, the results show that at least one of the configurations (differing edge wall heights) provides sufficient attenuation for reduction of the wayside noise at all receptor locations to the more restrictive target level of 61 dBA. If the train speed is reduced to 100 km/h, a further allowance for error is obtained.

It is considered that the very tall walls required in the edge wall only option for direct train noise mitigation would be structurally difficult to achieve (*e.g.*, wind loading), unaesthetic, and would not provide any factor of safety in meeting the wayside noise requirement, if that requirement could be met at all. The Multi-plenum system, on the contrary, meets the wayside noise target with substantial margin for error without the need for operational speed reduction and without tall edge walls, except were there are adjacent high rise structures (of height greater than 22 m, within 25 of track centreline).

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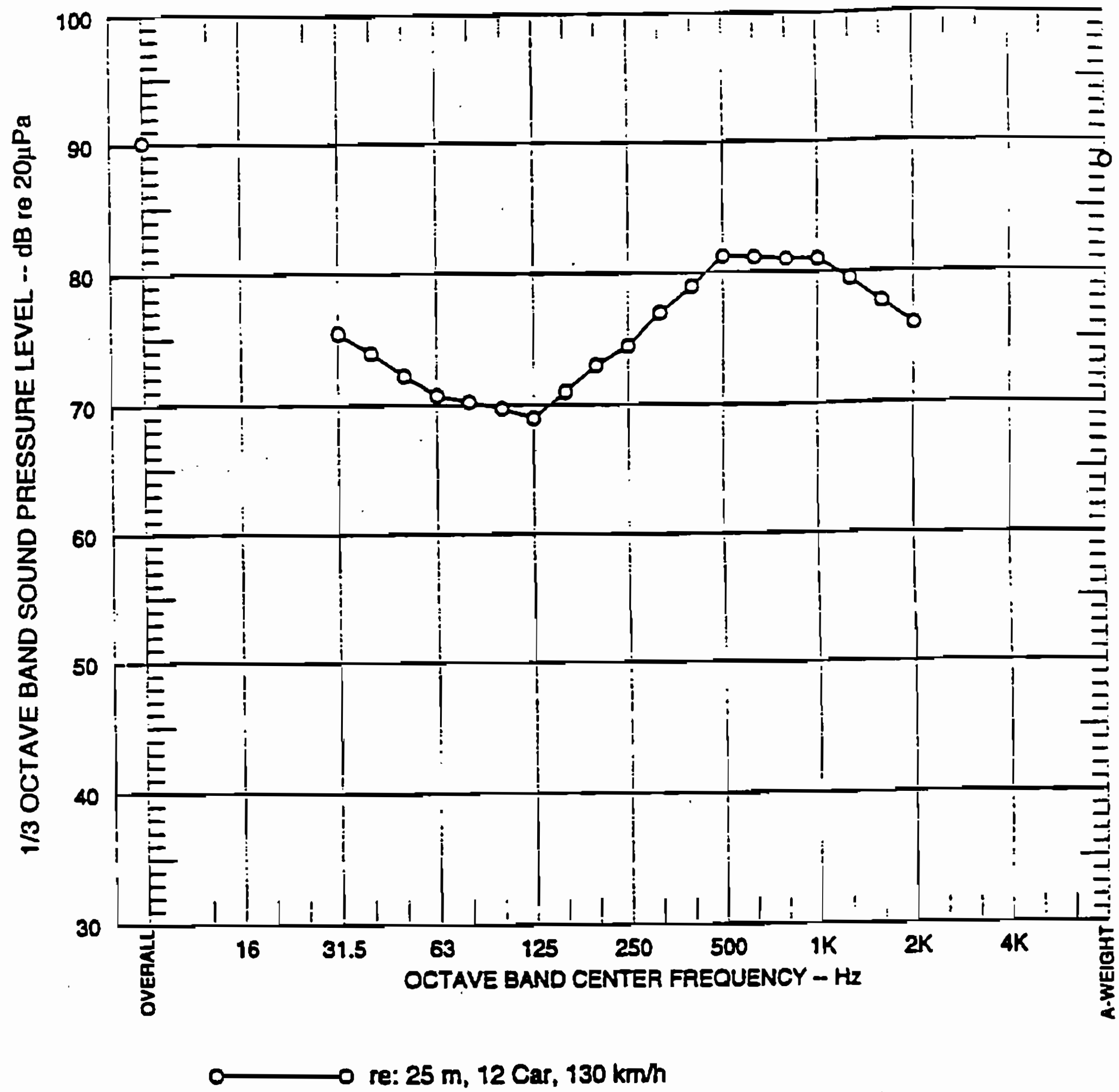


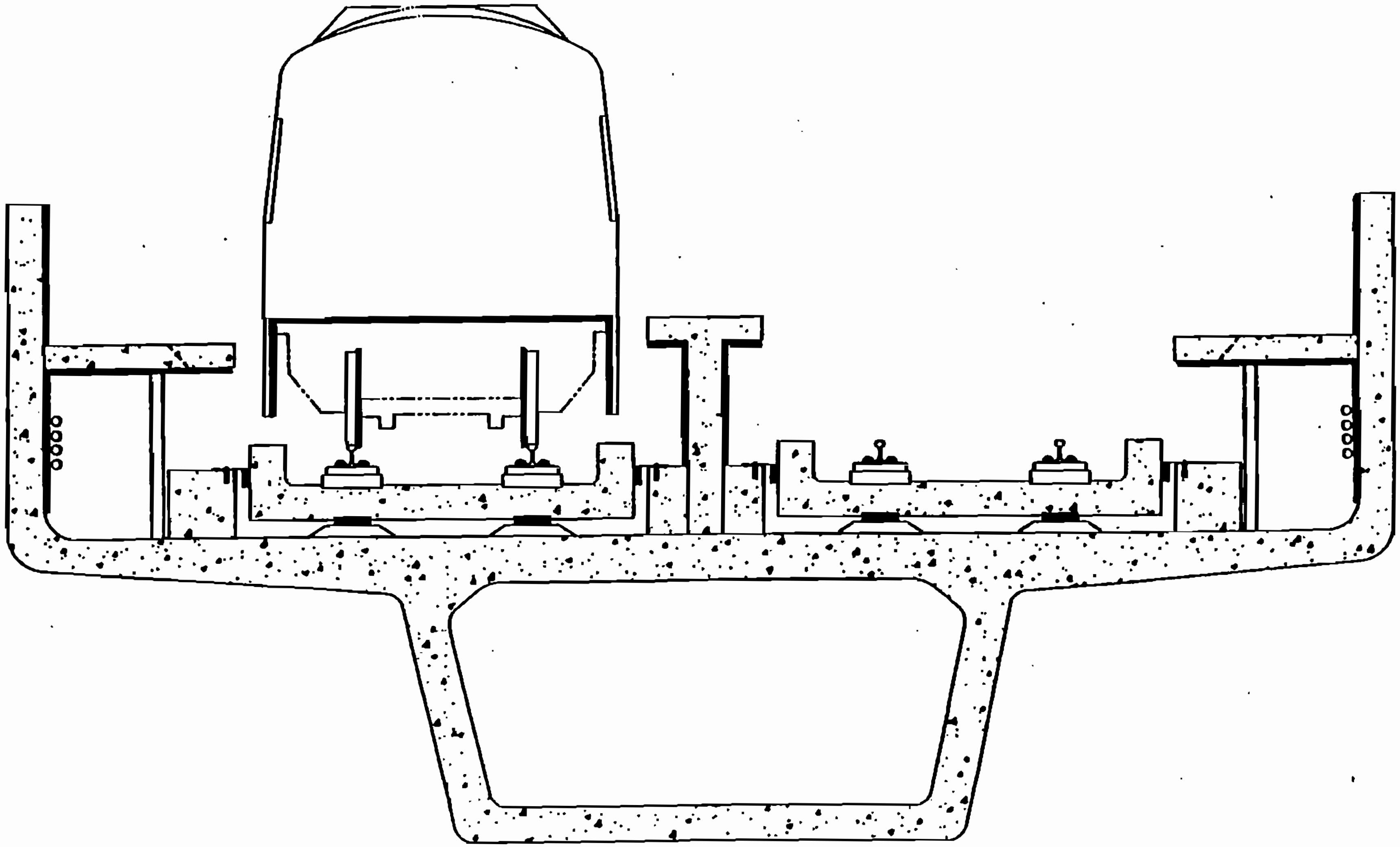
REFERENCE VIADUCT NOISE SPECTRUM

FIGURE 1

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

CROSS SECTION OF KCRC WEST RAIL VIADUCT DESIGN - TANGENT TRACK

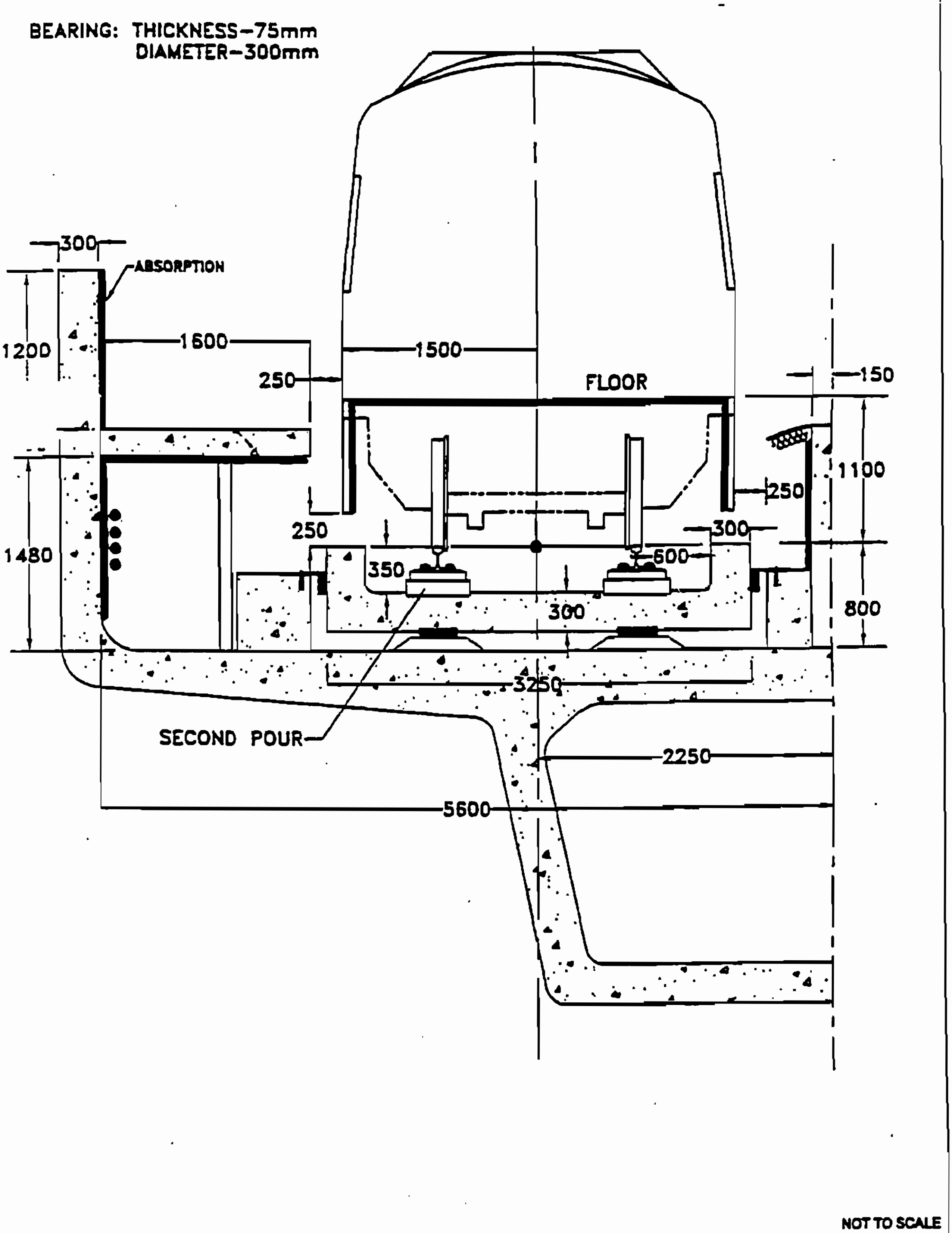
FIGURE 2

Contract/C1588/C1588_2

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS SECTION OF KCRC WEST RAIL VIADUCT DESIGN - TANGENT TRACK

FIGURE 3

Contract/C1586/C1586_3

ERM

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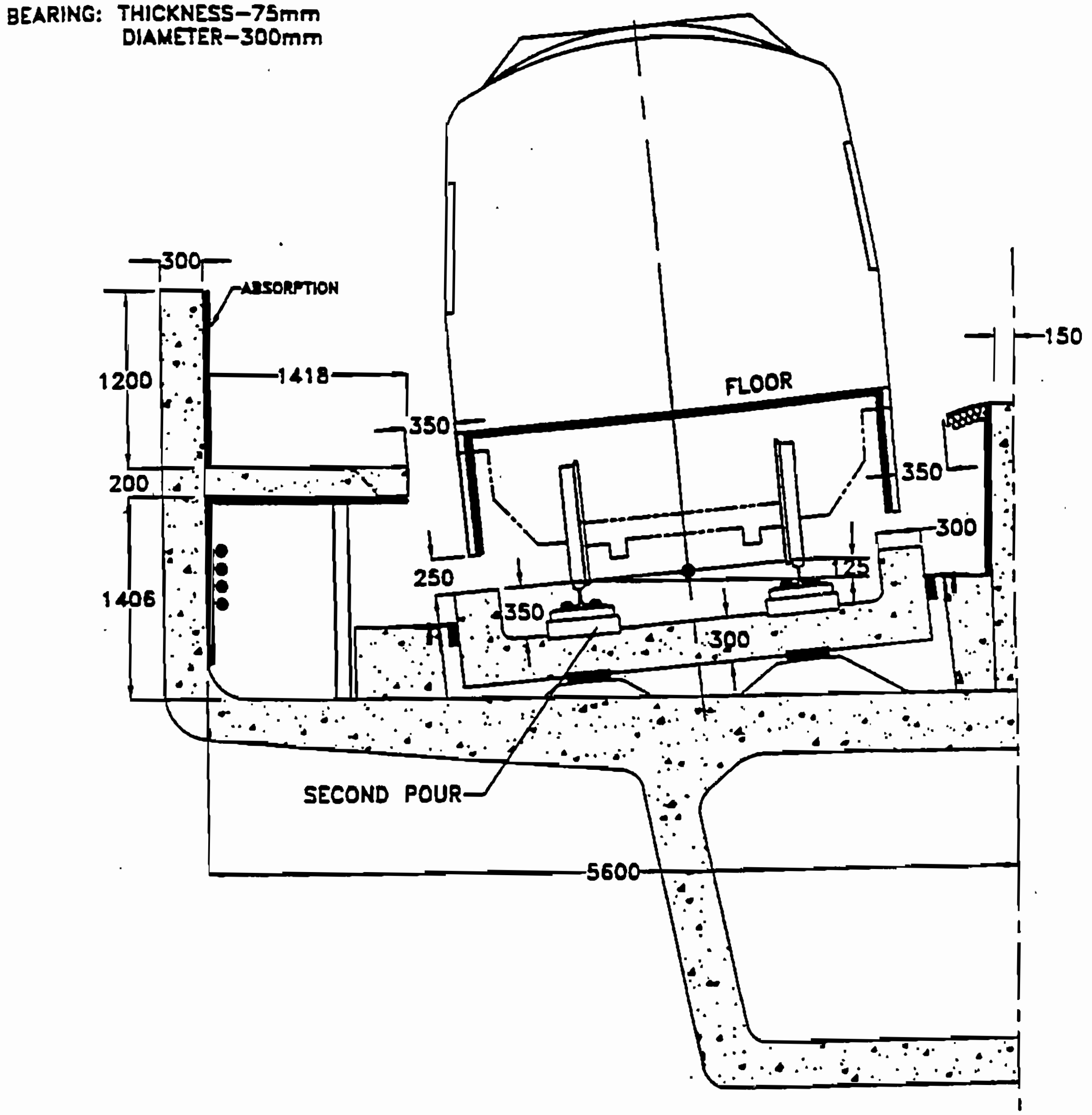
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

CROSS SECTION OF KCRC WEST RAIL VIADUCT DESIGN - SUPERELEVATED TRACK (125mm)

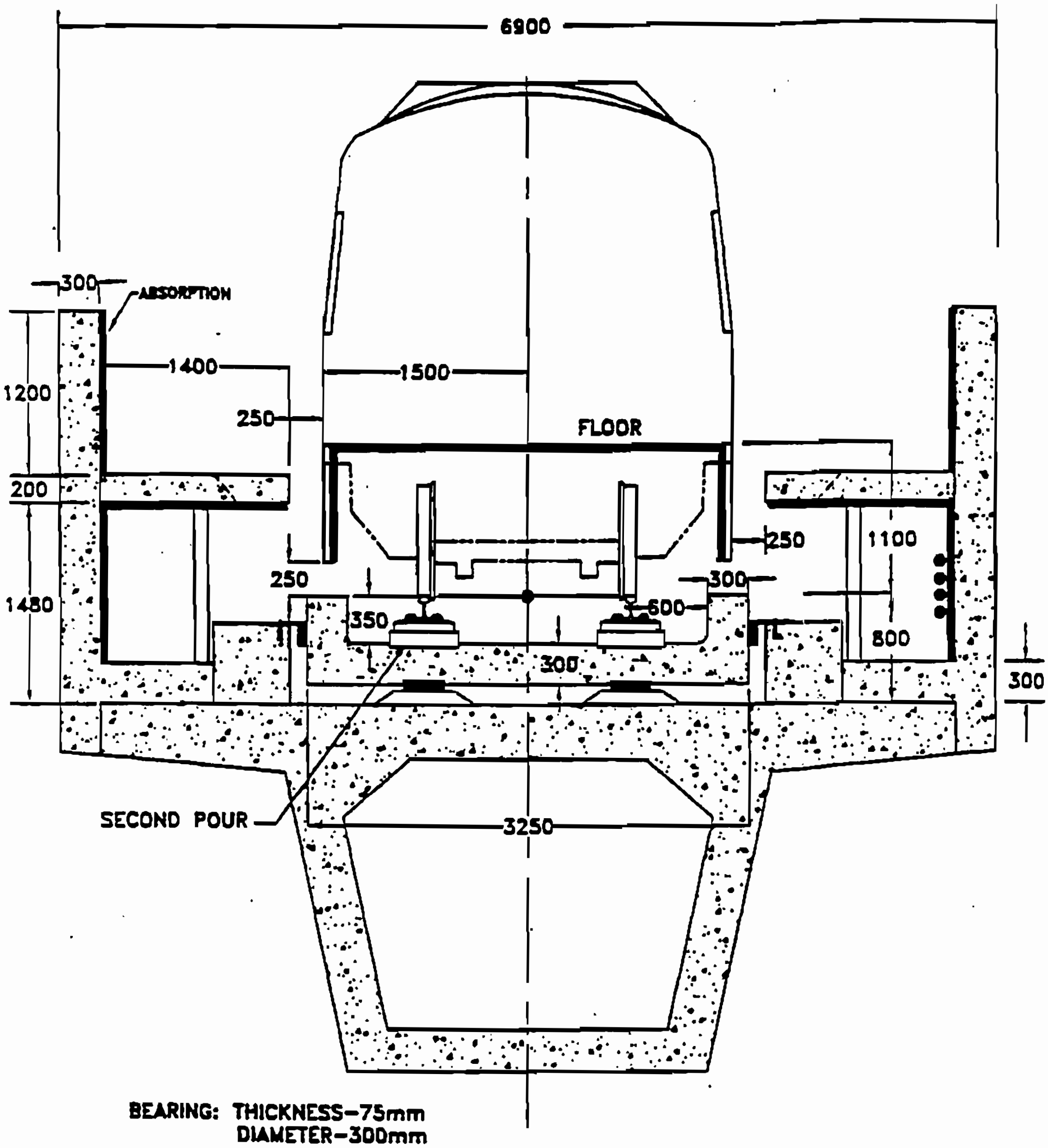
FIGURE 4

Contract/C1566/C1566_4

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



BEARING: THICKNESS–75mm
DIAMETER–300mm

NOT TO SCALE

CROSS SECTION OF KCRC WEST RAIL SINGLE TRACK VIADUCT DESIGN - WITH TANGENT TRACK

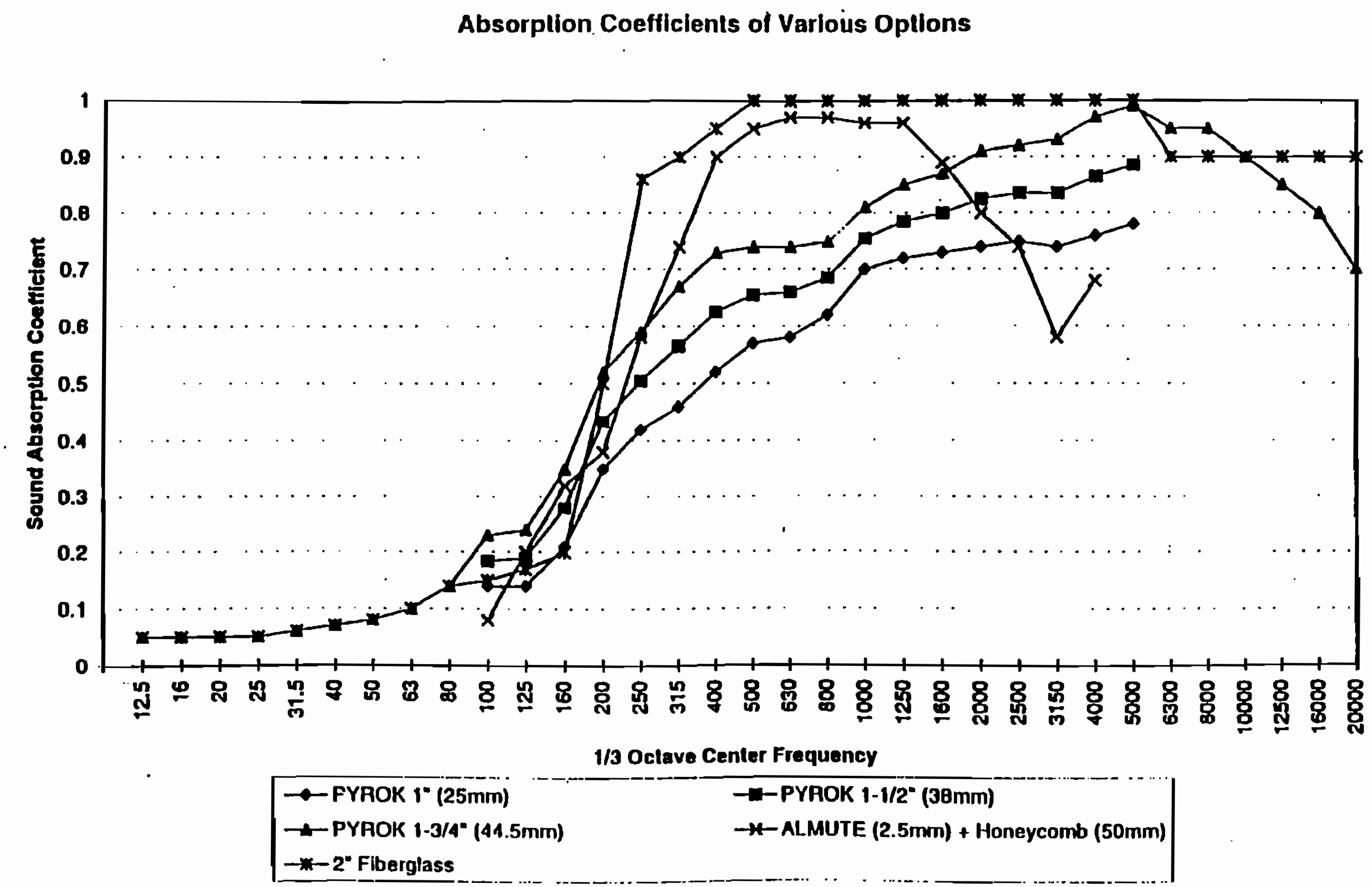
FIGURE 5

Contract/C1588/C1588_5

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



ABSORPTION COEFFICIENTS FOR VAIDUCT NOISE BARRIERS AND THE PLENA

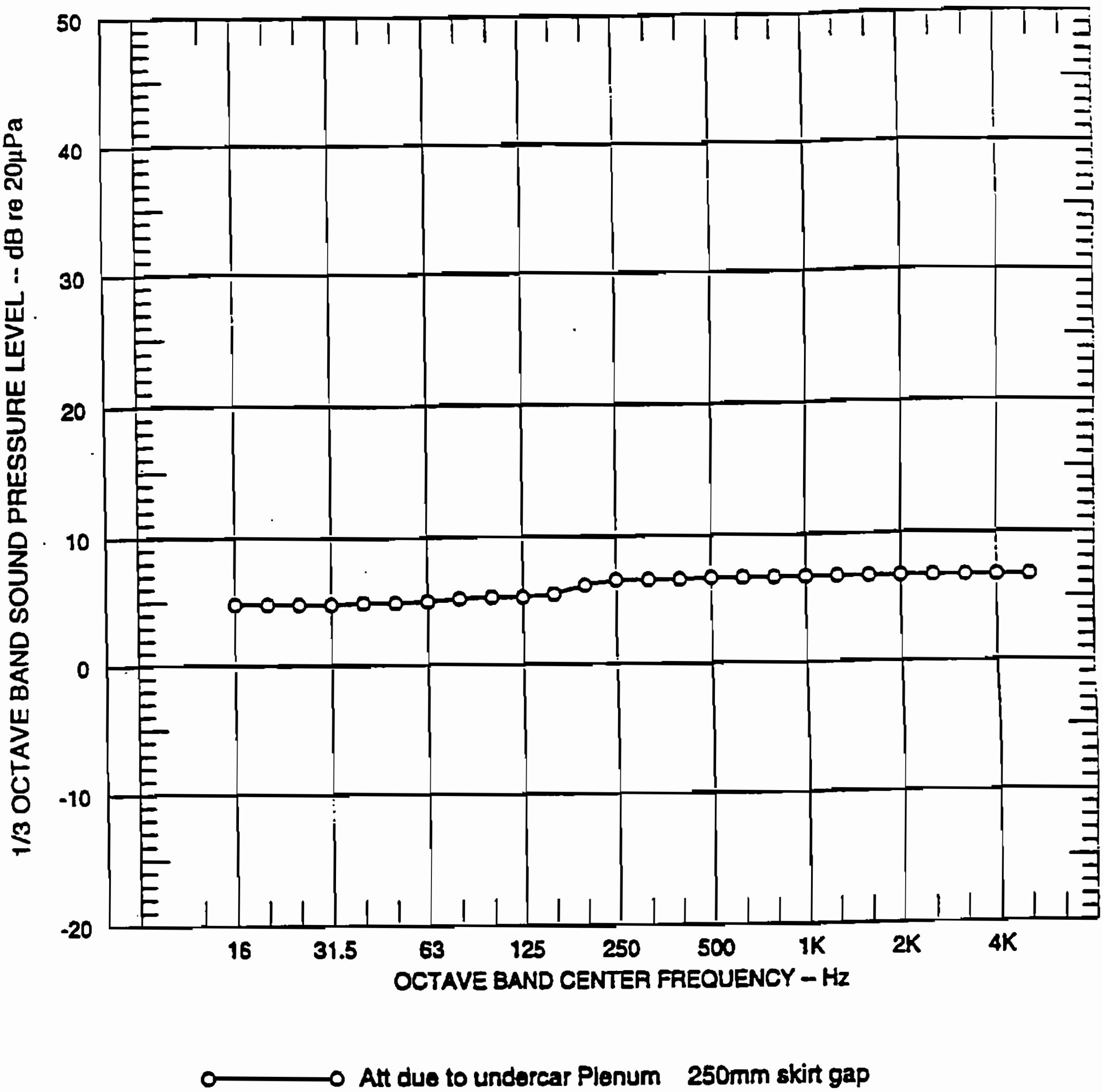
FIGURE 6

Contract/C1588/C1588_6

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CALCULATED ATTENUATION DUE TO THE UNDERCAR PLENUM

FIGURE 7

Contract/C1588/C1588_7

ERM

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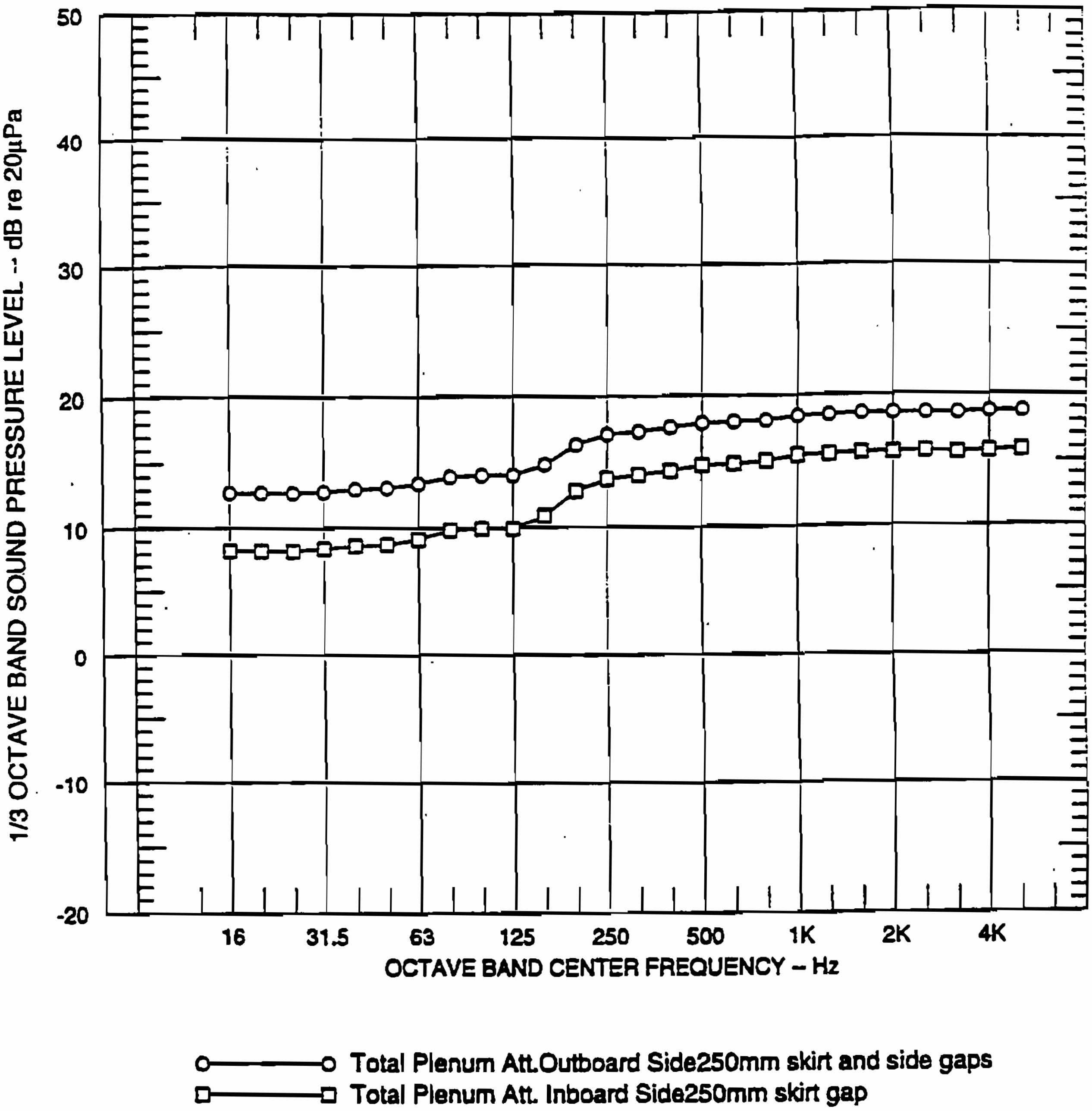
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

CALCULATED TOTAL ATTENUATION DUE TO PLENA

FIGURE 9

Contract/C1588/C1588_9

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

CONCEPT SPECIFICATION AND STRUCTURE RADIATED NOISE EVALUATION OF THE KCRC WEST RAIL VIADUCT

January 1998

1. INTRODUCTION

Contained herein is a summary of findings regarding the concept specification and structure radiated noise evaluation of the KCRC West Rail Project. This work was primarily performed by Alan Crockett and George Wilson at Wilson, Ihrig & Associates, Inc. (WIA) in Oakland, California. Much of this work has been previously presented at: 1) the KCRC Technical Workshop on Noise held in Hong Kong on 27-28 August 1997; 2) the KCRC Trackform Workshop held at Battelle in Columbus, Ohio on 9-10 October 1997; and 3) KCRC in Hong Kong on 28-29 October 1997 and 15-17 December 1997 to Members of the Board, KCRC Technical Staff and EPD Staff. This work has been primarily concerned with the prediction and minimisation of the wayside reradiated noise from the proposed KCRC West Rail Viaduct Structures with consideration given to EMU transit train, freight and mixed use traffic.

ERM-Hong Kong has determined in discussion with the Environmental Protection Department and members of the Operational Noise Working Group established by KCRC that given the noise criteria and allowances for the proposed alignment, the total wayside noise target could be expressed as a maximum overall A-weighted noise level at 25 m from the track centerline during a 12 car transit train passby of 64 dBA. For freight and mixed use traffic, the target level is 67 dBA. Thus, the direct noise from the train taken together with the structure radiated noise must be less than or equal to these values. A baseline noise level (no noise mitigation) at 25 m from the track centerline for a 12 car transit train travelling over the viaduct with a concrete deck at 130 km/h is taken to be 88 dBA. Thus a reduction of 24 dBA is required from the noise mitigation measures in order to achieve the target noise level.

1.1 Scope of the Project

This study has progressed forward in four phases as described in *Table 1*. Initially, it was assumed that a full enclosure was necessary for adequate reduction of the direct noise from the train and that different trackforms would be evaluated regarding their effectiveness in reducing the structure radiated noise. Phases 1 and 2 were thus planned to be an empirical study and a Finite Element Analysis (FEA), respectively, of structure radiated noise. After work on these phases had begun, the study was expanded to include the possibility of (cantilevered) edge wall barriers/ semi enclosure as an alternative to full enclosure. As a consequence of the determinations of Phases 1 and 2, Phase 3 was undertaken to evaluate the noise reduction effectiveness of a more elaborate direct noise barrier system consisting of noise plenums beneath the car and the safety walkway, in addition to edge walls.

Table 1 Chronology Of The KCRC Viaduct Noise Study

Chronology
1 Empirical Study of the Re-reradiated Noise from the Viaduct with Full Enclosure
2 FEA Study of Re-Radiated Noise/Analysis of Edge Walls -Semi Enclosure
3 FEA Study of Re-Radiated Noise/Evaluation of the Multi-Plenum Direct Noise Barrier
4 Effect of the Viaduct Structural Design and Civil Considerations on Re-Radiated Noise

In Phase 4, consideration was given to the possibility of eliminating the need for floating slab trackwork by altering the viaduct structure (increasing its mass and stiffness and reducing its noise radiating area) or of providing further noise reduction by structural redesign. Reradiated noise determinations were also made for freight and mixed use lines. In addition, predictions of reradiated noise, or more precisely, the design choices necessary to achieve wayside noise compliance, were to be brought in line with civil (structural) requirements. Finally, a number of special topics were to be addressed relating to the importance of reradiated noise from secondary structures on the viaduct.

2. EMPIRICAL ANALYSIS OF STRUCTURE RADIATED NOISE

For the Initial Assessment Report (IAR), preliminary estimates of reradiated noise reduction from low vibration trackform and floating slab were established by ERM Hong Kong Ltd. These identified a noise reduction of 15 dBA with Low Vibration Track (LVT) and 20 dBA from floating slab. If no full cover was placed upon the viaduct it was also assumed that a barrier/semi-enclosure system for mitigation of direct train noise could achieve as much as 18 dBA reduction. These preliminary estimates are summarised in *Table 2.*

Table 2 IAR Estimates of Noise Reduction at 25 m - Baseline: Ballasted Track No Facade Correction

Full Enclosure	Noise Reduction
LVT	15
Floating Slab/Stiff Baseplate	20
Barrier/Semi Enclosure	18

An empirical analysis was performed by WIA in the first phase of this project to ascertain whether these reductions were realistic. To determine the projected wayside noise for West Rail concrete viaduct structures, results from a number of noise measurement programs have been reviewed, assembled and interpreted in terms of the West Rail System expected operating characteristics. This work has been presented previously in Ref. 1 . The measurement programs and reviews considered include several completed at the San Francisco BART system, the Washington, D.C. Metro system, the Metropolitan Atlanta Rapid Transit System and the Hong Kong MTRC system. In all cases, the portions of the studies applicable to concrete viaduct structures were the subject of this investigation.

The reader is referred to Ref. 1 for the full description of the Empirical Study. For the purposes of this report, results developed in that work are presented which directly bear on the prediction of structure radiated noise and the confirmation of modelling assumptions. It suffices to say that the Empirical study began with a data review of the early information developed at the San Francisco BART System. The BART aerial structure or viaduct is the smallest cross-section of all of the viaduct studies and has a relatively low amount of structural radiation compared to the airborne noise. However, even at the BART structures, the low frequency wayside noise, i.e., below 125 Hz, is predominantly structure-radiated and, therefore, provides a starting point for developing the re-radiated noise for the West Rail concrete viaducts. The radiating area, the mass and the stiffness of the viaduct structures, which can vary significantly between different viaduct designs, as well as the stiffness of the track support system are major determinants of the reradiated noise. At systems such as the MTRC where very stiff rail fixation was used in the initial system and early extensions, the radiated noise is significantly greater because of the rail fixation stiffness. Therefore, throughout this study an effort has been made to take into account the effects of the rail fixation stiffness and structure design on the structure vibration levels and re-radiated noise.

Figure 1 presents the average of wayside noise levels from several sets of early measurements with the San Francisco BART system using 2-car prototype vehicle trains. This spectrum consists of a combination of structure radiated noise, mostly at low frequencies, and direct train noise which dominates the spectrum above about 200 Hz. The direct noise from the train comes primarily from the under car where it is radiated from the wheels, the rails and the trucks. As is apparent from the chart, after correction of the data for the original measurement speed to 130 km/h and for 12-car length train at 25 m distance, the average overall wayside noise level is about 88 dBA. This matches the assumed wayside overall A-weighted noise level at reference conditions (assuming no noise mitigation) for the West Rail Project. The rail was not smooth ground rail at the times of the measurements and therefore represents rail in an average condition of maintenance. This corresponds with the level developed from the Lantau Airport Railway (LAR) MTRC train baseline data for ballasted track after applications of the appropriate correction factors as discussed above. Throughout this study, this spectrum will be considered as the reference spectrum for total wayside noise.

Figure 2 presents data obtained at the covered aerial structure with floating slab located between the Kwai Fong and Kwai Hing Stations and at a comparable section of concrete viaduct north of the Kwai Hing Station. The MTRC viaduct without cover includes the sound barrier which attenuates the higher frequency airborne noise from the trains. The data was also taken in the (noise) shadow beneath, but not directly under, the viaduct thus further reducing the contribution of the train radiated noise. The low frequency re-radiated noise from the MTRC structure is very evident on *Figure 2*. One of the main reasons for the greater amplitude of the low frequency noise than for many of the other viaduct structures is the relatively stiff rail fixation used for the structures at the measurement location. The rail fixation is the very stiff continuous pad with Pandrol clips with embedded shoulders. This design results in higher vibration levels for the concrete structure than with the much more resilient baseplates used on the BART, Washington, D.C. Metro and MARTA structures.

The wayside noise measurement for the covered MTRC structure between Kwai Fong and Kwai Hing Stations has discontinuous floating slab with the stiff continuous pad type of rail support as for the adjacent sections of viaduct which do not have the floating slab track. The data on *Figure 2* show the very effective reduction of the lower frequency noise radiated from the structure. However, the higher frequencies do not show the reduction expected for two reasons: (1) the noise radiated from the floating slab in the 250 to 500 Hz region due to the stiff rail fastening and (2) the interference from background noise for frequencies above 500-1000 Hz.

Figure 3 presents two charts showing the adjustments made to the data from the MTRC structure intended to eliminate the effects of background noise which affected the higher frequency noise data, to eliminate the airborne noise component from the trains, and to eliminate characteristics of the spectra which can be attributed to the specific design of the structure. For instance, the resonance in the frequency range of 300-400 Hz for the floating slab section is not due to background noise. Analysis indicates it is associated with the fundamental longitudinal bending mode of the mini slab. But since this characteristic is sensitive to the design details of the floating slab, it was removed for the purpose of developing a generic projection. Later in this study, when more detailed minislab designs are considered, this spectral characteristic reappears and is considered in the analysis because the affect of the resonance is somewhat unavoidable given the range of floating slab designs under consideration. The two adjusted spectra on *Figure 3* indicate then the radiated noise as measured at the MTRC covered structure with the very stiff rail fixation characteristic of the MTRC structure.

Figure 4 presents the results for the BART and MARTA type concrete viaducts with relatively soft resilient rail fasteners (20 to 25 kN/mm) superimposed with the structure radiation from the uncovered MTRC structure with the very stiff continuous rail support. As is evident, the low frequency noise from the BART and MARTA structures are very similar. The average for the BART and MARTA trains establish the low frequency radiated noise and the upper frequency portion of the data curve is the estimated radiated noise from the viaduct with the airborne component from the train eliminated. Note that the MARTA data is for a structure with sound barrier wall so that it does include some increased radiating area compared to the BART structure data.

Figure 4 indicates then the difference in radiated noise which could be expected from the MTRC structures with a more resilient rail fixation system. Note that resilient rail fixation effects are generally limited to the frequency range above 31.5 Hz, as is shown by the data of *Figure 4*. The data in *Figure 4* indicate the correction factor which can be applied to the MTRC structure noise data for a more resilient rail fixation.

Figure 5 presents the final results showing the projected re-radiated noise from the MTRC concrete viaduct as corrected to the KCRC operating conditions. The charts on *Figure 5* also show the estimated additional effect of the Sonneville type rail fixation in reducing the radiated noise from the structure. This difference is based on measurements of the effect of the Sonneville rail fixation compared to a standard resilient direct fixation baseplate system. The primary effect is in the frequency range between 30 Hz and 250 Hz. Generally, structure vibration measurements show no significant difference at frequencies above 250 Hz with the Sonneville type track compared to resilient direct fixation baseplates.

The final chart on *Figure 5* indicates the noise level for the covered MTRC viaduct with floating slab, corrected to the use of a low stiffness rail fixation system and to the operating conditions for the KCRC West Rail Project.

As is evident on the charts of *Figure 5*, the noise level with the covered aerial structure and the Sonneville type track is 71 dBA for the 130 km/h, 25 m operating condition. With the floating slab/soft fastener track, the overall wayside noise at 25 m is 61 dBA for the same operating conditions. The performance with respect to noise reduction of the four trackform types are summarised in *Table 3* for the empirical study. The empirical estimate derived by WIA for the low vibration trackform is 14 as compared to the preliminary estimate of 15 dBA reduction. The Cologne Egg provides 13 dBA reduction, whereas the floating slab with the stiff baseplate provides approximately 19 dBA reduction as compared to the preliminary estimate of 20 dBA. Employing soft baseplates on the floating slab increases the noise reduction from 19 to 24 dBA. The floating slab system with soft baseplates is the only trackform which provides an adequate reduction of the wayside re-radiated noise to below target maximum level of 64 dBA.

Table 3 Empirical Study of Estimates of Noise Reduction at 25 M - Baseline: Ballasted Track, No Facade Correction, 12-Car Train at 130 Km/H, Full Enclosure

	IAR Preliminary Estimate	WIA
LVT	15	14
Cologne Egg	-	13
Floating Slab/Stiff Baseplate	20	19
Floating Slab/Soft Baseplate	-	24

For the floating slab track to be effective in mitigating to the extent required the structure vibration which causes the re-radiated noise, it is essential that a resilient rail fixation system be used at the floating slab. The recommended parameters are that the floating slab be a discontinuous type made up of 1.5 m or 3 m length precast segments with total weight not less than 2,000 kg per m of track and with resilient rail fixation to the floating slab. With resilient rail baseplates, the baseplate assembly should be in the range of 20 to 25 kN/mm static stiffness and not more than 30 to 35 kN/mm dynamic stiffness. The baseplates should spaced at not less than 750 mm on center. With closer spacing, a softer baseplate would be necessary.

For vibration isolation of the cover from the main structure, a relatively stiff isolation assembly could be used to effectively reduce the radiated noise. In fact, a system with resonance frequency in the range of 50 to 100 Hz would be satisfactory. The A-weighted noise level is affected primarily by the higher frequency noise, e.g., noise at 250 Hz and higher frequencies.

Because it is necessary to reduce only the higher frequency noise from the cover, a relatively stiff rubber pad type isolation provided between the cover and the viaduct deck could be very effective in reducing the radiated noise at higher frequencies. Even a relatively stiff continuous rubber pad, such as the continuous rail support pad used on the early MTRC structures, would be satisfactory. The fastening system must, of course, be arranged so that the fasteners do not cause a short-circuiting path around the rubber pad separating the two parts of the structure assembly. Rubber or neoprene grommets and sleeves can be used to provide isolation at anchor bolts which would be used.

3. MODEL FOR DETERMINATION OF STRUCTURE RADIATED NOISE

In the previous section, results were summarised from the study submitted on 13 July 1997, Ref. 1, of the expected re-radiated noise from the fully enclosed structure based on available empirical data from measurements at other transit facilities. This section describes the model used for the theoretical determination of the re-radiated noise. Central to this model is a finite element analysis (FEA) of the vibration transmission from the train into the trackform and down through the structure. From the vibration levels within the structure determined from the FEA, the structure radiated wayside noise is obtained at the standard reference conditions of 12-car train travelling at 130 km/h and at a distance of 25 m from the track center.

The finite element analysis of the structure is performed using the ANSYS 5.3 Finite Element Computer Program. The vibration levels in the structure are obtained from an analysis performed in the frequency domain. In all finite element analyses performed in this report, except the first of the full enclosure, a simply supported viaduct is assumed with pier spacing of 30 m. The model of the full enclosure is continuous over 5 spans and assumes a span length of 40 m. Variation in pier spacing will have an effect only at very low frequencies affecting ride quality and structural stability.

As vibration levels from one span to the next drop as much as 20 dB across a joint, the viaduct section modelled is between two joints. Thus, for a simply supported viaduct, only one span is modelled, whereas for the initial covered design, a 5 span section is studied. The load applied to the viaduct is one axle set on one track applied at midspan of the viaduct. Geometric symmetry allows the model to be reduced to half size along its length. Thus the simply supported span is modelled from midspan to the pier whereas the five span model is reduced to 2.5 spans. By applying symmetric and antisymmetric loading, running the model for each case and summing the results, the model size can be further reduced by another factor of two because modelling only ½ of the viaduct cross section is necessary.

The reduction of the model to 1/4 size is very important because it is necessary to employ a fine element mesh in order to resolve the vibration at high frequency. This fine mesh results in a Finite Element Model with as many as 30000 degrees of freedom and takes roughly 8 hours of computation time on a modern high speed workstation to calculate one case. Beam elements are used for the rail, plate elements for the floating slab, and brick elements for the structure. Effort was made to keep the characteristic length of an element on the order of 1/3 m, thus allowing resolution of propagating waveforms in the 300-700 Hz frequency range, which is the critical range for determining the overall A-weighted reradiated noise level.

Because the reduction of vibration across an expansion joint is on the order of 20 dB, it is assumed that the excitation of the span between joints is caused by the wheel sets located on the span. In the Finite Element Model, one wheel set is applied to the rail with primary and secondary suspensions incorporated and with unsprung mass, truck mass and coach mass included. Basic parameters of the model are listed in Appendix A. Excitation is applied by force via contact patch between wheel and rail such that at each frequency the roughness amplitude presented in *Figures 6 and 7* for wheel and rail roughness, respectively, is satisfied. Thus, it is assumed that roughness excitation is the major source of vibration in the structure as opposed to the moving impact load. At any point along the viaduct span, the vibration level due to all wheel sets acting on that structure section is obtained by an energetic incoherent sum of the contributions due to each wheel set. The contribution to the vibration level from each wheel set is obtained from the FEA for a single wheel set by using the vibration level determined by the model at the cross section whose distance from the single axle applied at midspan is the same as that from the axle in question to the structure section of interest along the viaduct span.

It can be seen in *Figures 6* and *7* (Ref. 2), that the roughness spectra for wheel and rail are very similar to that obtained by Remington in 1987, Ref. 3. The FEA uses an average of the roughness for the wheel and for the rail. It can also be seen that this level of roughness falls in the middle of the data presented in these figures. It thus represents neither the best nor the worst maintained wheel/rail but a wheel/rail in an average condition. For system wide projections of noise of the type presented in this work, an average condition of maintenance is the most realistic and therefore the most appropriate.

As a check of the assumption of wheel/rail roughness, a finite element analysis was performed on a generic viaduct with 54 kg/m rail and (soft) 21 KN/mm baseplates. The vertical vibration of the rail was determined, which incidentally, is not sensitive to the details of the support system beneath the trackform. It also provides a good measure of the appropriateness of the roughness assumption. This calculated vertical vibration is presented in *Figure 8* and compared to measured rail vertical vibration at the Washington Metro A13 aerial structure and Hightower Bridge at MARTA. Measurements on the WMATA A13 structure were made along sections of track with several types of stiff baseplates and several types of soft baseplates installed. Averaged vibration levels for the stiff and the soft baseplates are presented in *Figure 8*. The rails at the measurement locations and the wheels of most of the passby vehicles were in average to good condition. The calculated level of rail vibration compares favourably to the measured levels providing confidence in the assumed roughness spectra.

The vibration of the viaduct is converted to (reradiated) noise using the model developed by WIA for analysis of the Tsing Ma Bridge (TMB) (Ref. 4) , the Ma Wan Viaduct and the Kap Sui Mun Bridge (Ref 5). In the conversion to noise, the vibration levels of the radiating structural components at each cross section are weighted by cross section perimeter and cutoff frequency and energetically summed to obtain a sound intensity level for the cross section at a (cylindrical) radial distance from the viaduct. This sound intensity level per unit length of viaduct is then considered generic and incoherently integrated over the length of the train to obtain the sound intensity level due to the whole train at the given radial distance.

This method was recently put to test using vibration and measurement data taken on the TMB during passbys of work trains (Ref. 6). During the passbys of the work trains, vibration measurements were made on all of the major noise radiating trackform and bridge components. The radiated noise of each of these components was calculated as well as the total structural noise using the method described above. These spectra are shown in *Figure 9*. In *Figure 10*, the calculated total radiated noise determined from the vibration measurements is compared with measured noise 25m below and 25m diagonally below the track deck. Excellent agreement is shown between the calculated and measured levels, both on a spectral and an overall basis.

A final calibration of the finite element based reradiated noise model is presented in *Figure 11*. In that figure, the measured wayside noise level at the covered viaduct near Kwai Hing (MTR), adjusted to KCRC reference conditions is displayed. This measurement data is compared to a prediction of the reradiated noise using the method described above assuming trackform parameters relating to support stiffness and slab running weight similar to those specified for the Kwai Hing trackform. Good agreement between measurement and prediction is found up to about 600 Hz, which is the limit of the Finite Element based prediction. Above 600 Hz, the predicted reradiated noise is assumed to fall off at a rate of 12 dB per octave. Note that the resonance associated with the first longitudinal bending mode of the floating minislabs appears in both the measured and predicted results as is a major determinant in the overall A-weighted level.

4. RE-RADIATED NOISE ANALYSIS OF THE FULL ENCLOSURE

As a continuation of the Empirical Study, a Finite Element Analysis was performed to assess the reradiated noise from the fully enclosed viaduct with different trackforms. The results of this study are reported in Ref. 7. This reference also contains an assessment of the direct noise from the train and the mitigation of that noise by use of edge wall barriers/ semi enclosures. As this was a preliminary study wherein most of the issues were revisited in greater detail at a later date, it for the most part suffices to direct the reader to Ref 7 for further reading. A few of the issues, however, are relevant to the current report and are presented below. These are the difference in overall A-weighted levels with and without full enclosure and comparison of the expected noise reduction obtainable with the different trackform options.

As way of background, the Finite Element Model used for this part of the study assumed a fully enclosed viaduct with five spans between expansion joints and 40 m between piers. The cross section representation of the viaduct is shown in *Figure 12*, with isometric views of the inside and outside shown, respectively, in *Figures 13* and *14*.

The types of rail fixation included in the finite element analysis are:

- Sonneville type low vibration track, LVT, directly on the standard viaduct structure;
- Low stiffness egg type direct fixation baseplate;
- Floating slab track with high stiffness resilient rail fixation to the slab, similar to some rail fixation used at MTRC structures, and
- Floating slab track bed with low stiffness rail fixation, representing a fully effective floating slab track design.

The rail fixation parameters used for the analysis model are:

- LVT with dynamic stiffness of 44 kN/mm per block, block mass of 100 kg, spacing of 643 mm and rail pad with dynamic stiffness of 190 kN/mm.
- Egg type resilient baseplate with dynamic stiffness of 5.3 kN/mm, spacing of 643 mm.
- Concrete floating slab elements of 9 m length, 2100 Kg/m mass, support dynamic stiffness of 12.5 kN/m and rail support stiffness of 70 kN/mm at 643 mm spacing; and
- Concrete floating slab as for 3 but with rail baseplate stiffness of 9 kN/mm at 643 mm spacing.

These parameters roughly correspond to the trackforms considered in the preliminary empirical analysis.

The predicted wayside noise levels of reradiated noise for KCRC reference conditions (and level with the top of rail) are reported in *Table 4* for full enclosure and for several different edge wall heights. It can be seen that there is little difference in reradiated noise calculated for low vs high edge walls for any of the trackform options. However, there is a 2-4 dBA increase in the wayside noise level for LVT, soft baseplates and floating slab with stiff plates when the viaduct is fully enclosed. This is caused by radiation from the roof of the enclosure and an increase in radiation from the edge walls due to structural interaction between the edge walls and the roof. The effect is not significant in the case of the floating slab with soft baseplates where the difference with and without the roof is less than 1 dB. This is explained by the fact that the difference appears primarily in the lower frequencies and the floating slab with soft baseplates effectively removes the low frequency contributions whereas this is not the case with the other trackforms considered.

The prediction of the wayside noise levels for reference KCRC conditions for the empirical and the FEA of the full enclosure are presented in *Table 4* and compare to the preliminary estimates. As in the empirical analysis, the FEA indicates that the floating trackslab with soft baseplates is the only track form considered which will reduce the reradiated noise level to below the targeted maximum of 64 dBA. The preliminary, empirical and FEA estimates for the floating slab with stiff baseplates agree; however, the FEA indicates rather disappointing performance for both the LVT and the egg type baseplate when compared with the estimates presented in the Empirical Study. This can be explained by the fact that the reductions assumed for these trackforms were obtained from installations, such as at grade and in tunnels, were the surface upon which the trackform is mounted is very stiff, or in other words, is a high impedance mount. Vibration transmission reduction systems work best when they are installed on a high impedance mounting. The viaduct structure is, by contrast, not a high impedance mount. Therefore optimal performance cannot be expected from resilient mounts placed on a viaduct. The reason why the floating slab reductions are more consistent is because the empirical projections are based on actual measurement data taken on the MTR viaduct with floating slab installed, and not on at grade or tunnel installations.

Table 4 Wayside Noise Levels for Re-Radiated Noise at Top-of-Rail Elevation, 25 M, 130 Km/Hr, 12-Car Train

Configuration	Noise Levels dB(A) Re Radiated
LVT	
Fully Enclosed	79
Full Height Barrier	76
4.3 m Height Barrier	76
2.5 m Height Barrier	76
1.5 m Height Barrier	76
Cologne Egg	
Fully Enclosed	76
Full Height Barrier	75
4.3 m Height Barrier	74
2.5 m Height Barrier	74
1.5 m Height Barrier	74
Floating Slab with Stiff Baseplates	
Fully Enclosed	67
Full Height Barrier	63
4.3 m Height Barrier	63
2.5 m Height Barrier	63

Configuration	Noise Levels dB(A) Re Radiated
1.5 m Height Barrier	63
Floating Slab with Soft Baseplates	
Fully Enclosed	57
Full Height Barrier	56
4.3 m Height Barrier	56
2.5 m Height Barrier	56
1.5 m Height Barrier	56

Table 5 Prediction of L_{max} (dBA) at 25 m for 130 Km/Hr, 12-Car Train

	IAR Preliminary Estimate	Empirical	FEA .
Full Enclosure			
LVT	70	71	79
Cologne Egg	-	72	76
Floating Slab/Stiff Fastener	65	66	67
Floating Slab/Soft Fastener	-	61	57

5. PREDICTED AND WAYSIDE NOISE ANALYSIS OF THE MULTI PLENUM SYSTEM WITH EDGE WALLS

During the Empirical Study, it was decided that full enclosure along the entire length of the West Rail Viaduct was unacceptable for a number of reasons relating to cost, safety considerations and aesthetics. In the Ref. 8, the companion report to this study, the effectiveness of an alternative strategy to full enclosure is considered for the reduction of the direct noise from the train to a level sufficiently below the target maximum of 64 dBA. Edge walls of various designs were first considered and it was found that even with the most optimistic expectations of performance, the target criterion would still be exceeded. To achieve this level of reduction, very tall edge walls would have to be erected which would be impractical if not cost prohibitive to build, on account of wind loading, and would also be unaesthetic.

An alternate system, called the multi plenum system, was conceived at the 1st KCRC West Rail Workshop on Noise and evaluated in Ref. 8 regarding its effectiveness in mitigating the direct train noise. The concept is portrayed for the viaduct cross section in *Figure 15* for tangent track, and in *Figures 16-17* for curved track. Additional mitigation of direct train noise is achieved by creating noise plenums beneath the vehicle and under edge and center walkways to attenuate the noise source (beneath the train). Edge walls of considerably lower height are shown in Ref. 8 to be adequate in the reduction of the direct noise, when employed on the viaduct together with the plenums. This then implies that having employed this scheme, satisfaction of the (total) maximum wayside noise criterion depends on adequate reduction of the structure radiated noise, just as in the case of full enclosure.

A Finite Element Model of the viaduct with tangent track, shown in *Figure 15*, was constructed to determine the structure radiated noise levels for the LVT, the soft baseplates and the floating slab trackforms. A plan view of the floating mini slabs appears in *Figure 18*, showing the lateral and longitudinal resilient restraint pads and 4 egg type baseplates on each mini slab.

The rail fixation parameters used for the analysis of the multi plenum viaduct are:

- LVT with dynamic stiffness of 20 kN/mm per block, block mass of 100 kg, spacing of 750 mm and rail pad with dynamic stiffness of 200 kN/mm.
- Egg type resilient baseplate with dynamic stiffness of 12 kN/mm, spacing of 750 mm.
- 12 Hz Concrete floating mini slab elements of 1.5 m length, 2844 Kg/m mass, bearing dynamic stiffness of 6.5 kN/mm and rail support stiffness of 12 (soft), 30 (moderate) and 70 (stiff) kN/mm at 750 mm spacing.

The viaduct is assumed to consist of simply supported spans of 30m. Cross sections and isometric views of the finite element discretization are shown in *Figures 19 and 20*, respectively. The estimated structure radiated wayside noise for the five different trackforms is shown in *Figure 21*. It is seen that only the floating slab trackform with moderate to soft baseplates have overall A-weighted levels (63 and 58 dBA, respectively) less than the target of 64 dBA. The levels for the egg type fastener and the LVT are 75 and 74 dBA, respectively, which is roughly 10 dBA higher than the criterion. It is interesting to note that the level with floating slab and stiff baseplate is 69 dBA, indicating that the benefits of the floating slab can be compromised by selection of a baseplate which is too stiff. As mentioned previously the 400 Hz resonance appearing in the spectra d with the floating slab is attributable to the 1st longitudinal bending mode of the slab. Experiments in which the slab is lengthened, however, indicate that there are other resonances, caused primarily by the bending of the viaduct structural elements and occurring near 400 Hz, which become evident and tend to dominate the A-weighted level once the slab resonance is shifted to a lower frequency. As will be seen, it is not a simple matter of just lengthening the slab to gain a significant reduction in the A-weighted level.

On disadvantage to the use of floating slab trackform is that the slab itself radiates noise. The stiffer the baseplates, the more the slab radiates. This will become an issue only if the slab radiated noise becomes on the order of or exceeds the train noise. This trend appears in the slab radiated noise shown in *Figure 22*. The A-weighted noise level of the slab with stiff baseplates is 88 dBA, which is the same as that for the train noise, whereas the noise level for the moderate and soft baseplates is considerably less than that of the train.

Figure 23 shows the reference train with the structure radiated noise removed and *Figure 24* displays the noise receptors and sound barriers of different heights considered in the study of the mitigation of the direct train noise Ref 8. In *Figures 25-28*, the direct noise and the structure radiated noise is combined at receptor location 7 (25 m from track centerline and at top of rail) to obtain the total wayside noise, with and without the attenuation provided by the multi plenum and a 1.2 m high (measured from the walkway) edge wall system.

The combined noise from the train, deck and floating slab beneath the train are shown in *Figure 25* with no mitigation applied. For the LVT, the egg type fastener and the soft and moderate baseplates on the floating slab, the overall A-weighted combined noise is approximately that of the train noise alone. However the combined noise from the train and from the floating slab with the stiff baseplates is 91 dBA, or 3 dBA higher than the train noise alone.

In *Figure 26*, the structure radiated noise shown in *Figure 21* is energetically added to the combined under car noise displayed in *Figure 25* to obtain the total wayside noise with no mitigation applied. Comparison of *Figures 25* and 26 indicates that if there is no mitigation of the noise from the under car, it will completely determine the total overall A-weighted wayside noise level.

In *Figure 27*, the combined noise from the train, deck and floating slab beneath the train, as shown in *Figure 25*, is attenuated with the multi plenum system and the 1.2 m high edge wall. The overall A-weighted level after attenuation of the train noise only is 62 dBA as given in *Table 6* (taken from Ref 8) wherein the noise levels predicted for the multi plenum model at the ten receptor shown in *Figure 24* are given. It can be seen in *Figure 27* that the overall A-weighted levels for the LVT and egg type track, as well as the floating slab with soft baseplates is also about 62 dBA. The levels for floating slab with moderate and stiff baseplates are 64 and 66 dBA, respectively, again due to the additional under car noise radiated from the floating slab.

Table 6 Noise Levels (L_{max}) Predicted for the Multi Plenum Model at the Ten Noise Receptors Located 25 m from the Track Centerline and with Line-Of-Sight (Los) Indicated at Various Heights Above Ground -Re: 130 Km/H, 12-Car

RECEPTOR LOCATION (Height above Ground)	NO NOISE MITIGATION - dBA-	1.2 m (2.9 m) EDGE BARRIER - dBA -	2.5 m (4.2 m) EDGE BARRIER - dBA-	4.2 m (5.9 m) EDGE BARRIER - dBA-	5.4 m (7.1 m) EDGE BARRIER - dBA-
OUTBOARD:					
1. 1.5 m	88	53.8	50.6	49.4	49.3
2. 7 m (tor)	88	55.8	51.5	49.6	49.3
3. 12 m	88	58.2	53.0	50.2	49.6
4. 17 m	88	61.4	54.9	51.2	50.1
5. 22 m	88	63.4 los	57.2	52.8	51.1
INBOARD:					
6. 1.5 m	88	58.1	55.5	53.8	53.4
7. 7 m (tor)	88	62.0	58.0	54.9	53.9
8. 12 m	88	67.7	61.6	56.9	55.1
9. 17 m	88	74.2 los	67.0	60.2	57.3
10. 22 m	88	74.2 los	74.0 los	64.3	60.5

Figure 28 is analogous to *Figure 26* in that the structure radiated noise shown in *Figure 21* is energetically added to the combined under car noise displayed in *Figure 27* except now the under car noise is attenuated by the multi plenum system and the 1.2 m high edge wall. It is only the total noise for the floating slab with soft baseplates that satisfies the maximum 64 dBA limit at Receptor 7 with a 1.2 m high edge wall. The overall A-weighted noise levels presented in *Figures 25-28* are summarised in *Table 7*.

Table 7 Noise Levels (L_{max}) Estimated at Noise Receptor 7 (Inboard Tor) for the Different Trackform Options - Re: 130 Km/H, 12-Car

TRACKFORM	NO NOISE MITIGATION - dBA-	DIRECT NOISE AND UNDERCAR COMPONENT - dBA-	STRUCTURE RADIATED NOISE W/O UNDERCAR COMPONENT - dBA-	TOTAL NOISE - dBA -
1. Cologne Egg				
12 kN/mm	88	62	75	75
2. LVT				
20 kN/mm	88	62	74	74
3. Floating Slab				
70 kN/mm	88	66	69	71
4. Floating Slab				
30 kN/mm	88	64	63	66
5. Floating Slab				
12 kN/mm	88	63	58	64

There are several conclusions which can be drawn from *Table 7*:

- Only floating slab track from with relatively soft baseplates will be capable of reducing total wayside noise to within compliance.
- Placing stiff base plates on floating slab not only increases the noise radiated from the viaduct, but also from the floating slab itself.
- It is not sufficient for the structure radiated noise and the mitigated under car noise to be each less than 64 dBA to insure the total wayside noise is less than 64 dBA because the total wayside noise is the energetic sum of the two. Consider the case of floating slab with moderately stiff baseplates: the mitigated under car noise and the viaduct structure radiated noise are 64 and 63 dBA, respectively, whereas the total noise is 66 dBA. The energetic sum of the two can be as much as 3 dBA higher than either of the two in the worst case of their spectra being identical. If the spectra are similar, the structure radiated noise and the mitigated under car noise levels must be each roughly 61 dBA in order for the total noise to be within compliance.
- In the case of the floating slab with soft baseplates, the total noise level is increased by 1 dBA over the mitigated under car noise (63 dBA) even though the overall A-weighted level of the mitigated under car noise is 4 dBA higher than that of the structure radiated noise. Thus the total noise level will be within compliance when either the structure radiated noise or the mitigated

under car noise is near the maximum level (64 dBA) only if the other is significantly below (by roughly 5 dBA) the maximum level.

It should be noted that in the above example, neither the floating slab trackform nor the viaduct structure are optimised for maximum reradiated noise reduction. If necessary, the edge wall can also be made higher to further reduce the under car noise. Thus, although it is true in principle that the floating slab trackform with relatively soft baseplates is necessary for wayside noise compliance, the extent to which the noise can be reduced depends on the detail design of the viaduct, the trackform and the multi plenum/edge wall system.

6. EFFECT OF STRUCTURE TRACKFORM AND CIVIL REQUIREMENTS ON PREDICTED NOISE LEVELS FOR THE EMU LINE

In this section two important topics are discussed. First, the effect of the viaduct design on the reradiated noise is considered in order to resolve the issue of whether the need for floating slab trackform can be eliminated by alteration of the design of the viaduct. If floating slab cannot be eliminated then it would be useful to determine roughly how much noise reduction can be gained from structure optimisation. The second major issue concerns whether it will be possible to design a floating slab for the EMU and for the mixed use lines (freight and EMU) which will satisfy both the noise reduction and the civil (structural) requirements.

We begin with consideration of viaduct structural changes which are within or approaching the limit of practicality but which it is believed will lead to lower levels of reradiated noise. The three changes which lead toward this objective are to reduce the radiating area of the structure, to increase its mass and to increase its stiffness. It must be remembered that redesign is limited by the fact that the multi plenum/ edge wall system must be installed on top of the viaduct for adequate reduction of the under car noise and that this system has certain spatial requirements. One design which significantly reduces the radiating area is a single track as opposed to a double track viaduct, as shown with the multi plenum/ edge wall system in *Figure 29* without floating slab, and in *Figure 30* with floating slab.

In *Figure 31* the concept is taken further, by doubling the thickness of all of the structural members. Although this example probably goes beyond what is buildable, it will illustrate the advantages of a very significant increase in the mass and stiffness of the viaduct.

The estimated reradiated noise for different viaduct designs is shown in *Figure 32* for the reference KCRC conditions and dynamic (soft) baseplate stiffness of 12 kN/mm. As presented earlier, the overall A-weighted levels for the two track viaduct with and without the 12 Hz floating slab are 58 and 75 dBA, respectively. The level for the standard single track viaduct with no floating slab is 72 dBA, whereas for the stiff massive version it is 69 dBA. Thus for a single track structure with significantly reduced radiating area and significantly increased mass and stiffness, the reradiated noise level is still 5 dBA over the criterion even with very soft baseplates. With more moderate baseplates, as shown in *Figure 33*, the overall A-weighted level for the stiff massive single track structure is 72 dBA or 8 dBA over the target level. It is therefore concluded that compliance cannot be achieved without floating slab by optimisation of the structure. It should be noted, however, that the low frequency rumble noise is significantly mitigated by the viaduct changes, almost down to the performance level of the floating slab.

Viewed from a different perspective, optimisation of the structure can be very beneficial. The more that reradiated noise reduction can be achieved from the structural design, the more latitude there will be for civil considerations in the trackform design. In *Figure 32*, there is a 6 dBA advantage in noise level between the 'standard' two track viaduct and the stiff massive single track viaduct.

Analysis up to this point has not taken into account the major civil requirement on trackform design impacting the reradiated noise consideration, that is, the vertical deflection of the rail. Also, the viaduct had been redesigned with thicker cell walls, thereby increasing somewhat the stiffness and mass of the viaduct. In order to make more realistic reradiated noise projections, these factors needed to be taken into account.

Figures 34 and *35* show the revised FEA model cross sections for the two track and single track viaducts, respectively, with the strengthened cell walls. Additionally it was agreed with KCRC that, as a working assumption, the vertical static deflection for the EMU and freight lines would be limited to 7 and 5 mm, respectively. One configuration for the mini slab trackform which satisfies the 7 mm requirement for the EMU line is 21 kN/mm dynamic (15 kN/mm static) baseplates on 750 mm centers with 13 Hz 1.5 m mini slabs (2844 kg/m running mass) on 7.1 kN/mm dynamic stiffness bearings. This trackform/viaduct design shall be referred to as the current EMU configuration.

The reradiated noise from the slab and from the structure for this revised configuration are shown in *Figures 36* and *37*, respectively, and compared with the previously analysed floating slab/ viaduct configuration. It can be seen that the slab radiated noise is similar to the previous 12 Hz floating slab model with 30 kN/mm baseplates whereas the structure radiated noise is similar to the previous 12 Hz floating slab model with 12 kN/mm baseplates. Since these previous cases were shown to satisfy the total noise wayside requirement, these results indicate by similarity that it is possible to construct a floating slab trackform on the current (nonoptimized) two track viaduct design which satisfies the most important civil requirement of 7 mm static vertical rail deflection as well as the wayside noise requirement.

The reradiated noise levels from the slab and from the viaduct are plotted for the single and two track current EMU configurations in *Figure 38*. The overall A-weighted levels for the slab noise are similar because the trackform impedance mount does not have a significant effect on the slab vibration at the higher frequencies. However the structure radiated noise for the single track viaduct is 55 dBA, or 4 dBA lower than that for the two track viaduct.

Another kind of structural alteration is considered in *Figure 39*, with the FEA implementation shown in *Figure 40*. In this case an attempt was made to increase the stiffness or impedance of the mount beneath the floating slab support bearings by increasing the number of cells from one to three and moving the cell walls to beneath the bearings. A comparison of the slab and structure radiated noise for the one vs three cell viaduct designs is shown in *Figure 41*. The 12 Hz floating slab trackform with 30 kN/mm dynamic stiffness baseplates is assumed. The slab noise radiation is roughly similar, whereas the reradiated noise from the three cell viaduct is about 3 dBA lower than for the one cell viaduct. Note that due to the large difference in spectra between 160 and 400 Hz, the reduction of the reradiated noise could be considerably greater if the structural resonances at the higher frequencies were to align differently.

7. EFFECT OF STRUCTURE TRACKFORM AND CIVIL REQUIREMENTS ON PREDICTED NOISE LEVELS FOR THE FREIGHT AND MIXED USE LINES

The operational, wayside noise and civil requirements for the freight and mixed use lines are quite different from those for the EMU only line. If double stack freight is allowed, the maximum axle load, from the standpoint of rail fatigue life, is 32 tonnes. For single stack freight, it would be 22 tonnes whereas for the EMU line it is 18 tonnes. As shall be seen, the agreed upon maximum vertical static rail deflection of 5 mm will have very different consequences with regards to meeting the maximum wayside noise target of 67 dBA for these different tonnage requirements.

Besides the maximum static vertical rail deflection requirement, civil requirements demand a baseplate which can stand up to the punishment that the freight loading delivers to the baseplate. KCRC prescreened baseplates for freight usage and found that the ATP Acoustic Loadmaster may be suitable. In order to interject realism into the wayside noise projections for freight, WIA used the Loadmaster dynamic characteristics for the baseplate in the reradiated noise modelling. These characteristics were obtained from dynamic tests performed on the Loadmaster by WIA and are summarised in *Table 8*. The dynamic stiffness for this baseplate at the 22 tonne axle load for single stack freight is 49 kN/mm whereas for the 32 tonne load for double stack freight, it is 58 kN/mm. These stiffnesses are considerably higher than the value of 21 kN/mm used in the current EMU configuration. Additionally, the baseplate center spacing was reduced from 750 mm to 600 mm which further increases the effective stiffness of the baseplates.

Table 8 Selected Operational and Performance Data Pertaining to the Use of the Acoustic Loadmaster for Freight

AXLE LOAD (tonnes)		STIFFNESS (kN/mm)		DYNAMIC-TO-STATIC RATIO
Maximum	Noise	Static	Dynamic	
18	15	3.5	46.4	1.97
22	18	25.7	49.1	1.91
32	25	31.2	58.4	1.87

Other than the floating slab trackform properties, the other modelling parameters for freight are assumed to be the same as those for the EMU line, as described in Appendix A. The Acoustic Loadmaster or another baseplate with similar dynamic properties is assumed to be used in all instances on the freight only and mixed use lines. In the first attempt to satisfy the static rail deflection requirement, the slab running weight of 2844 kg/m was kept the same as in the EMU line. Since the baseplate center spacing was decreased to 600 mm, the length of the (mini) slab module was increased to 1.8 m with 6 baseplates on top of and six support bearings underneath each slab. In order to meet the static deflection requirement with double stack freight, the dynamic stiffness of the slab support bearings was increased to 14 kN/mm, which resulted in a 20.5 Hz floating slab. The reradiated noise from the slab and structure for this configuration is shown in *Figure 42*. The overall A-weighted wayside noise levels for the slab and the structure are 88 and 70 dBA, respectively. Thus the target of 67 dBA total maximum wayside noise level will be exceeded by this configuration.

If the running slab weight is doubled from 2844 kg/m to 5688 kg/m the resonance frequency of the slab will be reduced from 20.5 Hz to 14.5 Hz with no change in the static rail deflection, all other things being equal. There is a significant structural consequence to this alteration because the viaduct needs to be designed to carry the extra weight. A comparison of the reradiated noise, assuming 32 tonne freight, is made for the different mass floating slabs and is presented in *Figure 43*. Unfortunately, there is very little difference in the overall A-weighted levels, of either the slab or the viaduct reradiated noise. The resonance (spectral) structure in the viaduct response has certainly changed; however, the summation leads to similar A-weighted levels.

For the 22 tonne axle freight, the 1.8 m module length mini slab is again chosen, except in this instance, the running slab mass is assumed to be 4266 kg/mm. In order to satisfy the static rail deflection requirement, a bearing dynamic stiffness of 8.8 kN/mm is required. This results in a slab resonance frequency of 13.2 Hz. The reradiated noise spectra for the slab and viaduct are presented in *Figure 44*. The overall A-weighted levels for the slab and viaduct are 86 and 66 dBA, respectively. These levels indicate that the structure radiated noise is below the targeted level of 67 dBA.

In *Figure 45*, all conditions and design parameters are kept as in *Figure 44* except that the slab length is increased to 5.4 m from 1.8 m. The structure and slab radiated noise for both cases is compared in *Figure 45*. Again, as in the case of the floating slabs of different resonance frequencies, the resonance structure of the reradiated noise at higher frequencies is changed in the viaduct; however, there is little difference in the overall A-weighted levels for either the slab or the viaduct.

Figure 46 considers the same conditions and comparisons as in *Figure 45*, except the viaduct structure is assumed to be the strengthened three cell viaduct. For the 5.4 m slab the structure radiated noise is about the same for the two viaduct cross sections; however, for the 1.8 m slab, the structure radiated noise is reduced by 5 dBA with the strengthened three cell structure to 61 dBA. This results from the fact that the dominant resonance at higher frequencies for the 1.8 m slabs falls in the frequency range where the strengthened three cell viaduct is very effective at reducing the noise level. Fortuitous alignment of resonances did not occur in the case of the longer slabs.

The reradiated noise for 22 tonne axles on a single track viaduct is shown in *Figure 47* for the 5.4 m and the 1.8 m floating slab trackforms. In this case the reradiated noise levels for both trackforms is similar, with the structure radiated level at about 62 dBA, or 5 dBA below the targeted level.

There are several conclusions which can be stated concerning the freight study:

- The Acoustic Loadmaster or another baseplate with similar performance appears have the potential to satisfy the civil and perhaps the noise requirements for the freight and mixed use lines, at least for the 22 tonne axle (single stack) freight
- It was not possible to satisfy both the static rail deflection requirement and the wayside noise requirement for the 32 tonne (double stack) freight, given the design variations considered in this study. The exceedance was 3 dBA which could potentially be eliminated by viaduct structure optimisation.
- No significant advantage in reducing the A-weighted levels was obtained from either increasing the floating slab length or significantly increasing its mass
- For the 22 tonne axles, the structure radiated noise was reduced to 61 dBA for 13.2 Hz mini slabs on a strengthened three cell, two track viaduct, and to 62 dBA for the same trackform on a 'standard' single track viaduct. These levels are about 5 dBA below the targeted wayside criterion for freight.

In the case of strengthening the viaduct by the three cell design, a benefit of 5 dBA reduction was achieved for the short slabs, whereas for the longer slabs, there was no appreciable benefit. This is a consequence of the resonance interaction of the viaduct and the trackform, indicating that structural optimisation is possible but requires some analysis.

8. MISCELLANEOUS TOPICS

In this section a number of miscellaneous topic are addressed.

Figure 48 shows a comparison of the noise radiated from a 12 Hz floating slab of different lengths relative to the 1.5 m mini slab module for the dynamic baseplate stiffness of 30 kN/mm. The 4.5 module on the average does not show much difference in performance from the 1.5 m length slab. However, it has a considerably different resonance structure which can amplify or attenuate different frequency bands compared to the mini slab. Thus performance benefit or loss depends on slab-structure resonance interaction. The longer slabs radiate higher noise levels over most of the frequency range.

In *Figure 49*, the noise radiated from slabs in front of the train are shown. By 7 m ahead of the train, the overall A-weighted noise level is reduced by over 30 dBA. This indicates that radiation of noise from the slab in front of and behind the train (and therefore outside of the undercar plenum) does not significantly contribute to the wayside noise.

Measurement data of rail vibration from the WAMATA A13 Aerial structure and from the MARTA Hightower Bridge are presented in *Figure 50*. Comparison of the data taken for the soft vs the stiff fasteners at WAMATA indicates that although there is higher vibration of the rail when soft baseplates are used, this difference occurs primarily at lower frequencies. Therefore, there is very little effect on the A-weighted level. In *Figure 51*, this difference is plotted to show more clearly that the higher rail velocities in the case of the soft baseplates occurs only at the lower frequencies. Since the cutoff frequency of the rail is quite high, very little of this low frequency increase is radiated as noise away from the rail. The reference spectrum for the train noise does therefore not have to be corrected because soft baseplates will be employed as part of the reradiated noise mitigation.

The results presented in *Figures 50* and 51 were for soft and stiff baseplates directly attached to the viaduct. In *Figure 52*, the calculated rail vibration is presented with and without floating slab. Again it is seen that differences occur only at low frequencies which do not radiate as noise from the rail, leaving the a-weighted level unchanged. The reference spectrum for the train noise does therefore not have to be corrected because floating slab will be employed as part of the reradiated noise mitigation.

In *Figures 53* and 54, comparisons are made of respectively of the rail vibration and the noise radiated from the rail under and ahead of the train. *Figure 54* shows first that the model calculation of the noise radiated from the rail beneath the train agrees quite favourably with the assumed train noise reference spectrum, of which the rail noise is a part. Secondly, it shows that by about 10 m in front of the train, the noise radiated from the rail drops to a level that can be adequately mitigated by the edge wall only, without the need of coverage by the undercar plenum. The rail out in front of the train need not therefore be considered as a separate line source in the determination of the total wayside noise. As a modelling assumption, the radiating rail out in front of and behind the train can be adequately taken into account by assuming that the train is 1/4-1/2 car longer than it is actually to account for this radiation.

This assumption about how far in front of and behind the train the rail radiates significant noise is further substantiated by the measurement data taken during a train passby on the LA Metro and shown in *Figure 55*. For the microphone placed 1.2 m from the train, it can be seen that the high noise levels occur only when the train is adjacent to the microphone, and not before or after the passby.

In *Figure 56*, measurement data is shown indicating the increase in noise due to the presence of switches and crossovers. The increase in direct noise is taken from wayside noise measurements made with and without a switch installed on the BART San Leandro test track. The difference in overall A-weighted level of 8.5 dBA is not sensitive to speed between roughly 45-130 kM/h. The difference in reradiated noise was obtained from simultaneous measurements taken on the concrete decks of two adjacent simply supported spans of the MARTA Hightower bridge one span supported a crossover and the other supported simple tangent track.

In *Figure 57*, the noise radiated from the opposite track slab is presented for the current EMU configuration. It shows that the radiated noise level is 28 dBA and therefore can be neglected in the determination of the total wayside noise. In *Figure 58*, The structure radiated noise levels are traced from the floating slab under the train to the floating slab on the opposite track to show the reduction of radiated noise from one slab to the other.

9. CONCLUSIONS

9.1 Empirical and Full Enclosure FEA Study

In Phase 1, empirical data was gathered from previous studies on reradiated noise levels near transit train concrete viaduct structures and also on the vibration reduction performance of resilient baseplates, low vibration trackwork (LVT) and floating slab trackwork. After the data was applied to the KCRC West Rail Viaduct, it was found that with full enclosure, only the floating slab trackform provides sufficient reduction of the structure radiated noise. In Phase 2, the FEA was performed on the KCRC West Rail Viaduct to determine the structure radiated noise. The FEA also predicted that only the floating slab trackform provides sufficient reduction of the structure radiated noise.

9.2 Reradiated Noise Analysis of the Viaduct with the Multi Plenum System with Edge Walls

- The multi-plenum direct noise barrier together with floating slab trackform and resilient baseplates can reduce the total wayside noise to the targeted wayside noise level.
- Only floating slab track from with relatively soft baseplates will be capable of reducing total wayside noise to within compliance.
- Placing stiff base plates on floating slab not only increases the noise radiated from the viaduct, but also from the floating slab itself.
- It is not sufficient for the structure radiated noise and the mitigated undercar noise to be each less than 64 dBA to insure the total wayside noise is less than

64 dBA because the total wayside noise is the energetic sum of the two. If the spectra are similar, the structure radiated noise and the mitigated undercar noise levels must be each roughly 61 dBA in order for the total noise to be within compliance.

9.3 Effect of Structure Trackform and Civil Requirements On Predicted Noise Levels for the Emu Line

- Structural redesign, within practical limits, will not provide adequate reduction of the reradiated noise, and therefore, will not eliminate the need for floating slab.
- Low frequency rumble noise can be significantly mitigated by the viaduct changes.
- The more that reradiated noise reduction can be achieved from the structural design, the more latitude there will be for civil considerations in the trackform design.
- It is possible to construct a floating slab trackform on the current (nonoptimized) two track viaduct design which satisfies the civil requirement of 7 mm static vertical rail deflection and the wayside noise requirement.

9.4 The Freight and Mixed Use Study

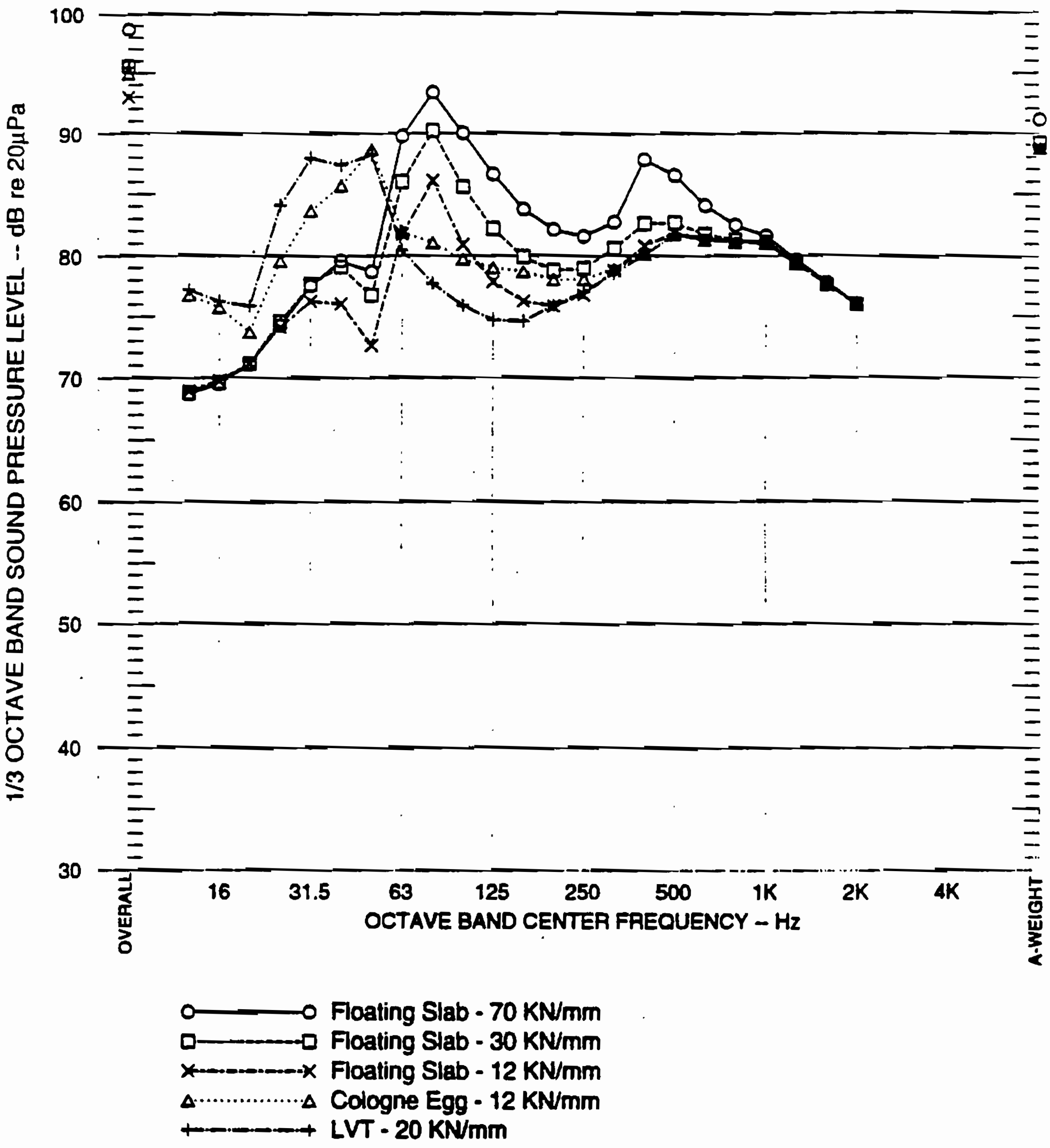
- It was not possible to satisfy both the static rail deflection requirement and the wayside noise requirement for the 32 tonne (double stack) freight. The exceedance was 3 dBA which could potentially be eliminated by viaduct structure optimisation.
- No significant advantage in reducing the A-weighted levels was obtained from either increasing the floating slab length or significantly increasing its mass
- For the 22 tonne axles, the structure radiated noise levels are about 5 dBA below the targeted wayside criterion for freight.

In the case of strengthening the viaduct by the three cell design, a benefit of 5 dBA reduction was achieved for the short slabs, whereas for the longer slabs, there was no appreciable benefit.

9.5 Conclusions from Miscellaneous Topics

- Longer slabs radiate higher noise levels over most of the frequency range.
- Radiation of noise from the slab in front of and behind the train does not significantly contribute to the wayside noise.
- The reference spectrum for the train noise does not have to be corrected because soft baseplates will be employed as part of the reradiated noise mitigation.

- The reference spectrum for the train noise does therefore not have to be corrected because floating slab will be employed as part of the reradiated noise mitigation.
- As a modelling assumption, the radiating rail out in front of and behind the train can be adequately taken into account by assuming that the train is 1/4-1/2 car longer than it is actually to account for this radiation.
- At switches and crossovers, the difference in overall A-weighted level is 8.5 dBA. The difference in reradiated noise is 4 dBA.



NOT TO SCALE

WIA

ESTIMATED TOTAL NOISE FROM THE TRAIN AND VIADUCT WITH NO MITIGATION OF THE DIRECT NOISE - re: 12 CAR, 130 kmh, 25m DISTANCE

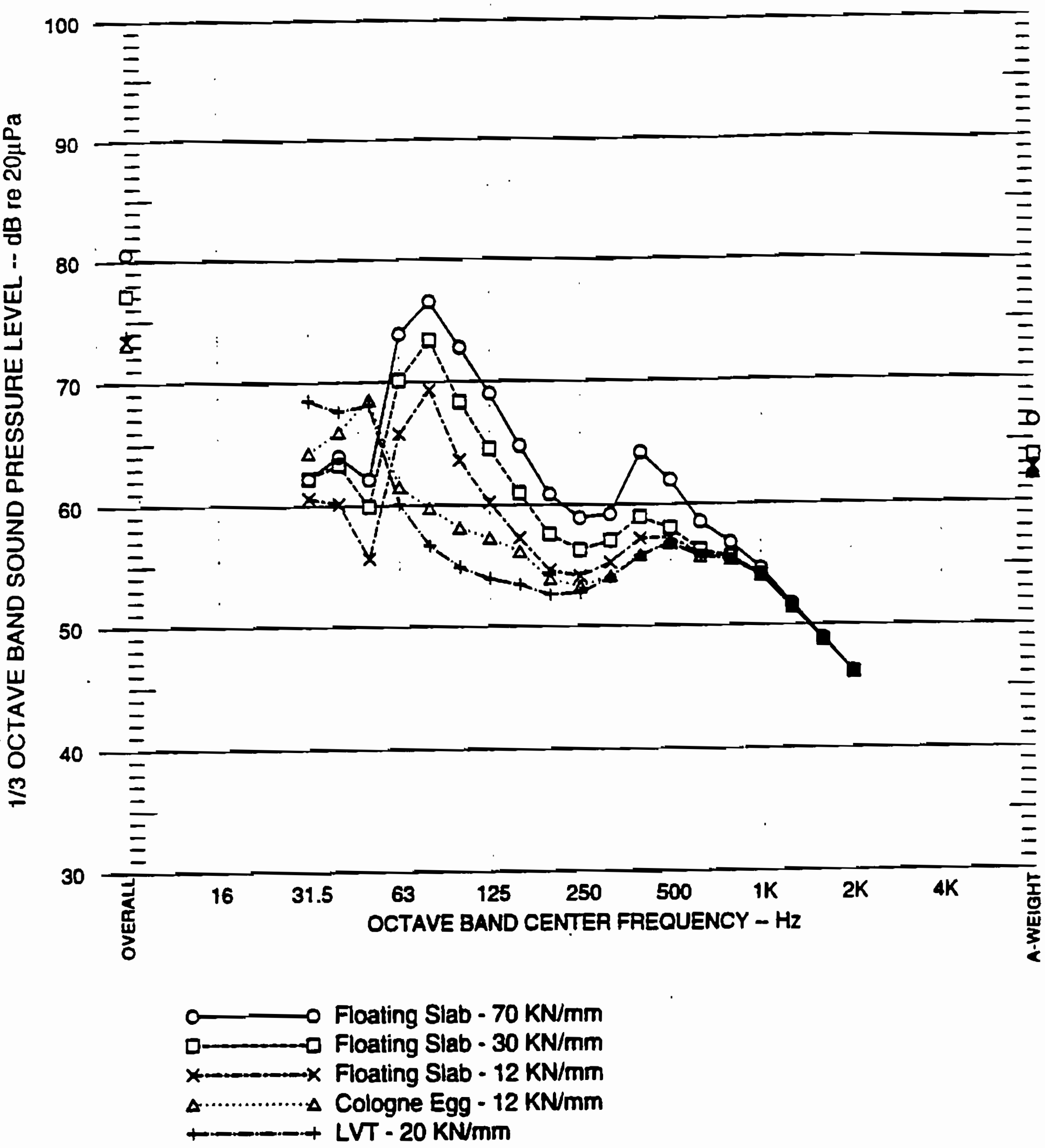
FIGURE 26

Contract/C1588/C1588_56

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED TOTAL NOISE FROM THE TRAIN AND FROM THE DECK (FLOATING SLAB) UNDER THE TRAIN AT LOCATION 7 WITH MAXIMUM MITIGATION APPLIED (1.2m EDGE WALL AND DOUBLE PLENUM SYSTEM)

W I A

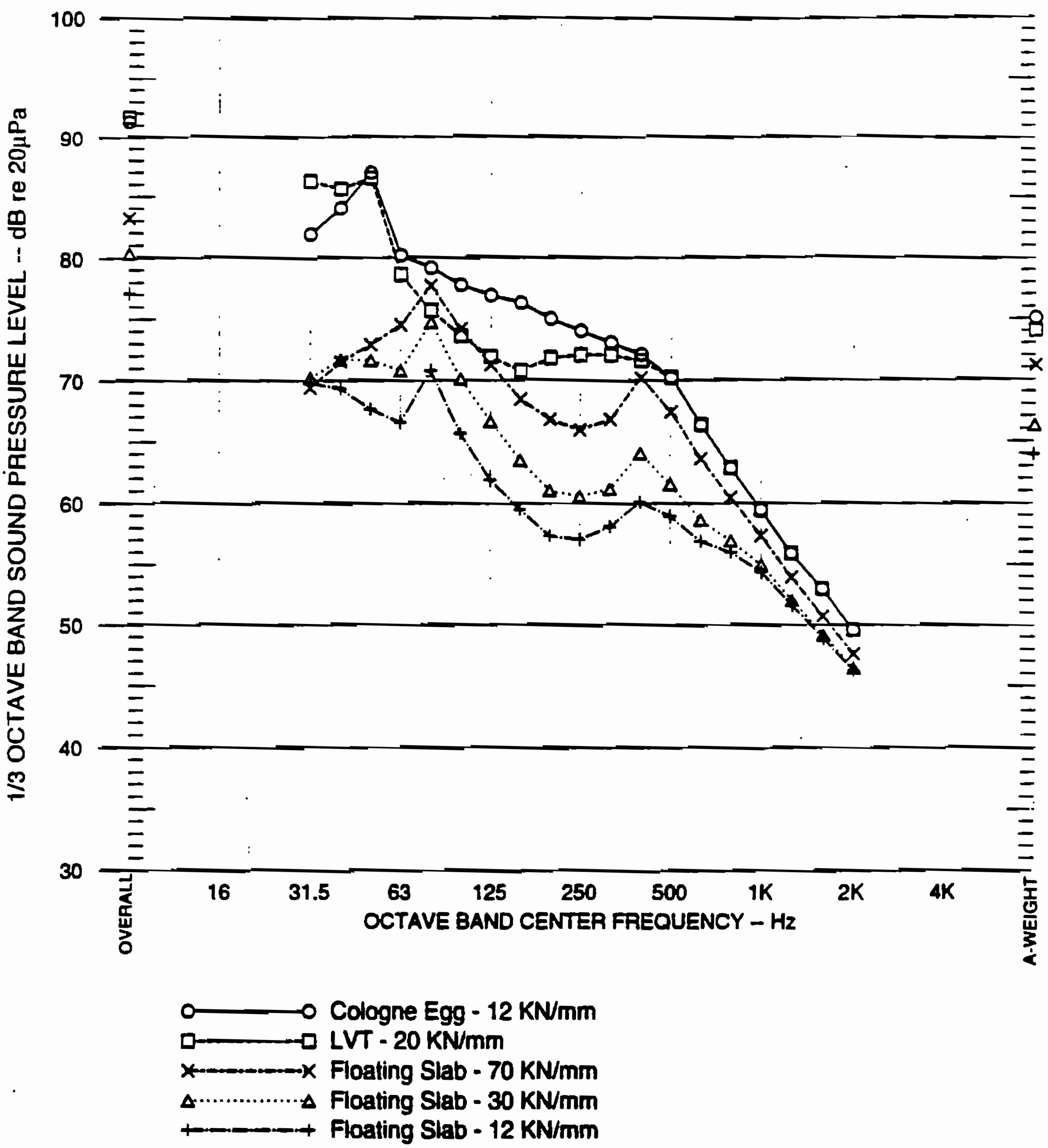
FIGURE 27

Contract/C1588/C1588_57

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A

ESTIMATED TOTAL NOISE FROM THE TRAIN VAIDUCT AT LOCATION 7 WITH MAXIMUM MITIGATION OF THE DIRECT NOISE (1.2m EDGE WALL AND DOUBLE PLENUM SYSTEM)

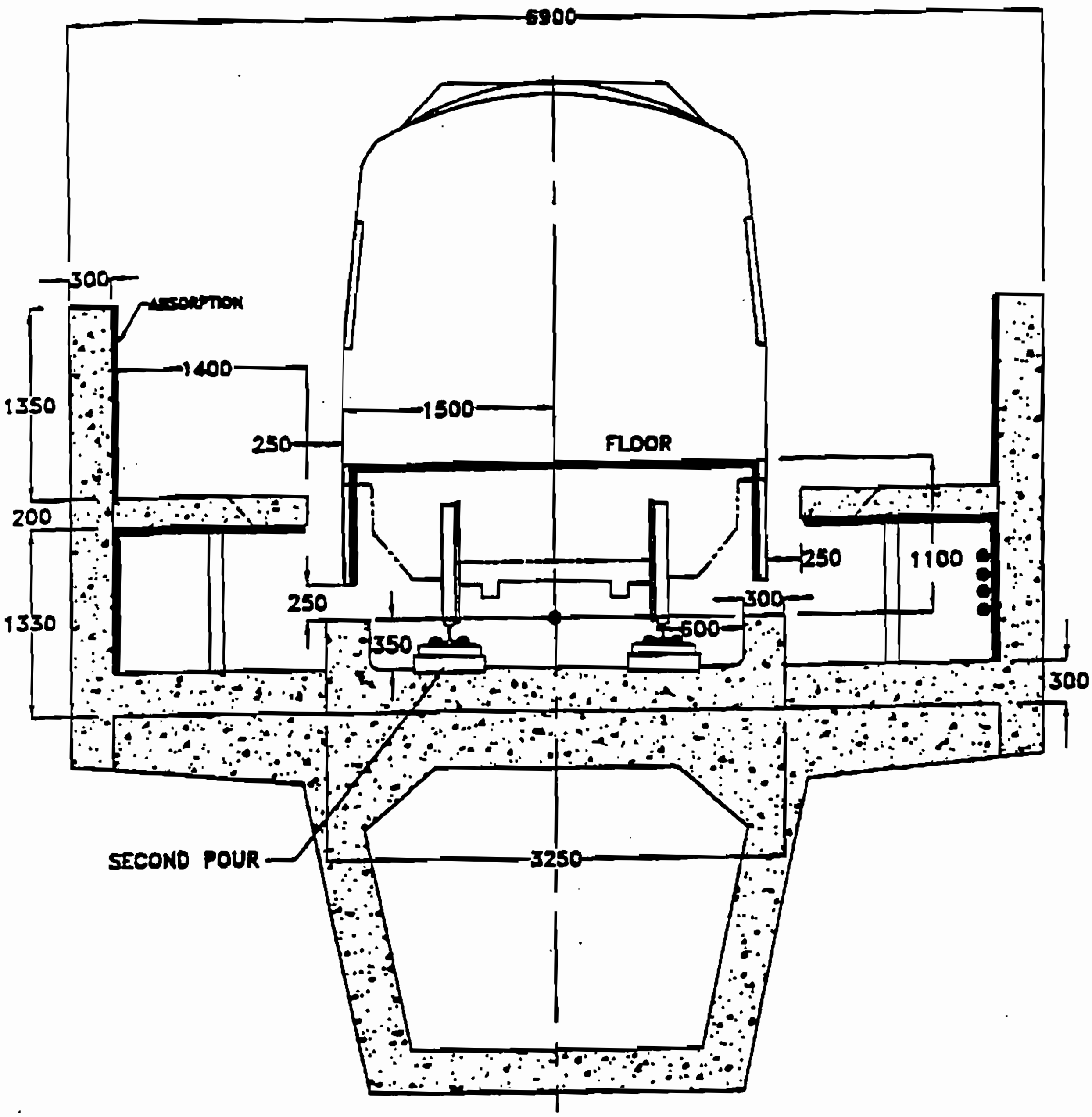
FIGURE 28

Contract/C1588/C1588_58

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL SINGLE TRACK VIADUCT DESIGN - WITH DIRECT FIXATION RAIL FASTENERS

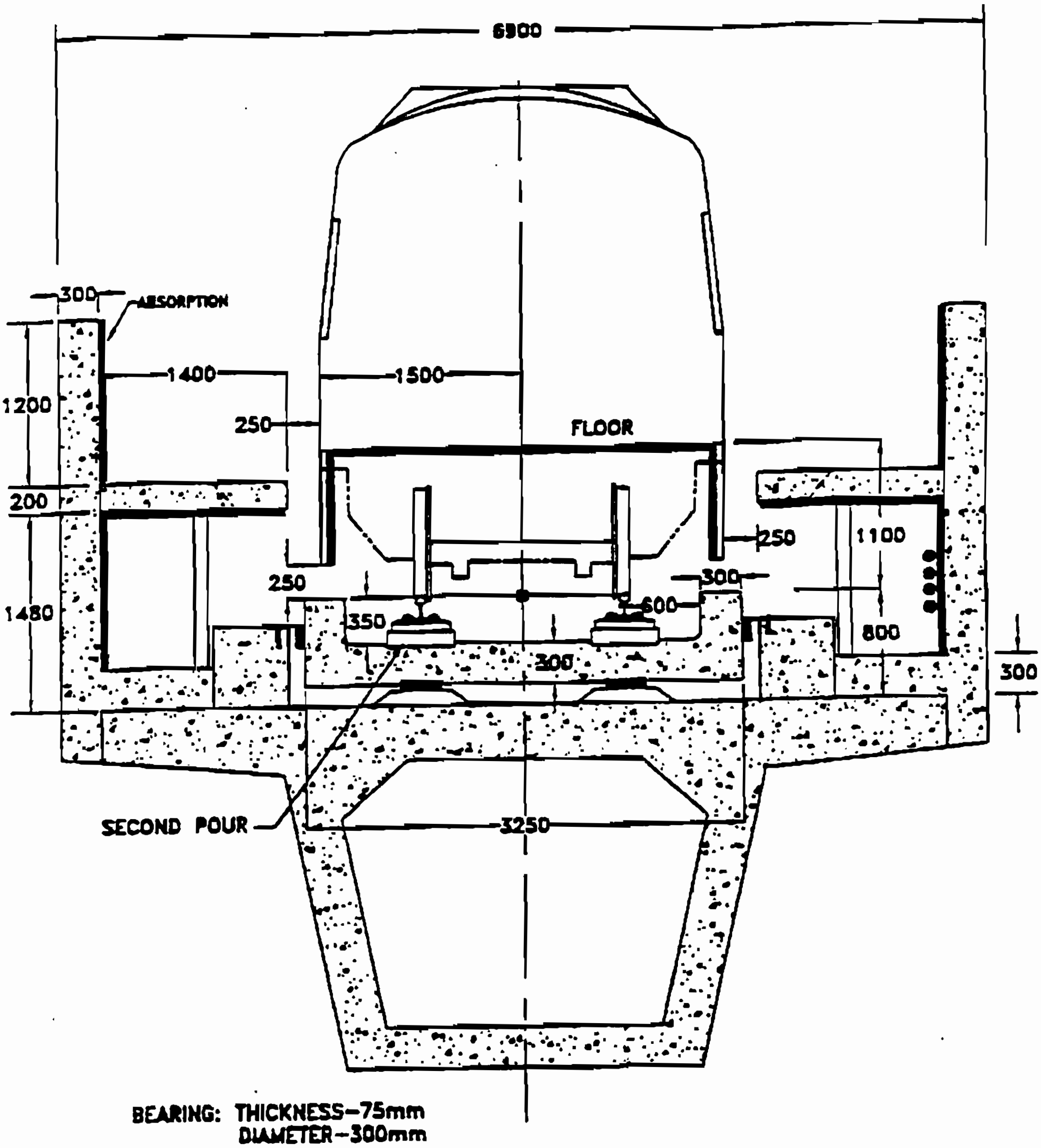
FIGURE 29

Contract/C1500/C1500_59

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL SINGLE TRACK VIADUCT DESIGN - WITH FLOATING SLAB

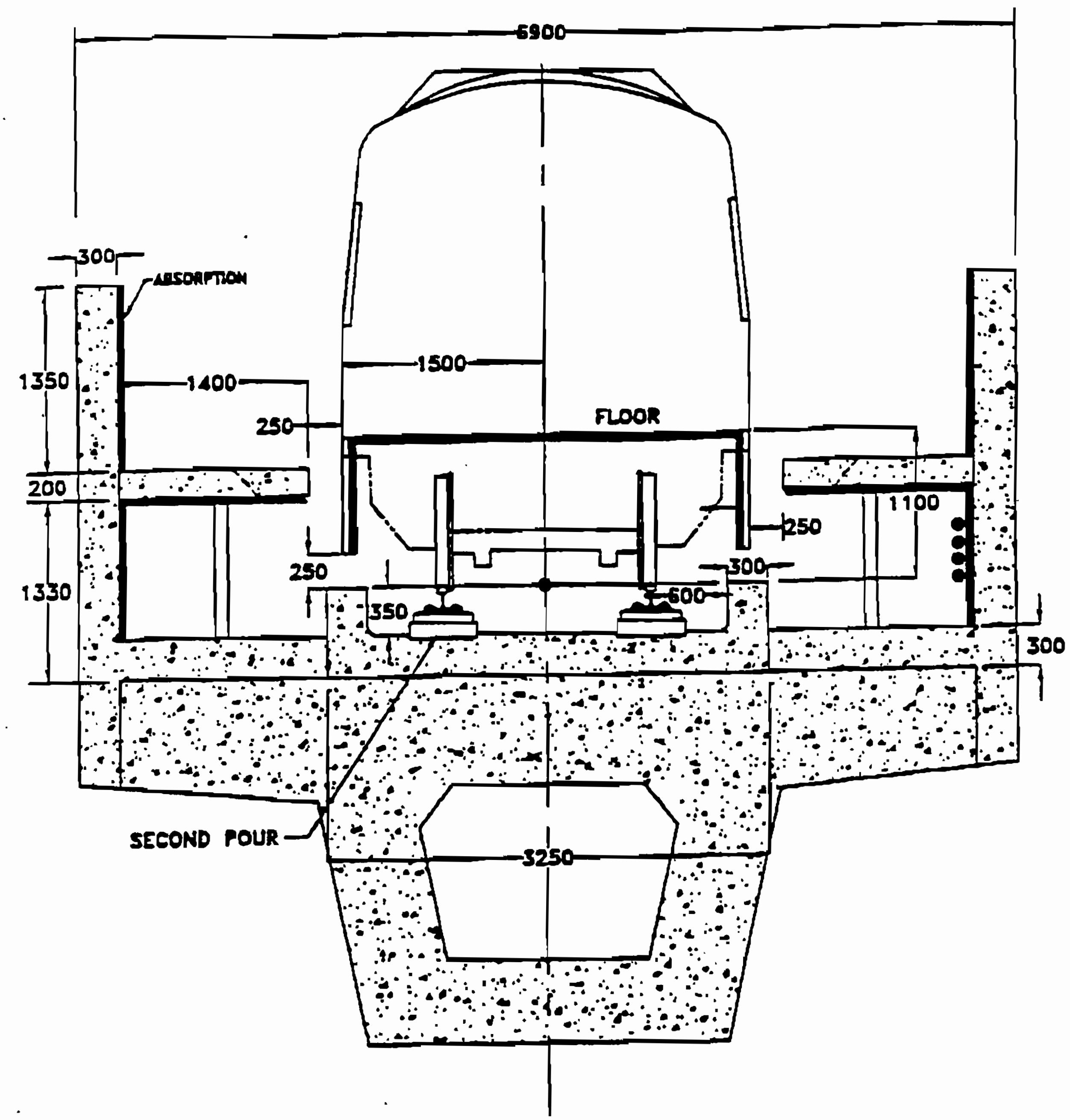
FIGURE 30

Contract/C1589/C1589_60

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL SINGLE TRACK VIADUCT DESIGN - WITH MASSIVE SUPPORT CELL AND DECK

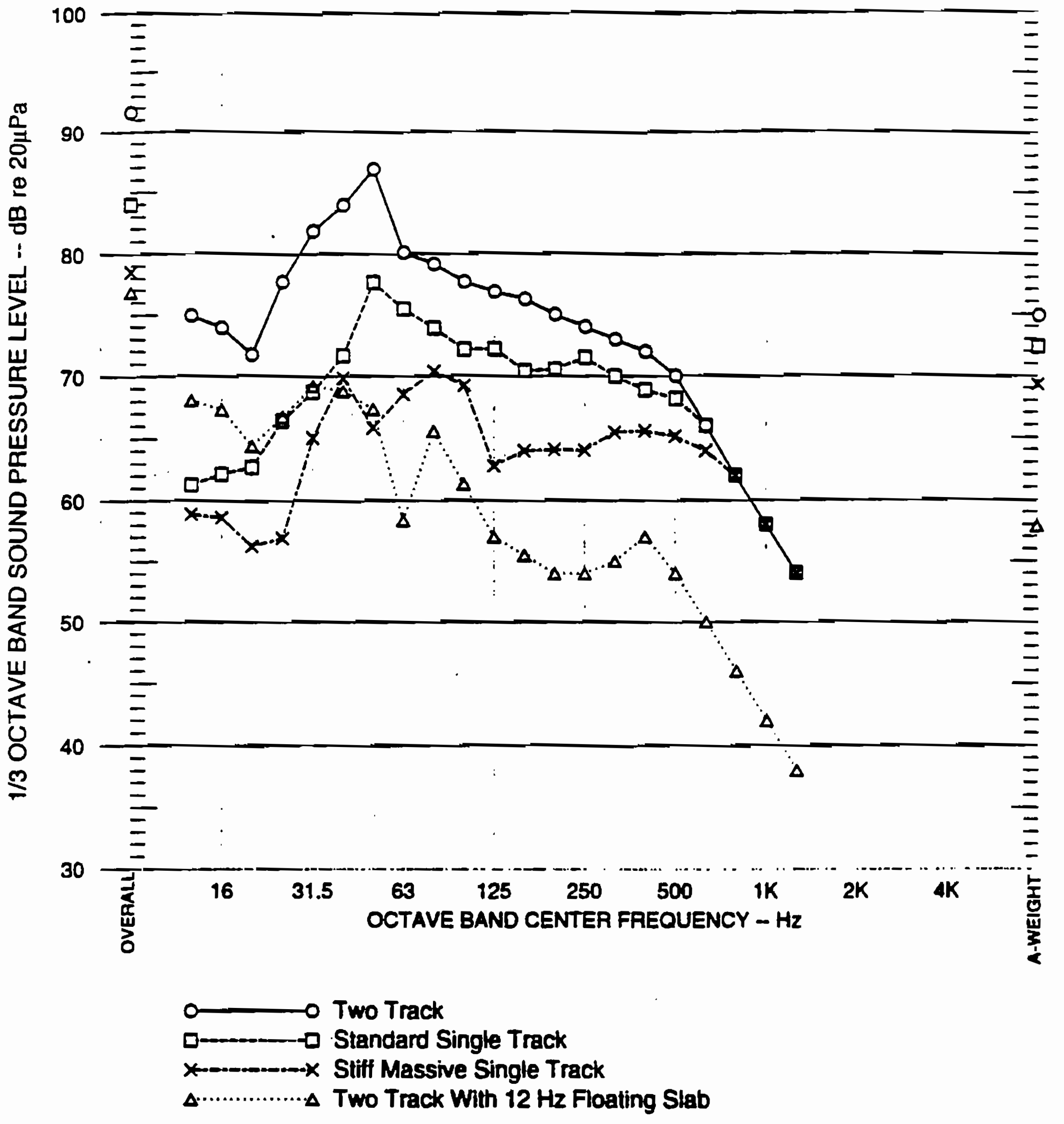
FIGURE 31

Contract/C1588/C1588_61

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED STRUCTURE RADIATED NOISE FOR DIFFERENT VIADUCT DESIGNS - re: 12 CAR 130 kmh, 25m DISTANCE (BASEPLATES STIFFNESS: 12 Kn/mm)

FIGURE 32

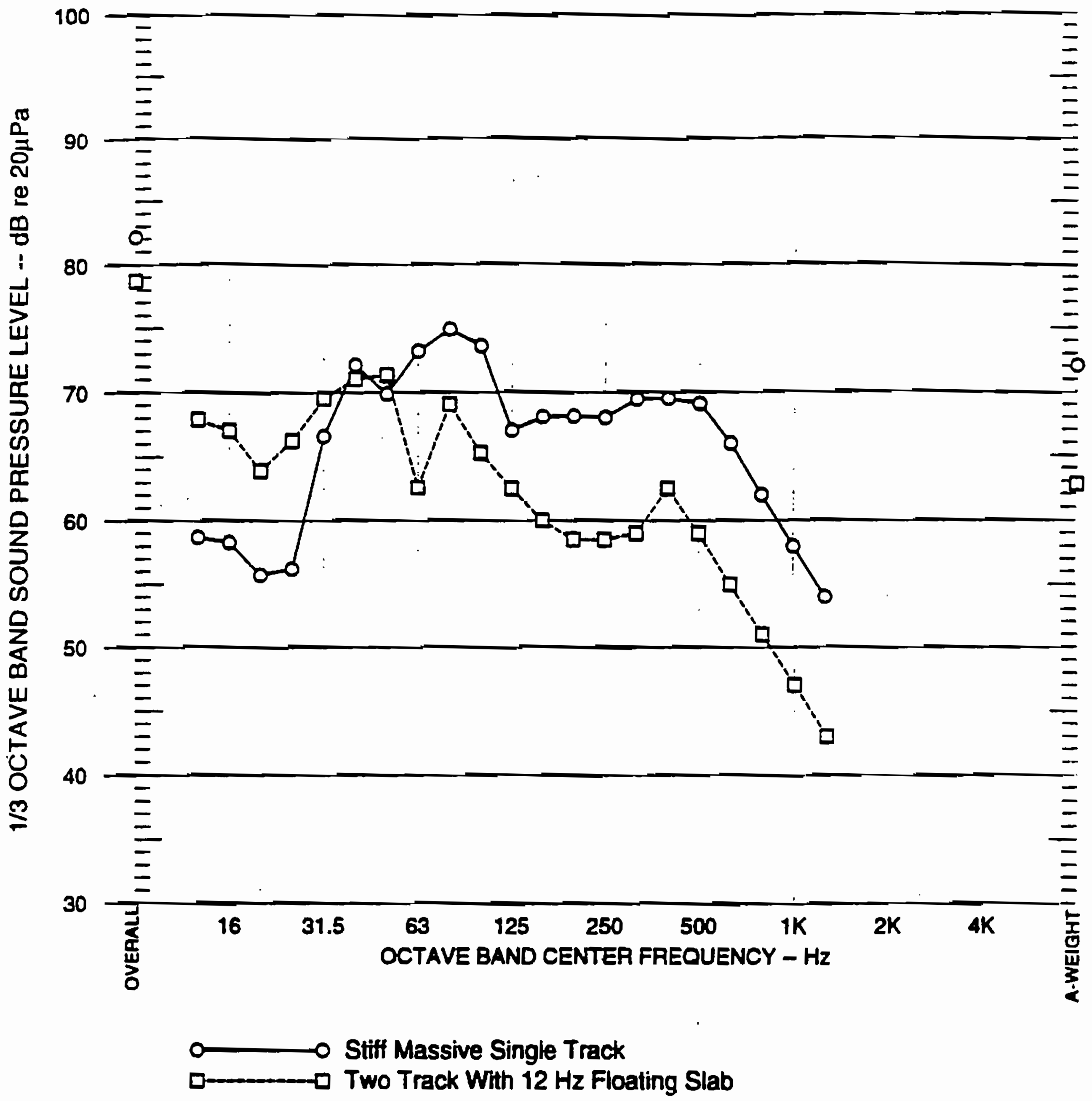
IWIA

Contract/C1500/C1500_62

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



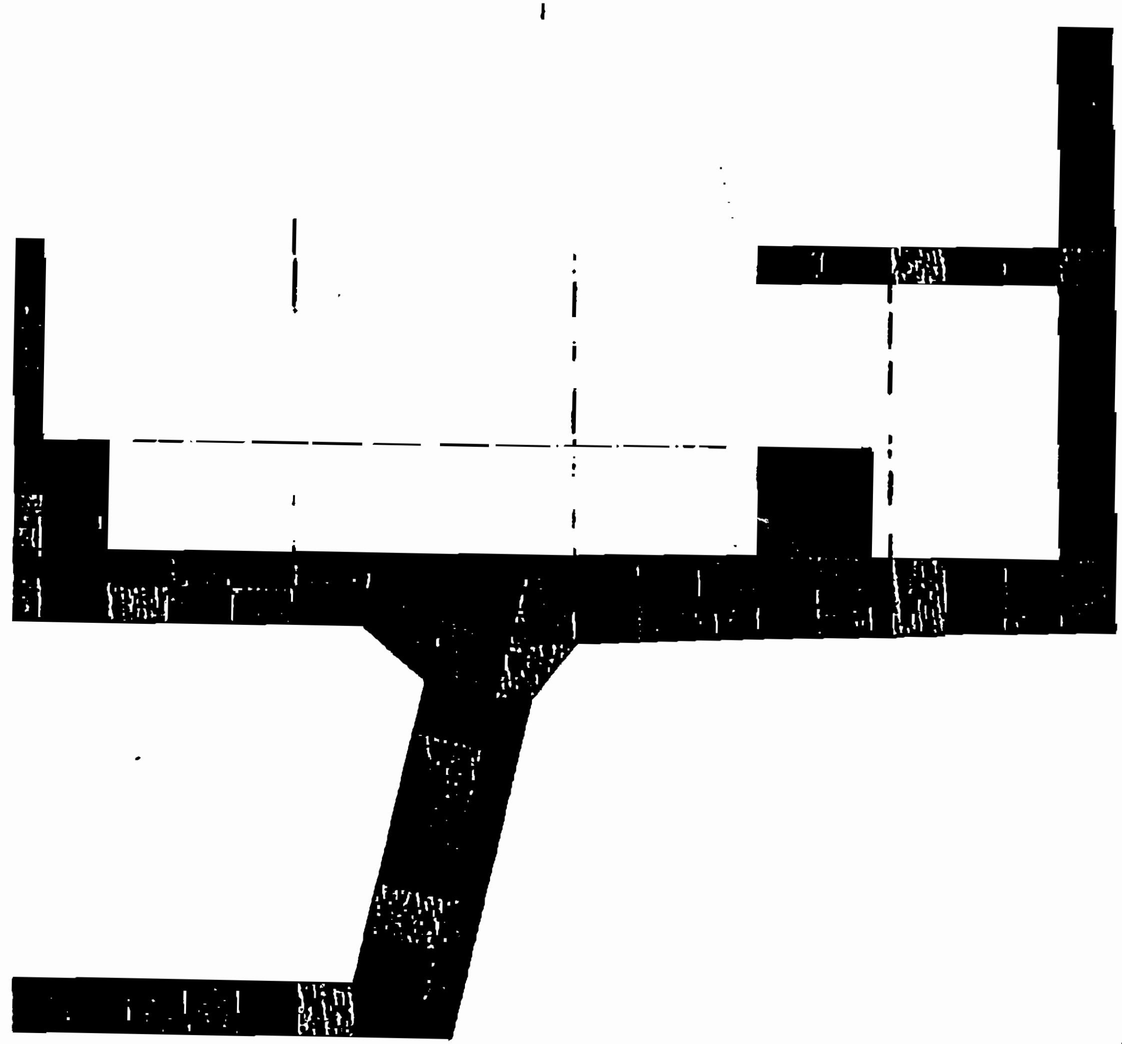
NOT TO SCALE

ESTIMATED STRUCTURE RADIATED NOISE FOR DIFFERENT VIADUCT DESIGNS - re: 12 CAR 130 kmh, 25m DISTANCE (BASEPLATES STIFFNESS: 30 Kn/mm)	FIGURE 33	KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY

WIA

Contract/C1500/C1500_63

ERM



WIA

FINITE ELEMENT MODEL OF TWO-TRACK VIADUCT CROSS-SECTION WITH STRENGTHENED CELL

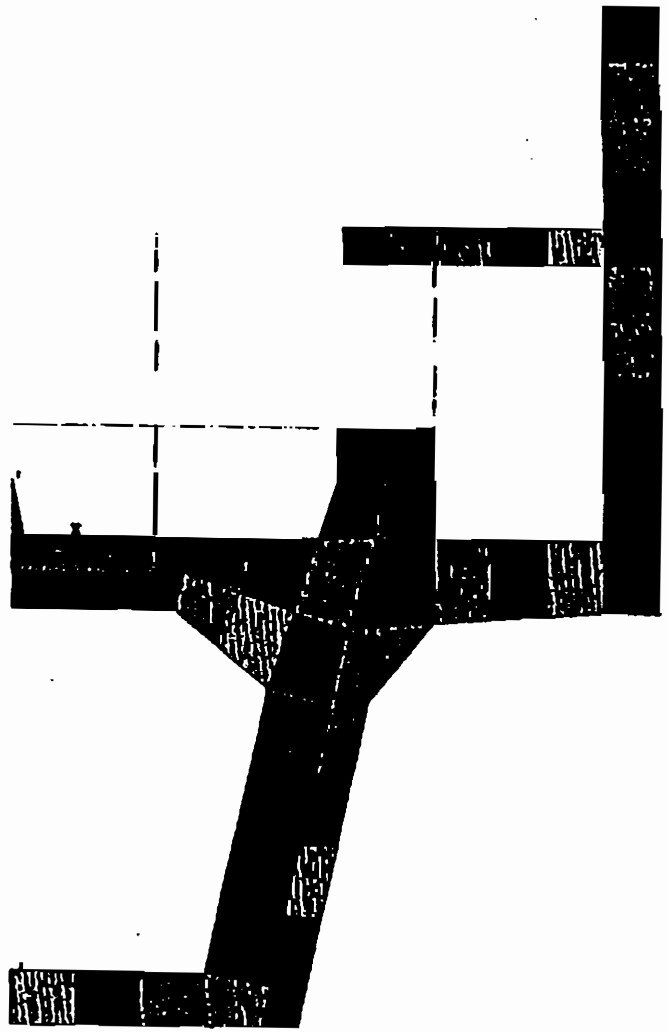
FIGURE 34

Contract/C1588/C1588_64

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



FINITE ELEMENT MODEL OF SINGLE TRACK VIADUCT WITH STRENGTHENED CELL

FIGURE 35

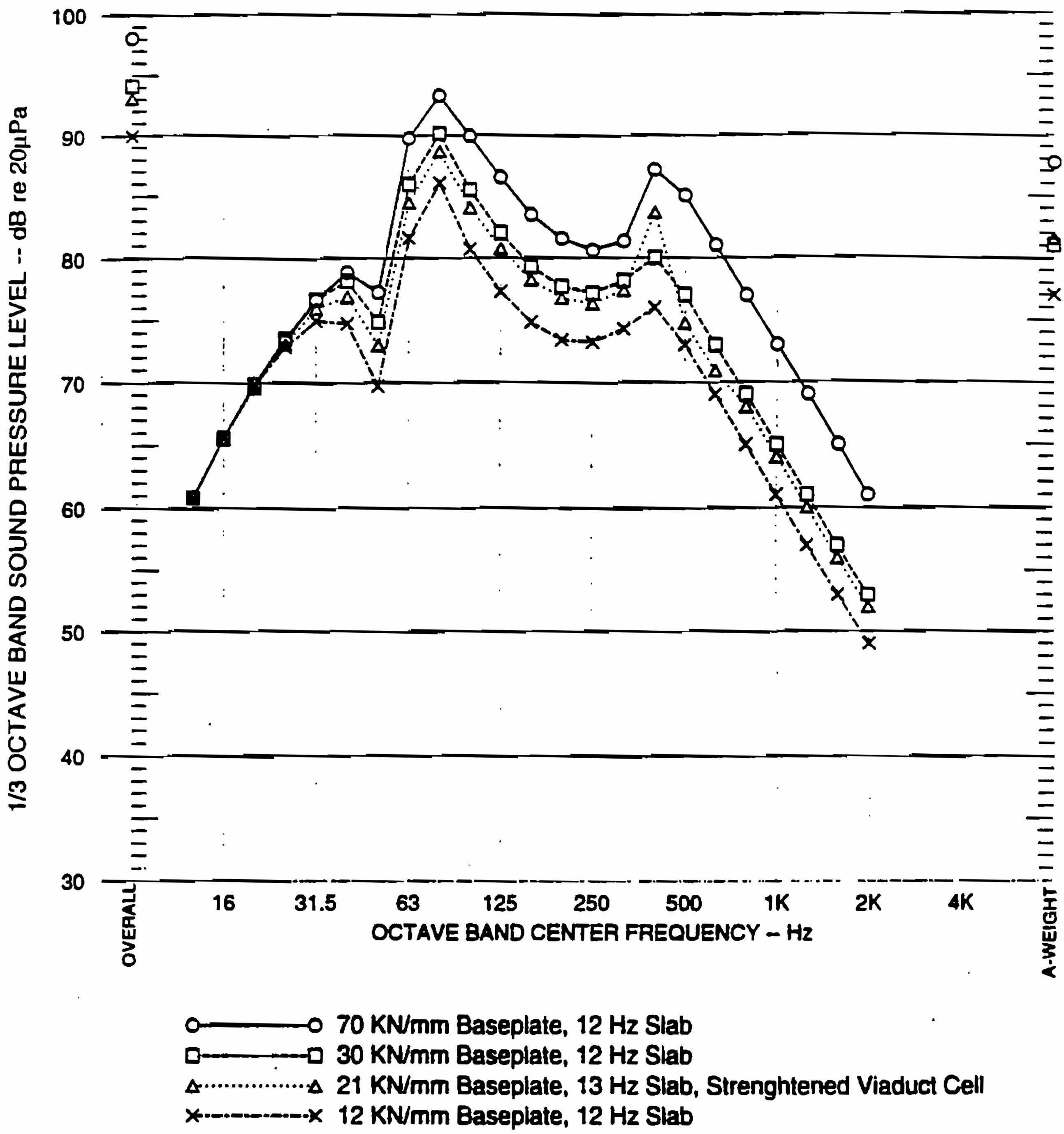
Contract/C1588/C1588_65

WIA

ERM

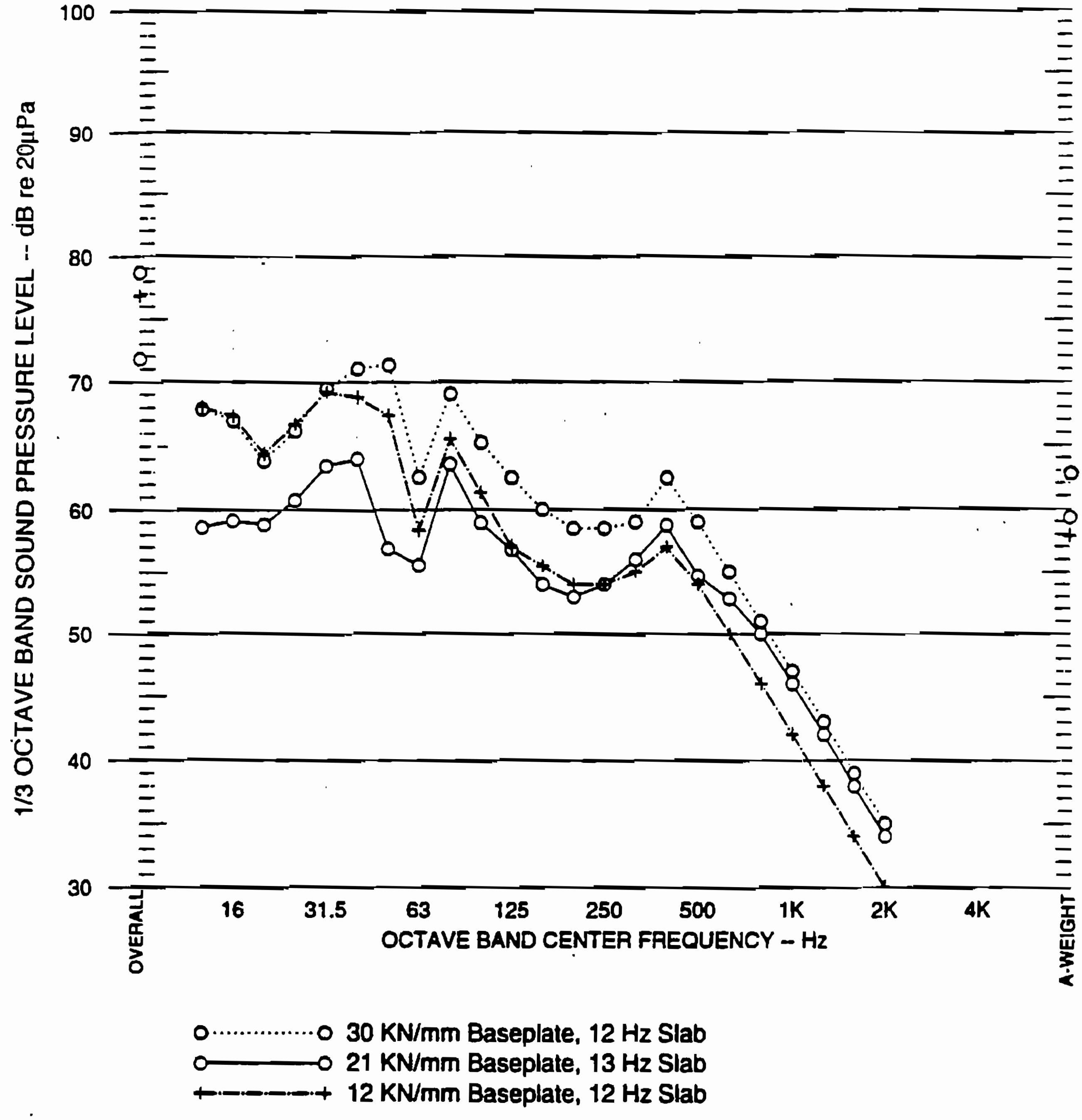
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA	ESTIMATED RADIATED NOISE FROM THE FLOATING SLAB - re: 12 TRANSIT CAR 130 kmh, 25m DISTANCE	FIGURE 36 Contract/C1500/C1500_06	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

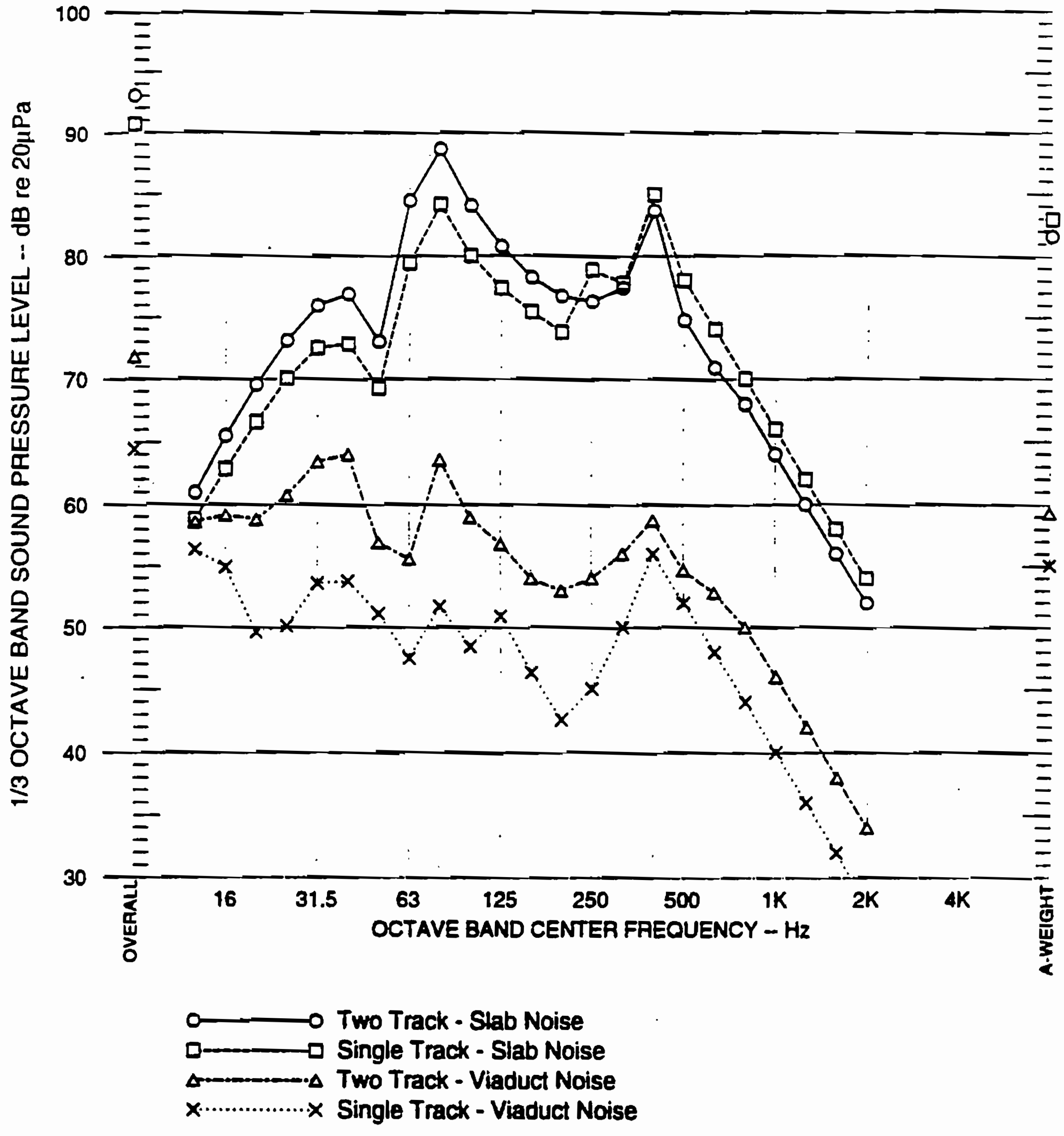
ESTIMATED RADIATED NOISE FROM THE TWO TRACK VIADUCT - re: 12 TRANSIT CAR 130 kmh, 25m DISTANCE

FIGURE 37

Conrad/C1500/C1500_67

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A

ESTIMATED STRUCTURE RADIATED NOISE FROM THE KCR VIADUCT - re: 12 TRANSIT CAR 130 kmh. 25m DISTANCE

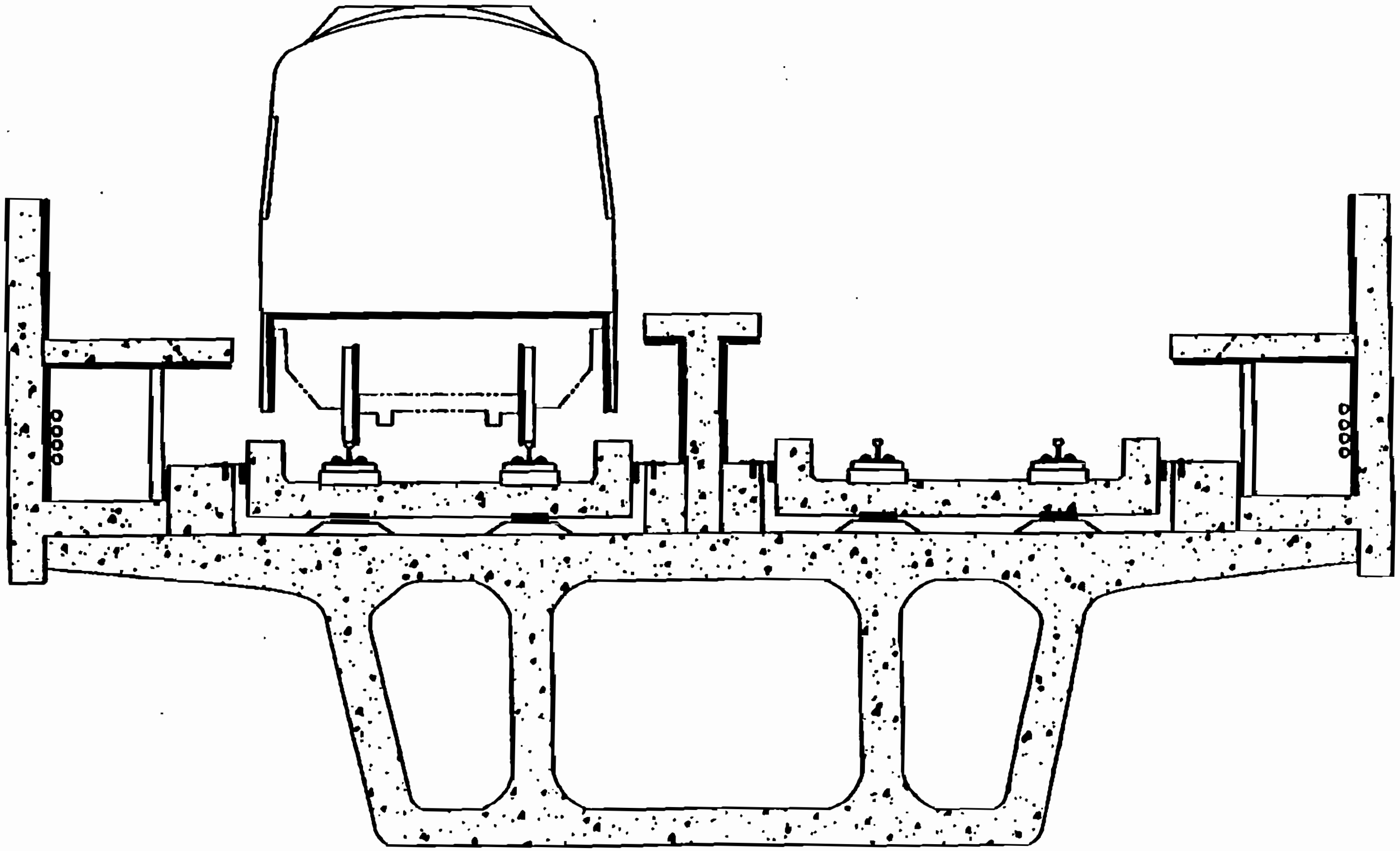
FIGURE 38

Contract/C1588/C1588_68

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



STRENGTHENED THREE-CELL CROSS-SECTION WITH CELL WALLS UNDER TRACKFORM MODEL

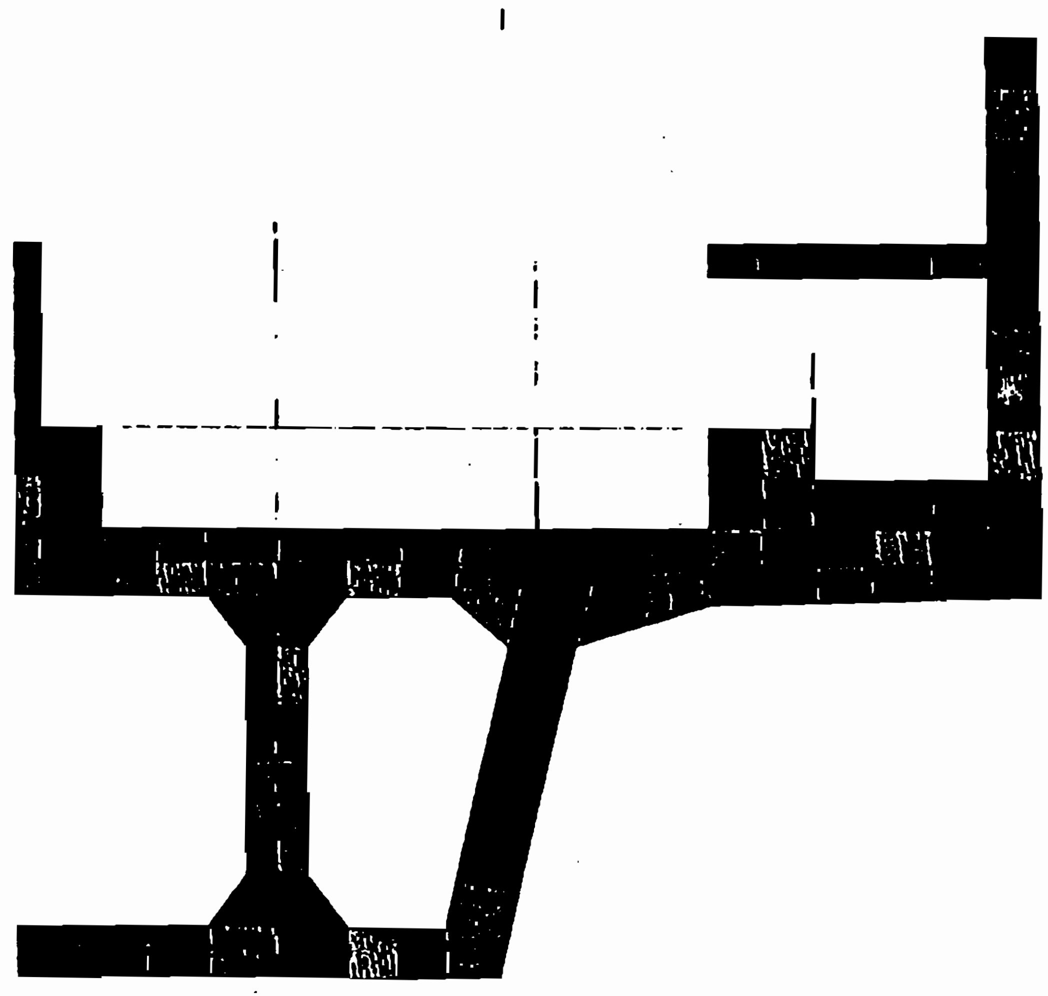
FIGURE 39

Contract/C1588/C1588_69

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL TS900 EIA STUDY



W I A

FINITE ELEMENT MODEL CROSS-SECTION OF THE THREE-CELL VIADUCT

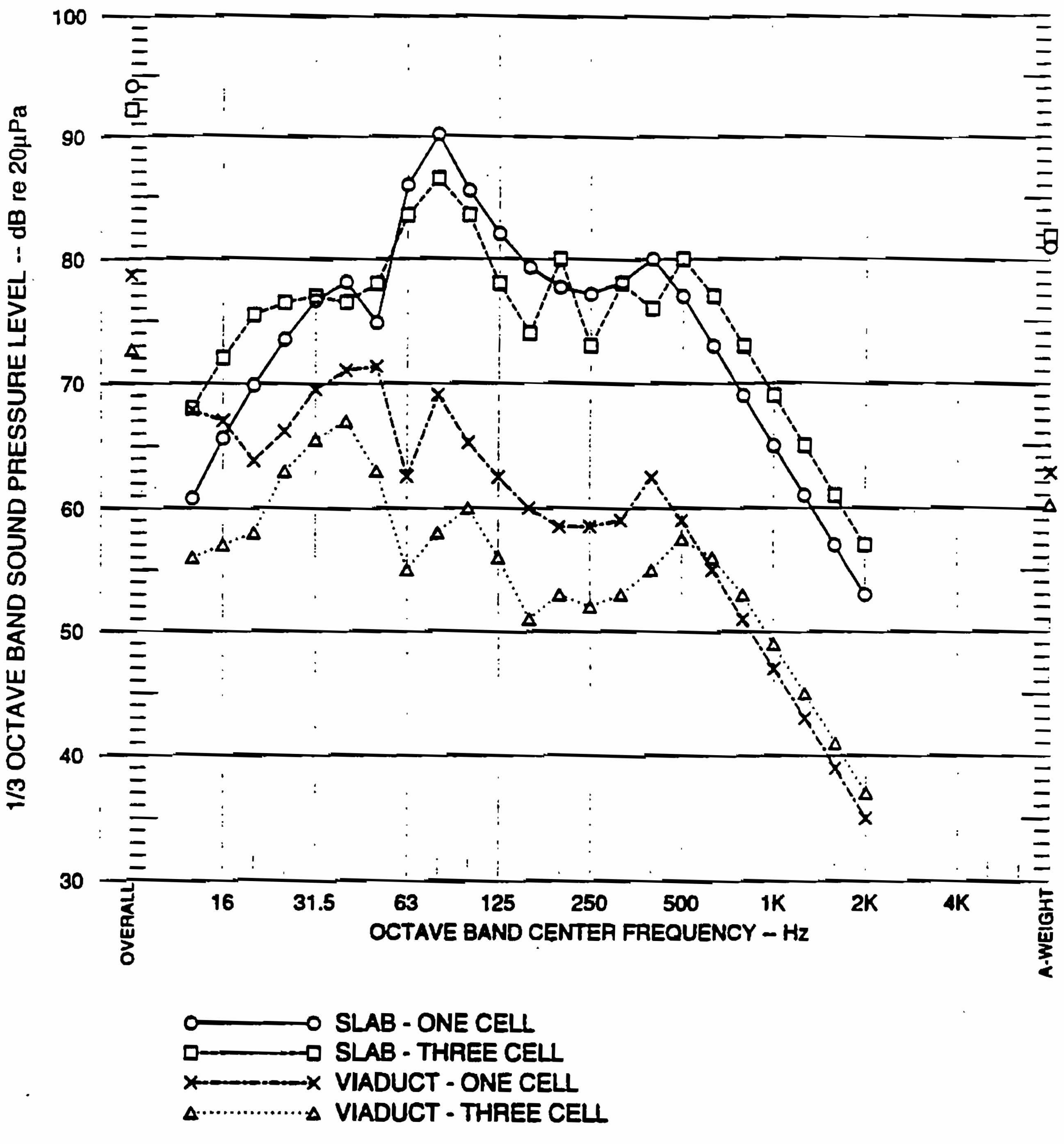
FIGURE 40

Contract/C1588/C1588_70

ERM

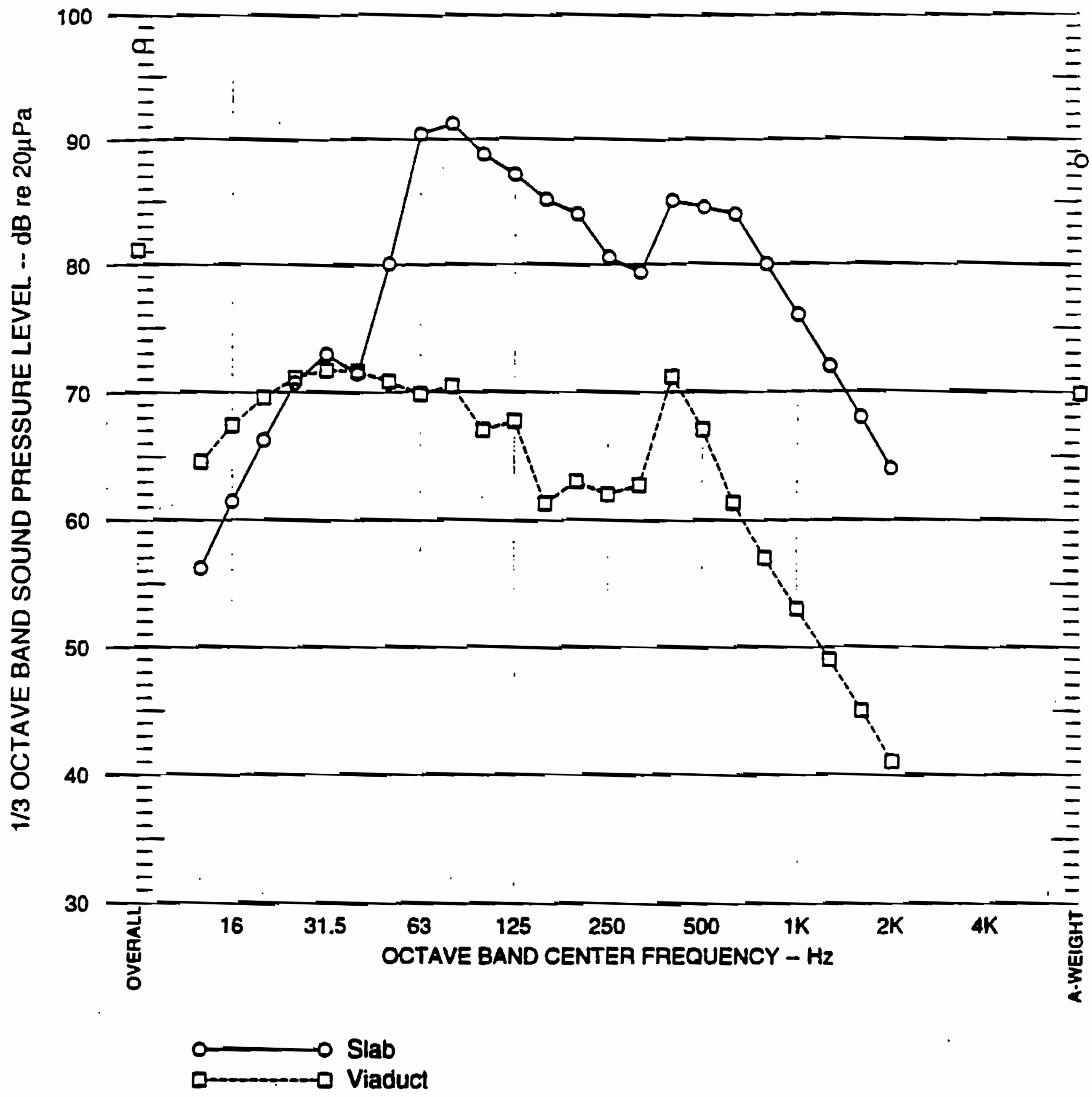
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA	COMPARISON OF RE-RADIATED NOISE FOR ONE VS THREE-CELL VIADUCT STRUCTURE - 12 Hz SLAB, 30 kN/mm BASEPLATE (DYNAMIC)	FIGURE 41	ERM
	Contract/C1588/C1588_71		KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RE-RADIATED (32T FREIGHT) NOISE FROM TWO TRACK VIADUCTS - 20.5Hz, 2844kg/m FLOATING SLAB: ACOUSTIC LOADMASTER

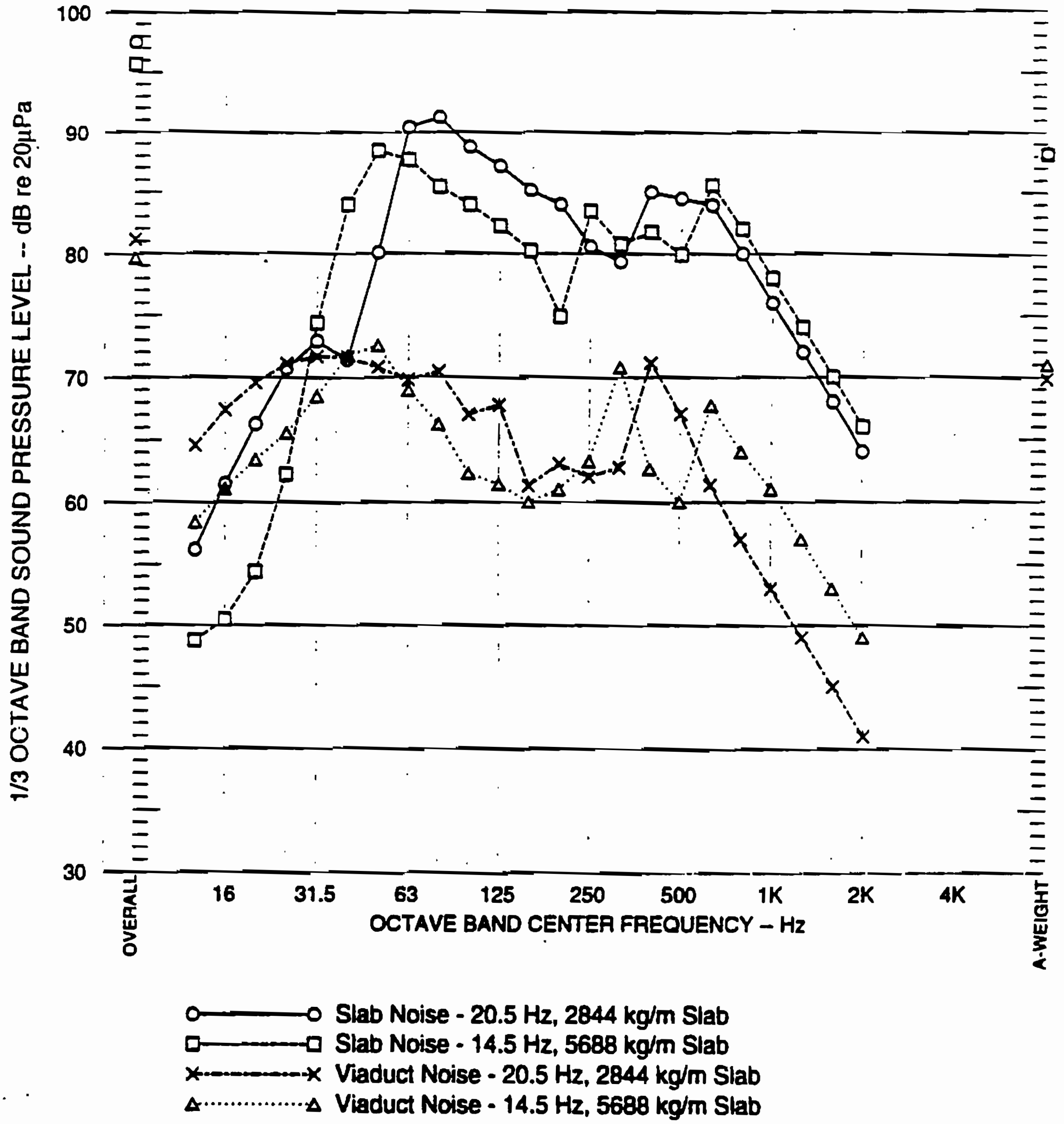
FIGURE 42

Contract/C1588/C1588_72

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

COMPARISON OF RE-RADIATED (32T FRIEGHT) NOISE ON A TWO TRACK VAIDUCT FOR DIFFERENT MASS FLOATING SLAB: ACOUSTIC LOADMASTER BASEPLATE

FIGURE 43

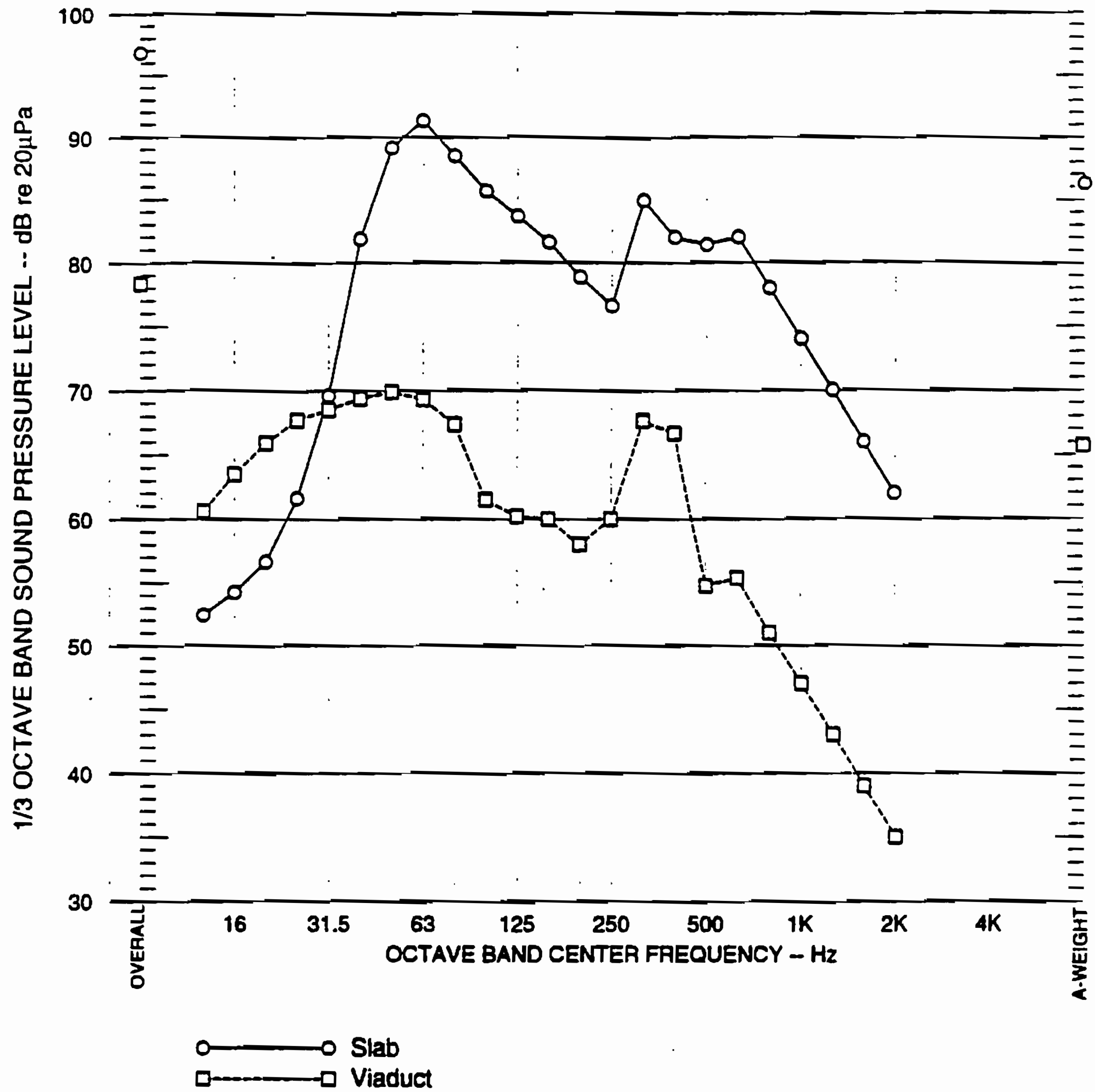
Contract/C1500/C1500_73

WIA

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

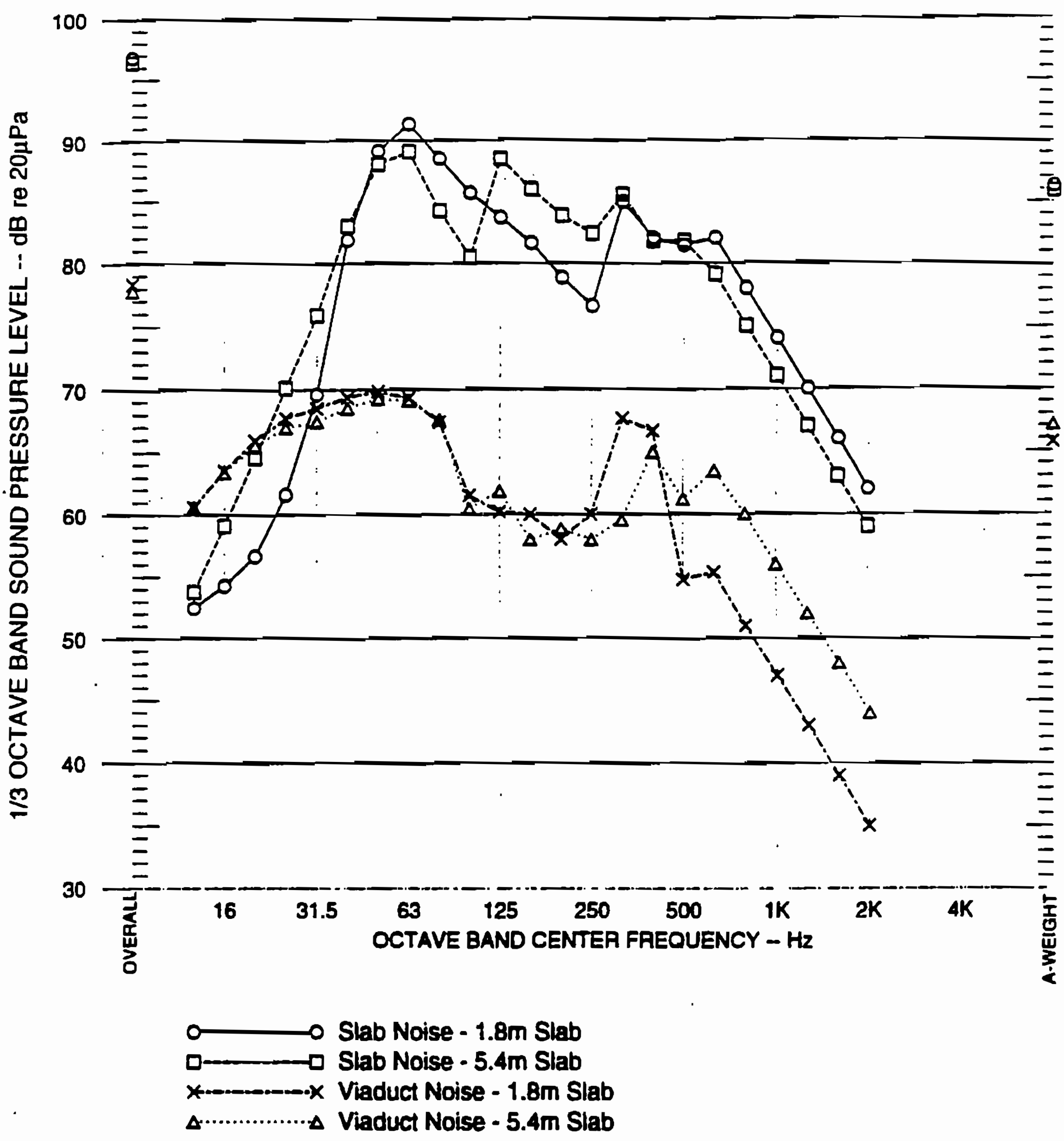
RE-RADIATED (22T FRIEGHT) NOISE FROM TWO TRACK VAIDUCTS - 13.2Hz, 4266 kg/m Floating Slab - ACOUSTIC LOADMASTER

FIGURE 44

Contract/C1588/C1588_74

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A

COMPARISON OF RE-RADIATED (22T FRIEGHT): 1.8m VS 5.4m SLAB LENGTH - 13.2Hz, 4266 kg/m FLOATING SLAB - ACOUSTIC LOADMASTER BASEPLATE

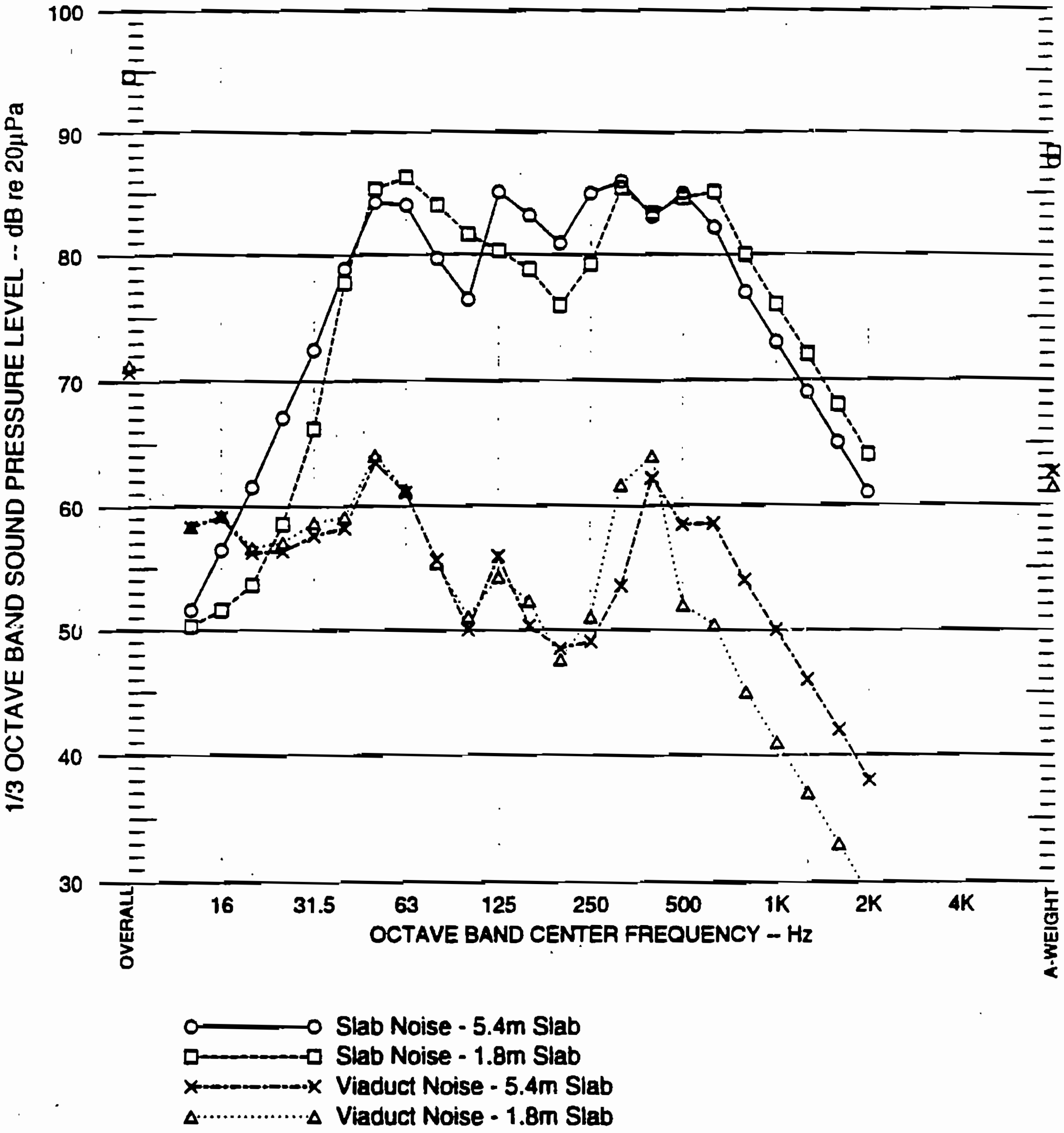
FIGURE 45

Contract/C1566/C1566_75

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RE-RADIATED NOISE FOR A SINGLE TRACK VIADUCT FOR 22T FREIGHT - 13.2 Hz, 4266 kg/m FLOATING SLAB WITH ACOUSTIC LOADMASTER BASEPLATE

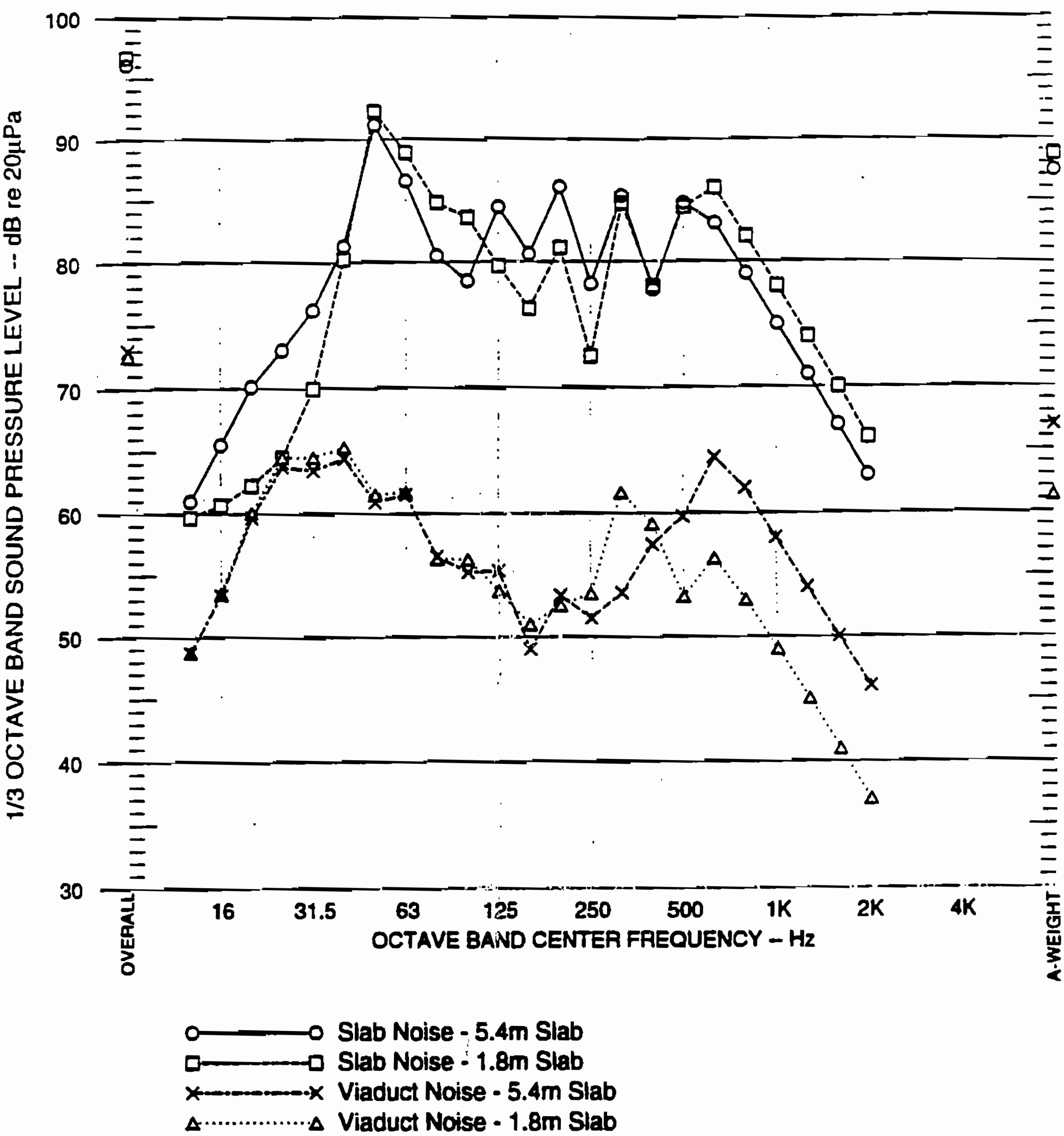
FIGURE 47

Contract/C1588/C1588_77

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA

RE-RADIATED NOISE FOR 22T AXLE FREIGHT ON A STRENGTHENED THREE CELL VIADUCT - 13.2 Hz, 4266 kg/m FLOATING SLAB WITH ACOUSTIC LOADMASTER BASEPLATE

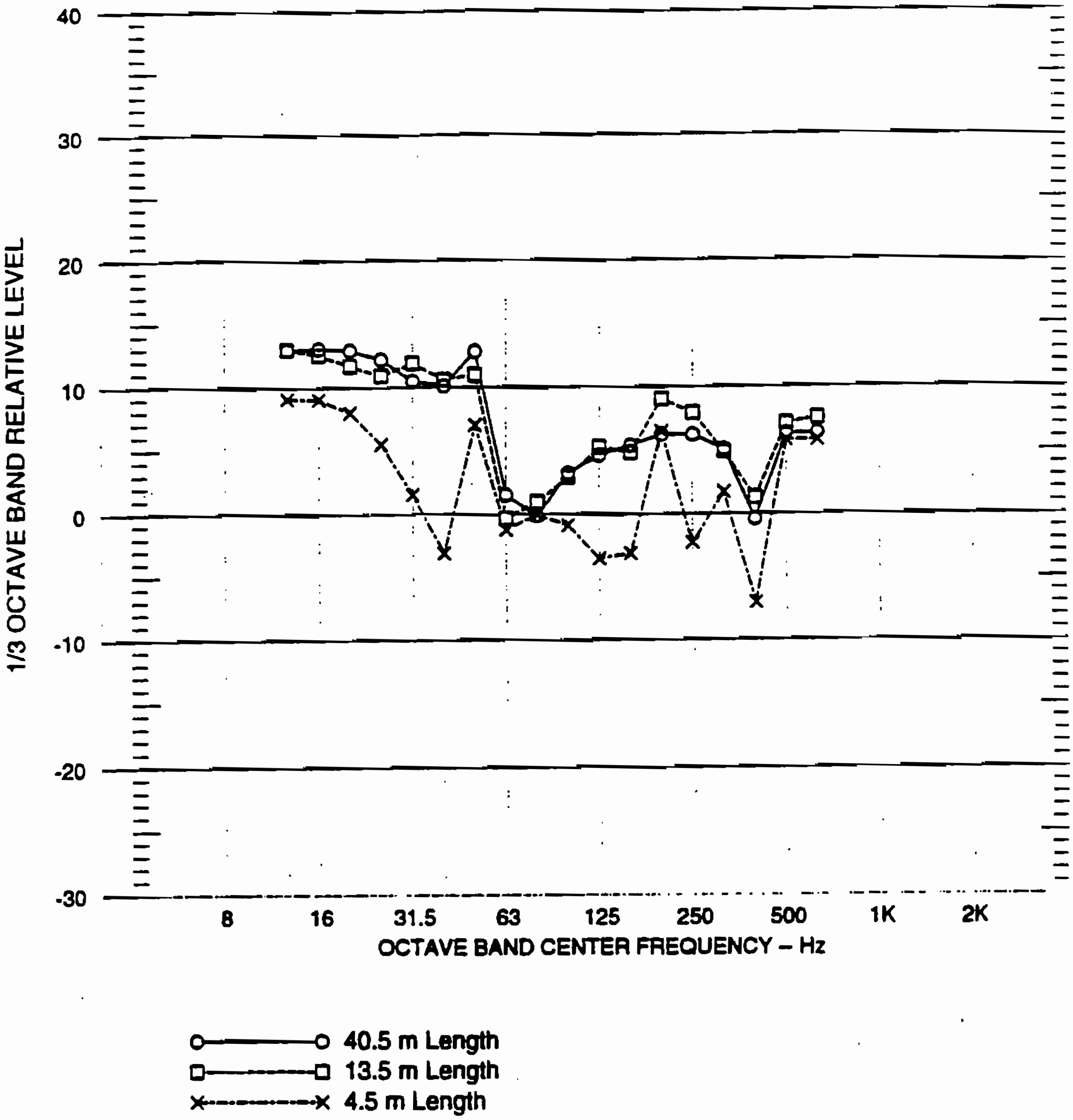
FIGURE 46

Contract/C1588/C1588_78

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

NOISE RADIATED FROM 12 Hz FLOATING SLABS OF DIFFERENT LENGTHS - RELATIVE TO THE 1.5m MINI-SLAB MODULE (BASEPLATE STIFFNESS: 30 kN/mm)

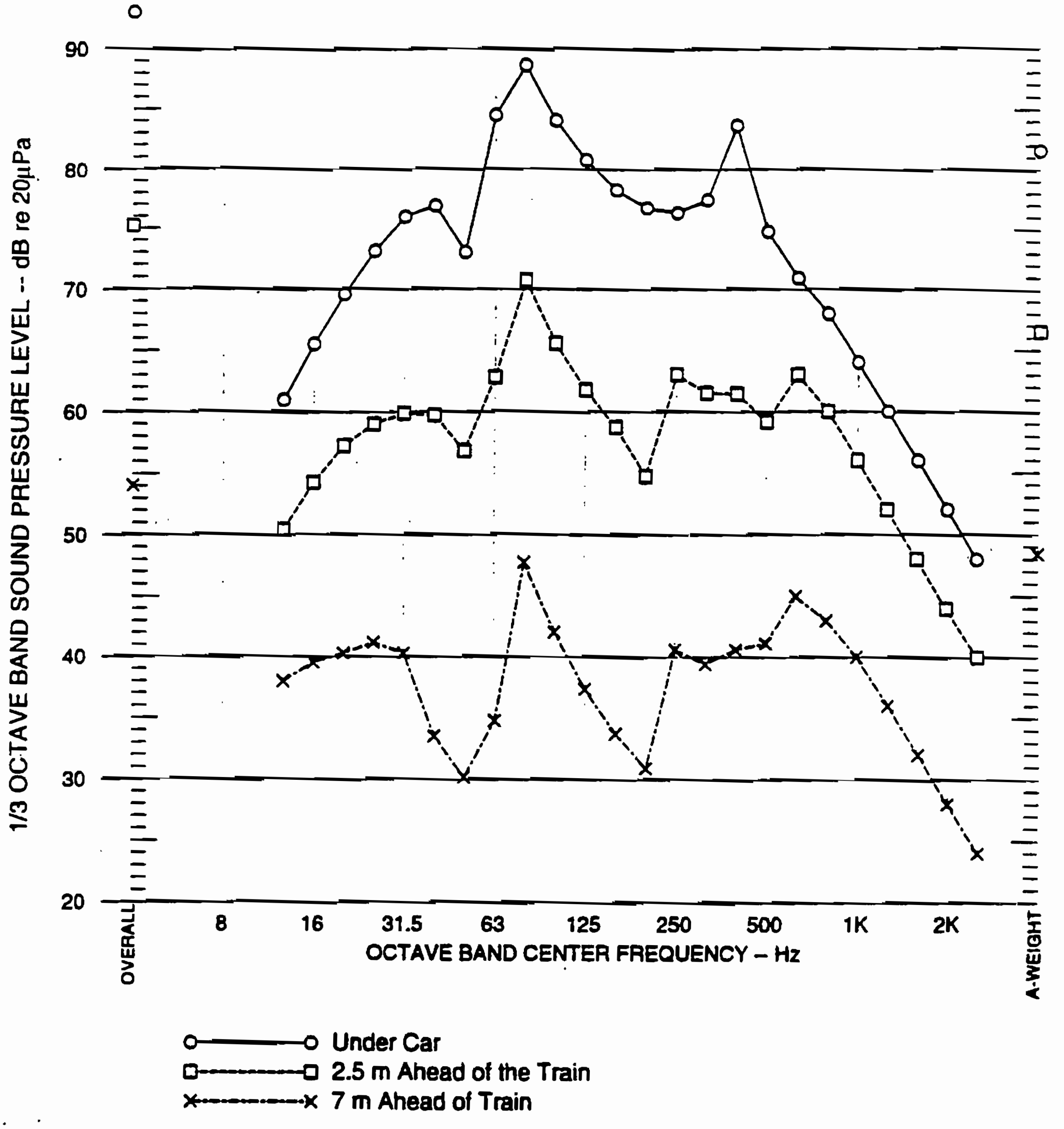
FIGURE 48

Contract/C1500/C1500_78

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA

ESTIMATED NOISE RADIATED FROM THE FLOATING SLAB - 13 Hz RESONANCE FREQUENCY WITH 21 kN/mm BASEPLATES

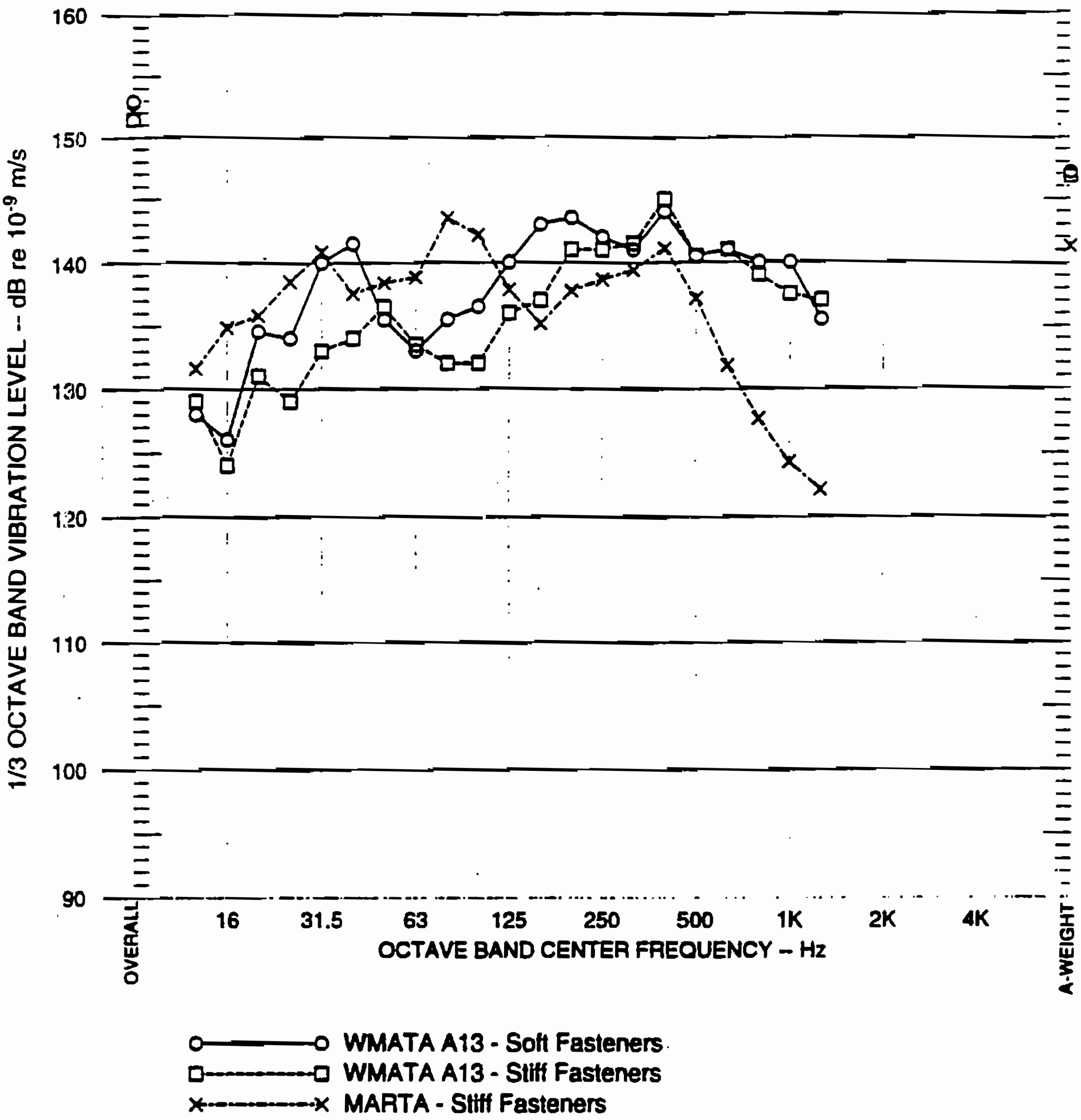
FIGURE 49

Contract/C1508/C1508_79

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RAIL VIBRATION MEASUREMENT DATA TAKEN ON VIADUCTS AND ADJUSTED TO 130 kmh

FIGURE 50

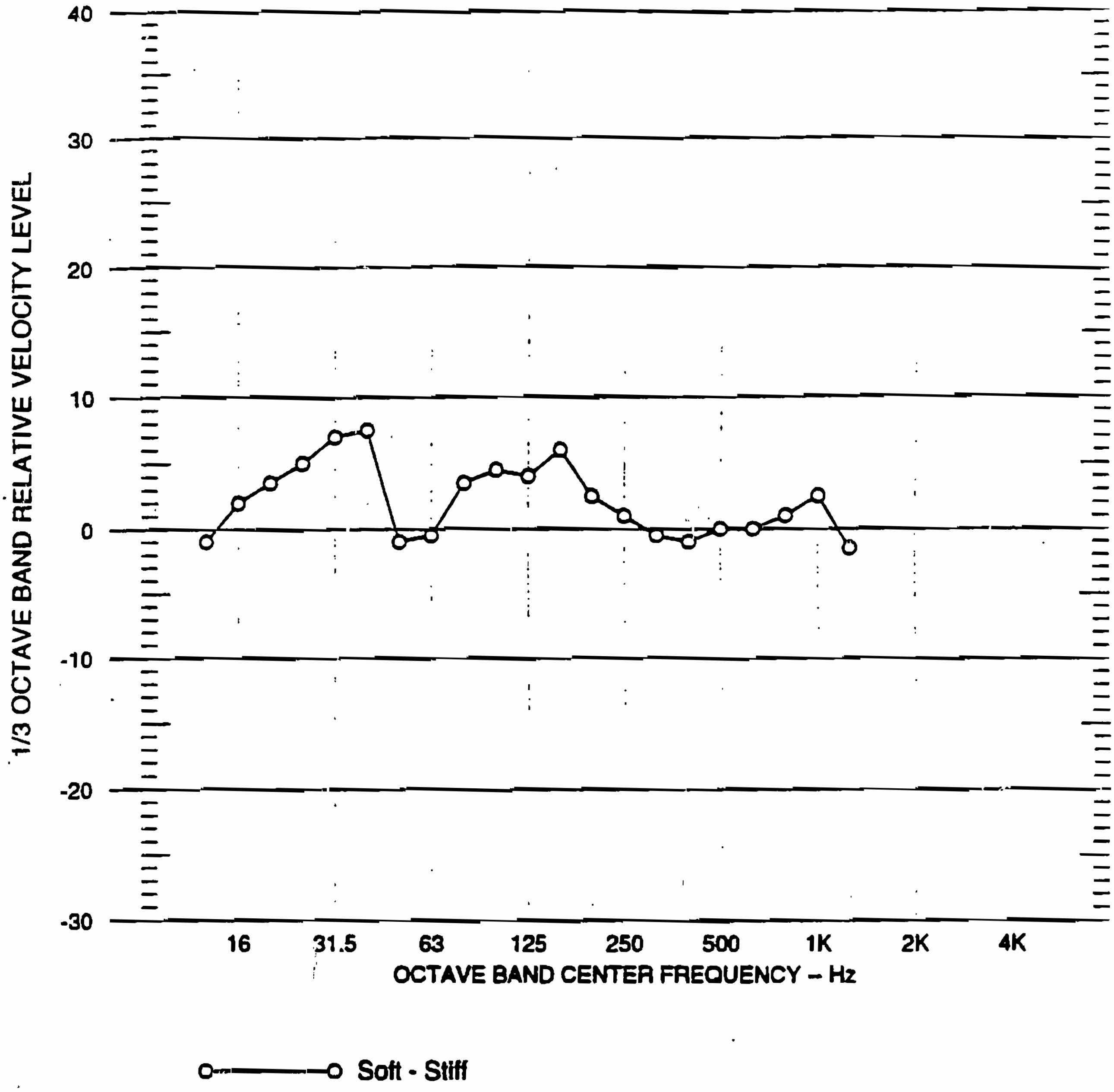
Contract/C1589/C1589_50

WIA

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RELATIVE RAIL VIBRATION - SOFT VS STIFF BASEPLATES

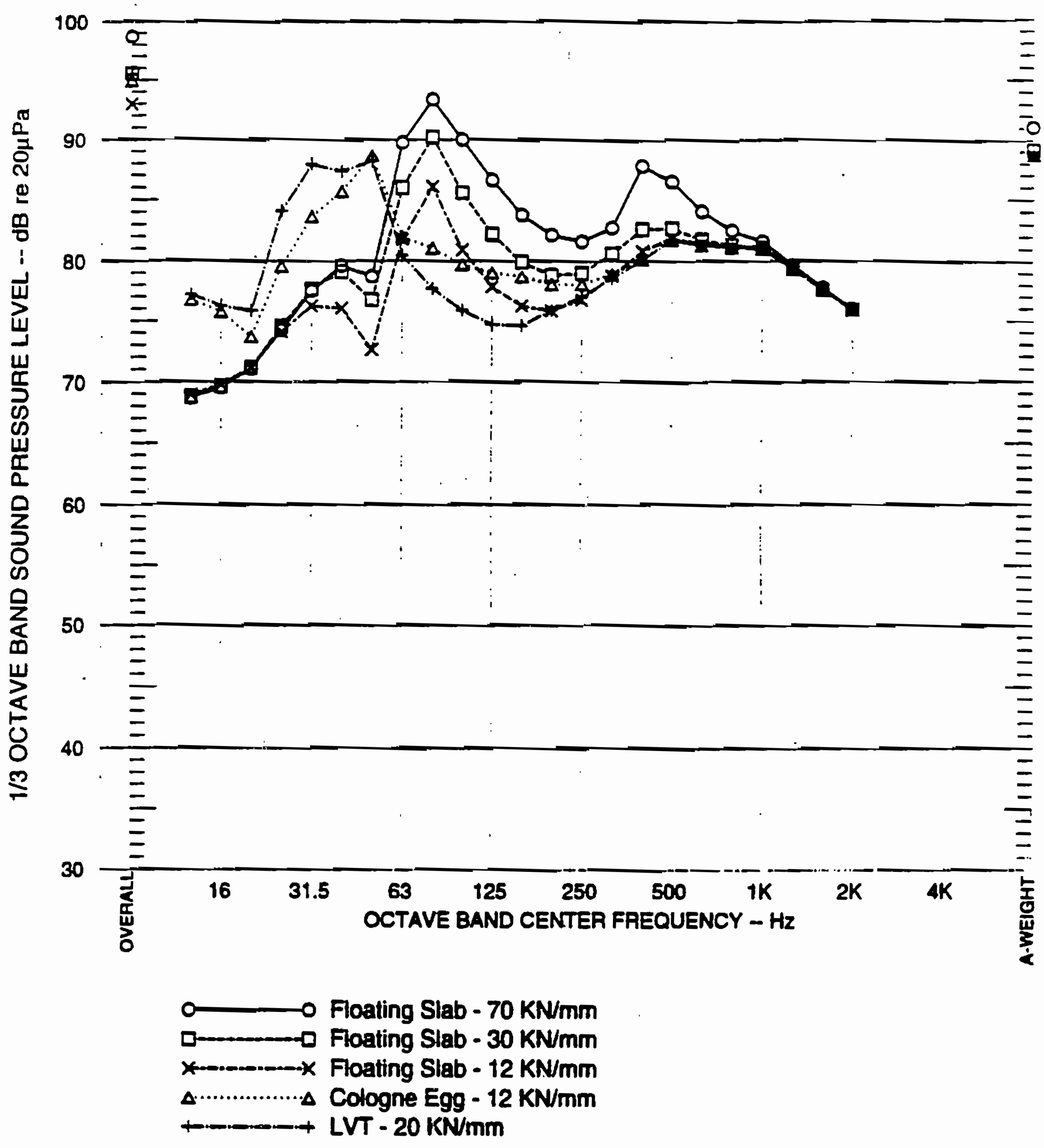
FIGURE 51

Contract/C1588/C1588_81

ERM

KOWLOON - CANTON RAILWAY CORPORATION

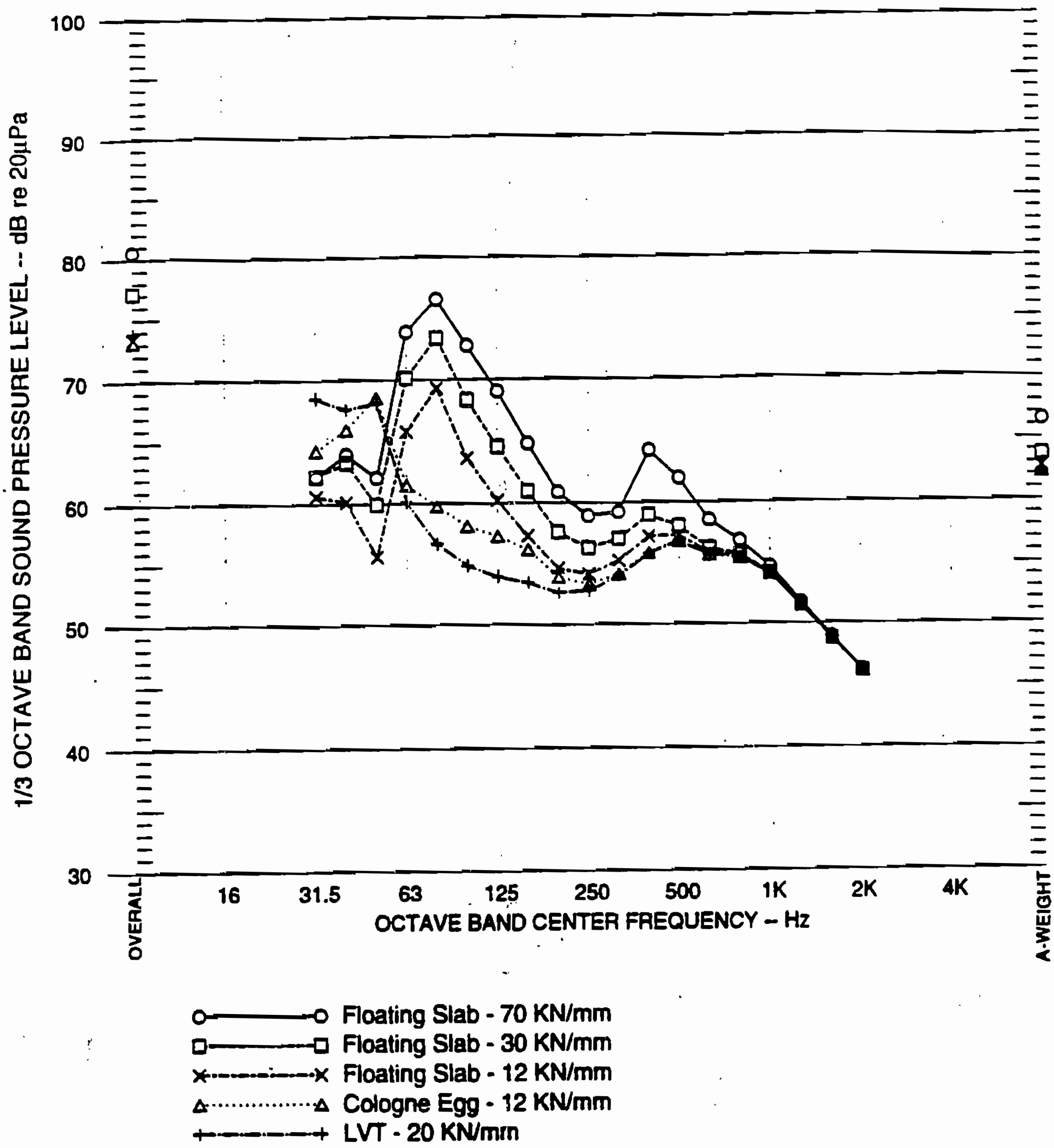
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA	ESTIMATED TOTAL NOISE FROM THE TRAIN AND VIADUCT WITH NO MITIGATION OF THE DIRECT NOISE - re: 12 CAR, 130 kmh, 25m DISTANCE	FIGURE 26	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY

Contract/C1500/C1500_56



ESTIMATED TOTAL NOISE FROM THE TRAIN AND FROM THE DECK (FLOATING SLAB) UNDER THE TRAIN AT LOCATION 7 WITH MAXIMUM MITIGATION APPLIED (1.2m EDGE WALL AND DOUBLE PLENUM SYSTEM)

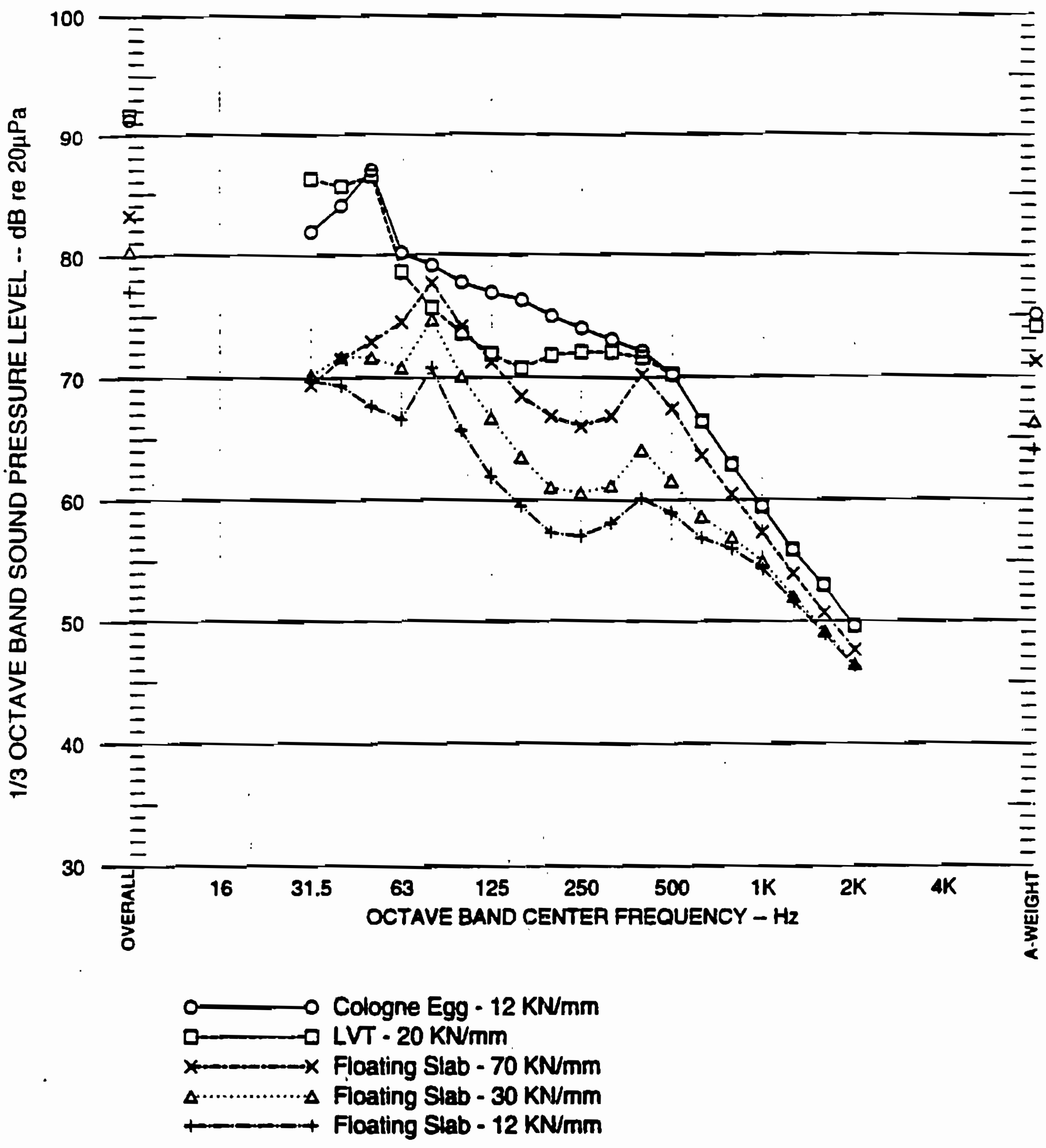
FIGURE 27

Contract/C1588/C1588_57

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED TOTAL NOISE FROM THE TRAIN VAIDUCT AT LOCATION 7 WITH MAXIMUM MITIGATION OF THE DIRECT NOISE (1.2m EDGE WALL AND DOUBLE PLENUM SYSTEM)

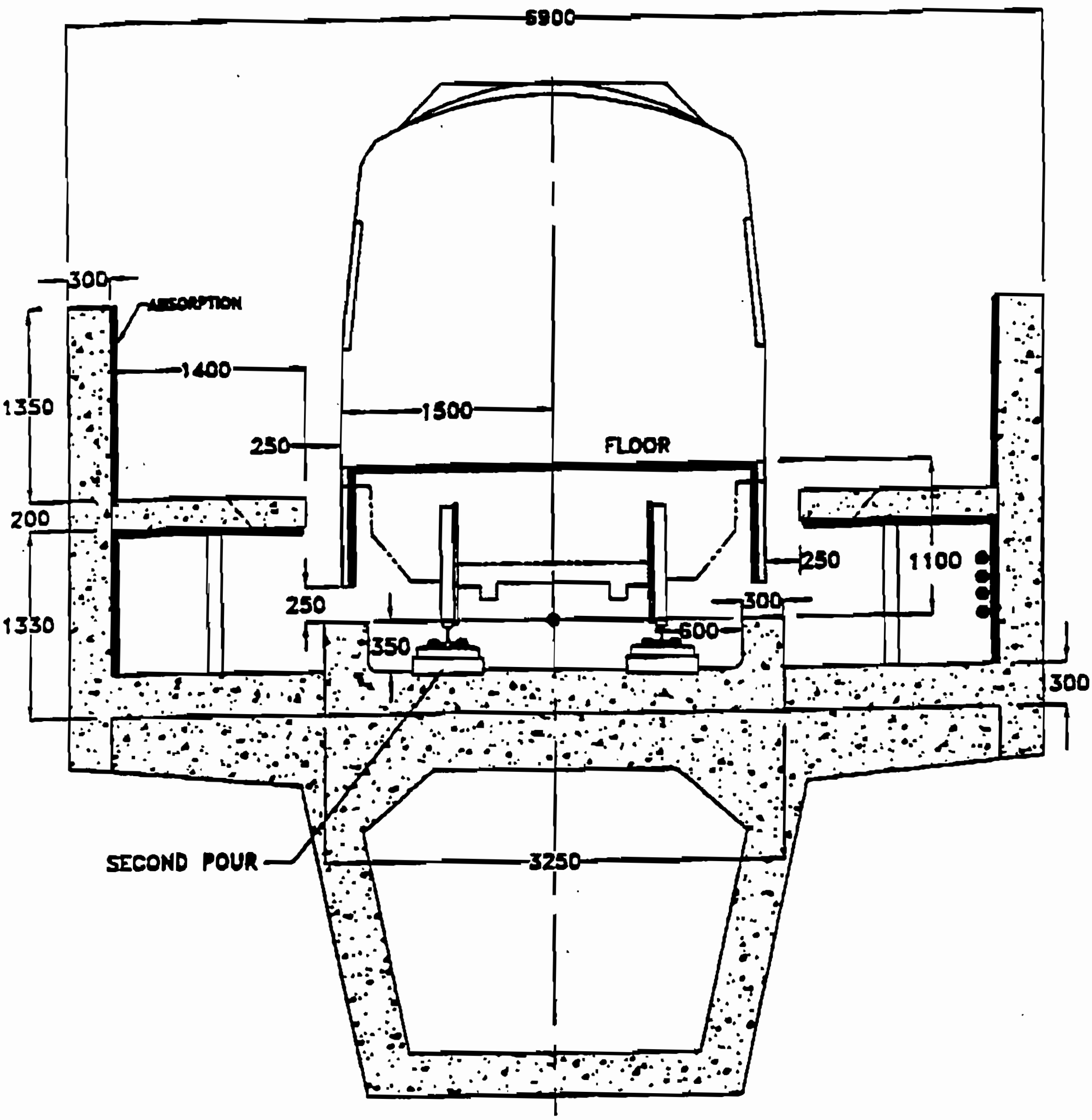
FIGURE 28

Contract/C1500/C1500_56

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL
SINGLE TRACK VIADUCT DESIGN -
WITH DIRECT FIXATION RAIL FASTENERS

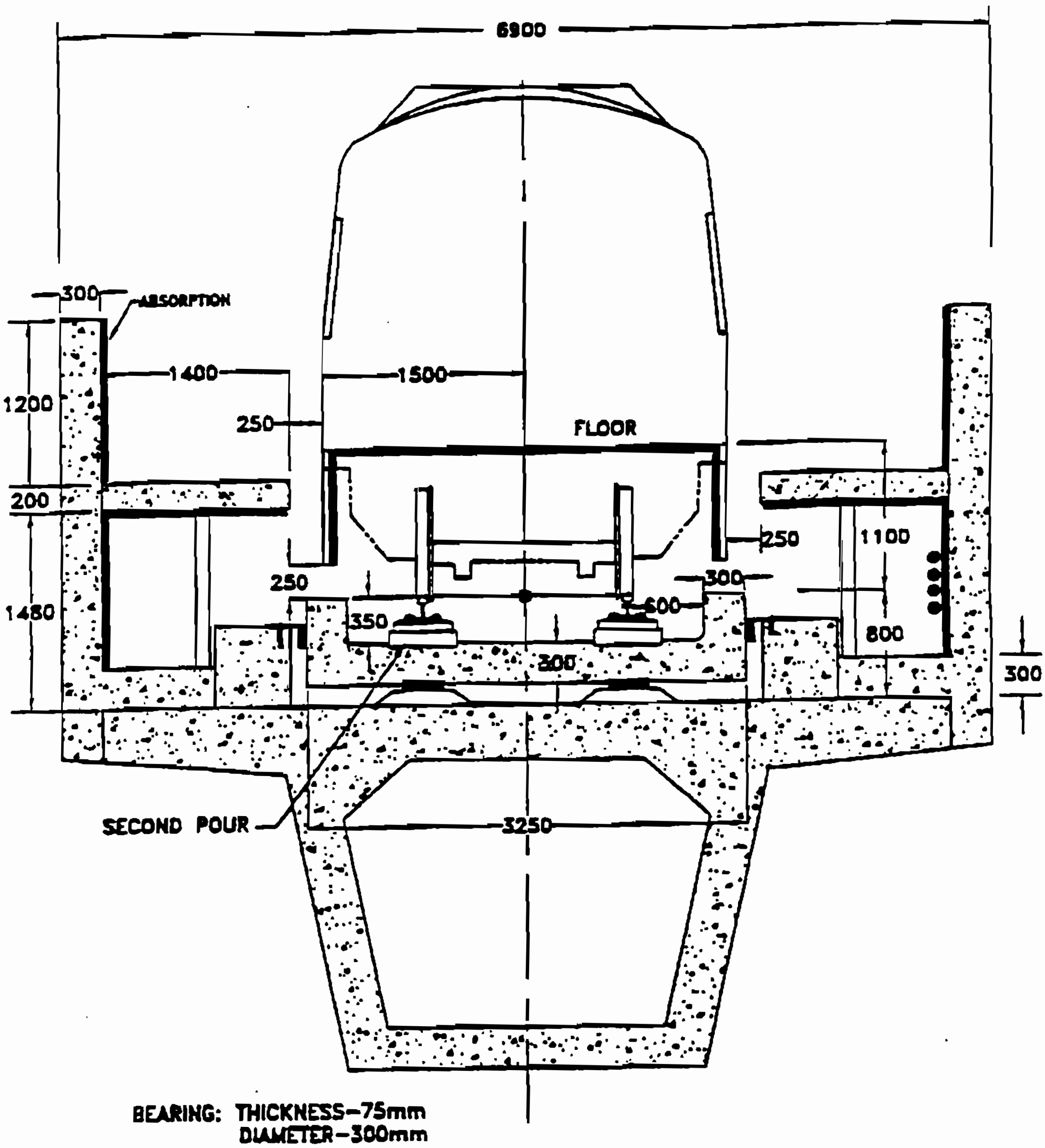
FIGURE 29

Contract/C1500/C1500_50

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL
SINGLE TRACK VIADUCT DESIGN -
WITH FLOATING SLAB

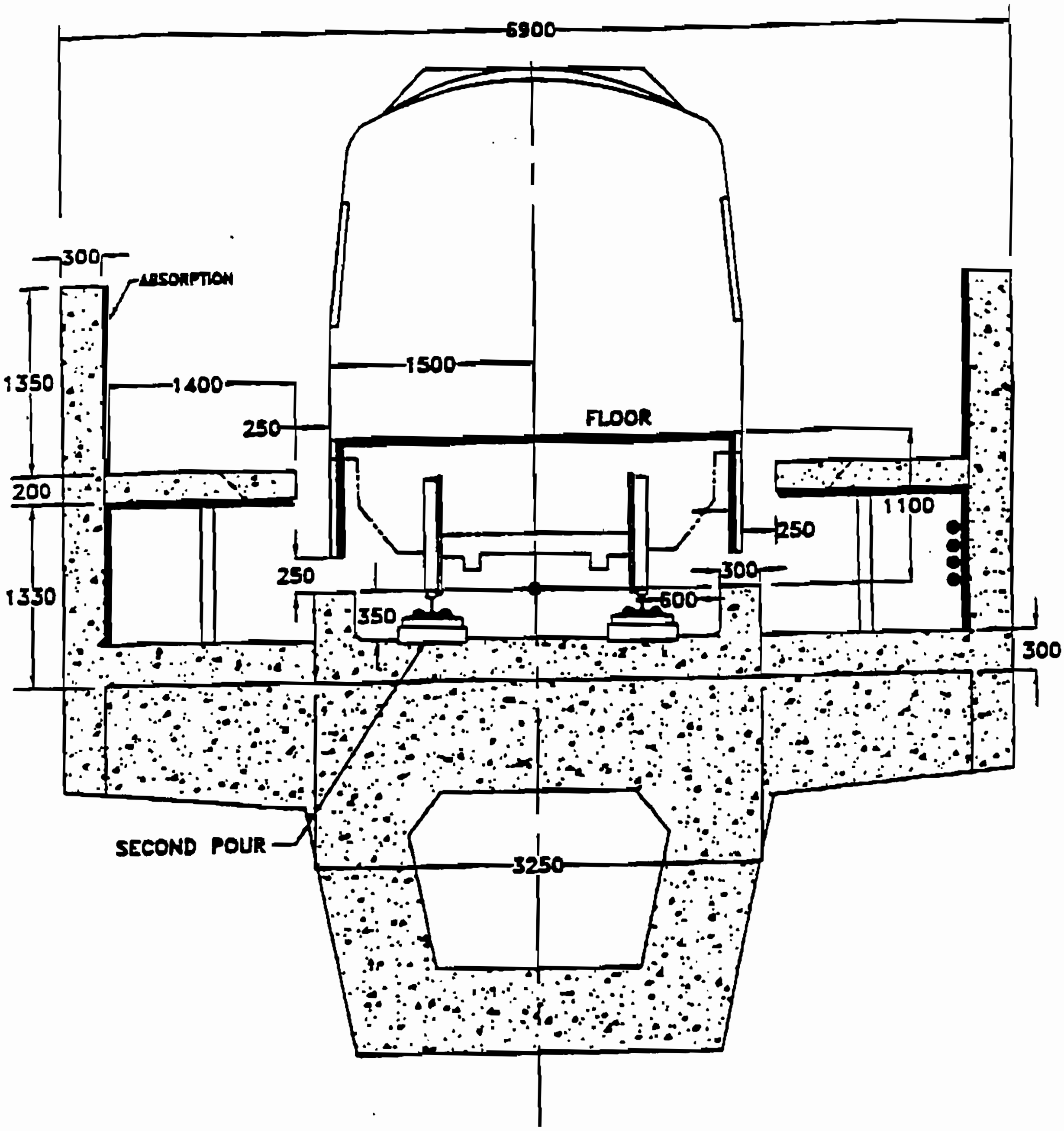
FIGURE 30

Contract/C1588/C1588_60

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



CROSS-SECTION OF THE KCRC WEST RAIL SINGLE TRACK VIADUCT DESIGN - WITH MASSIVE SUPPORT CELL AND DECK

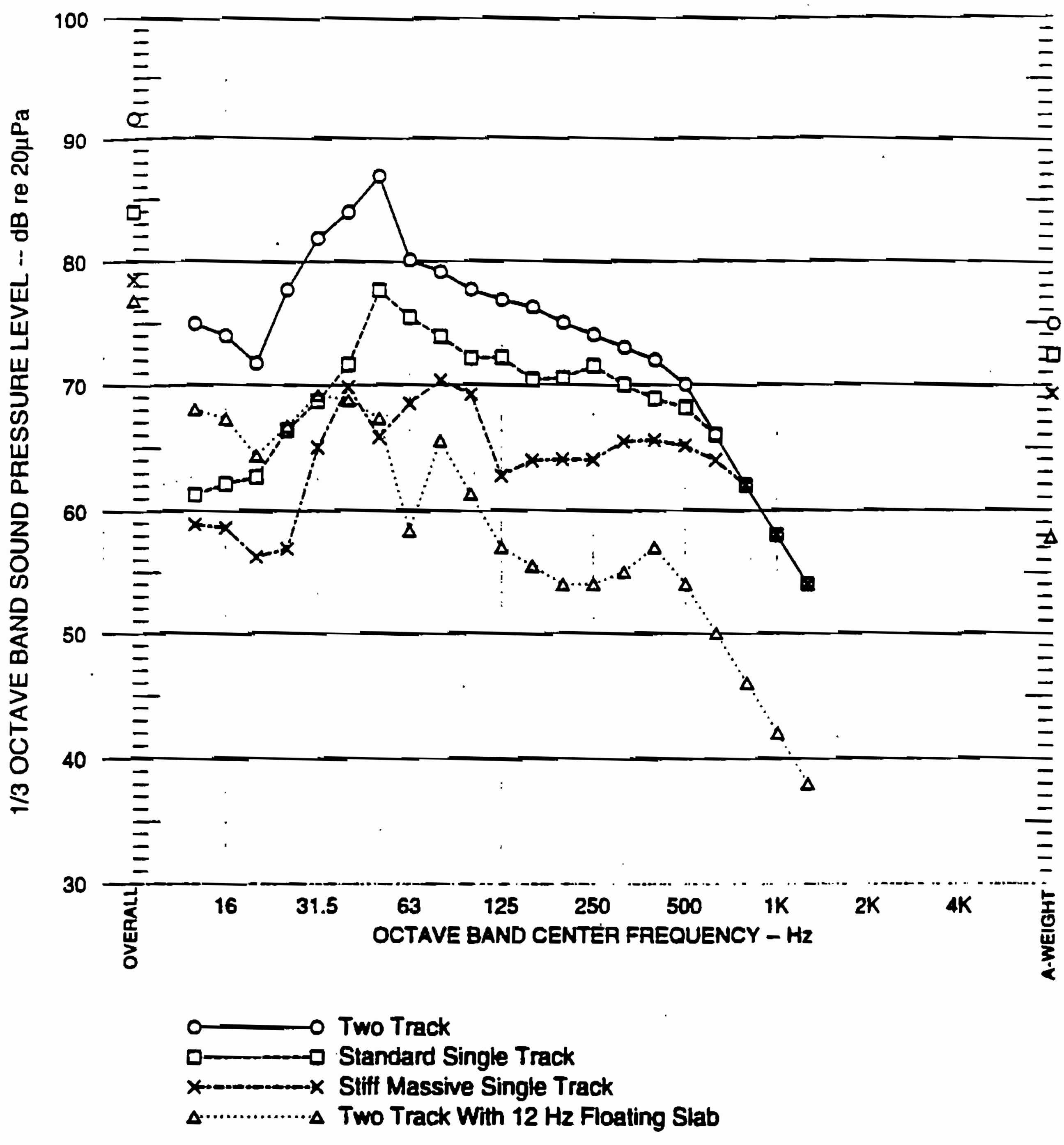
FIGURE 31

Contract/C1588/C1588_61

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED STRUCTURE RADIATED NOISE FOR DIFFERENT VIADUCT DESIGNS - re: 12 CAR 130 kmh, 25m DISTANCE (BASEPLATES STIFFNESS: 12 Kn/mm)

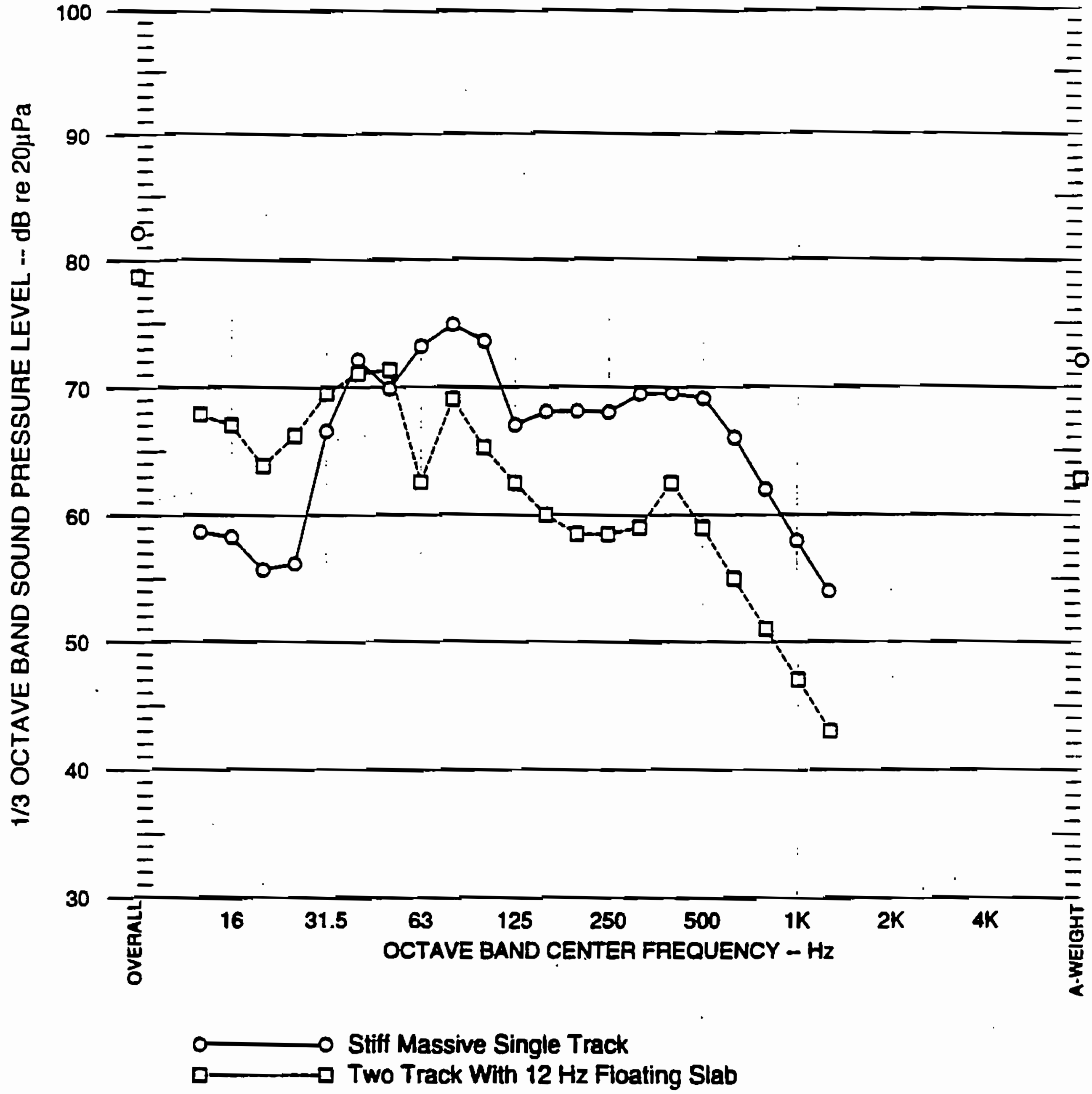
FIGURE 32

Contract/C1500/C1500_62

ERM

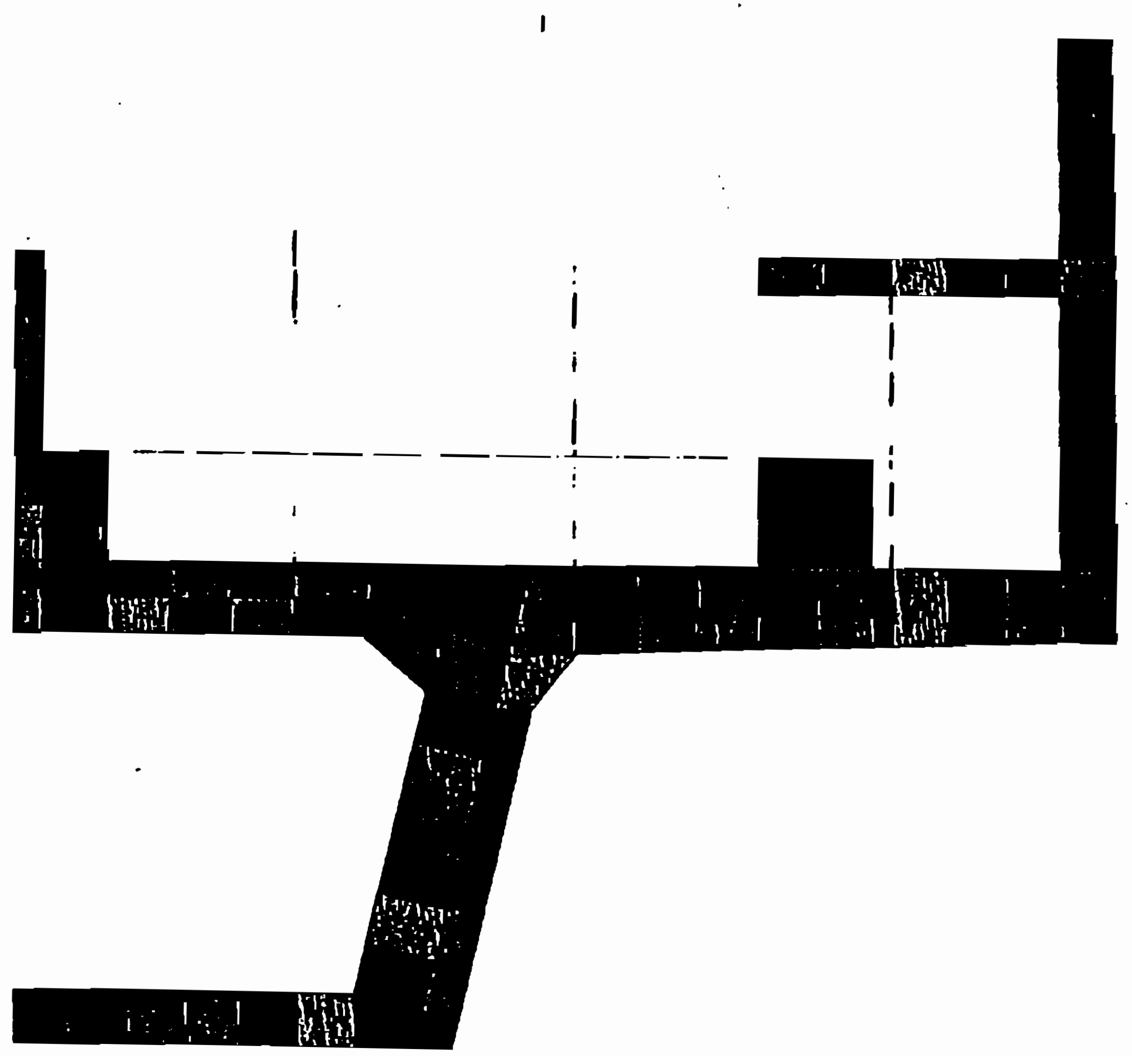
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A	ESTIMATED STRUCTURE RADIATED NOISE FOR DIFFERENT VIADUCT DESIGNS - re: 12 CAR 130 kmh, 25m DISTANCE (BASEPLATES STIFFNESS: 30 Kn/mm)	FIGURE 33	ERM	KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



FINITE ELEMENT MODEL OF TWO-TRACK VIADUCT CROSS-SECTION WITH STRENGTHENED CELL

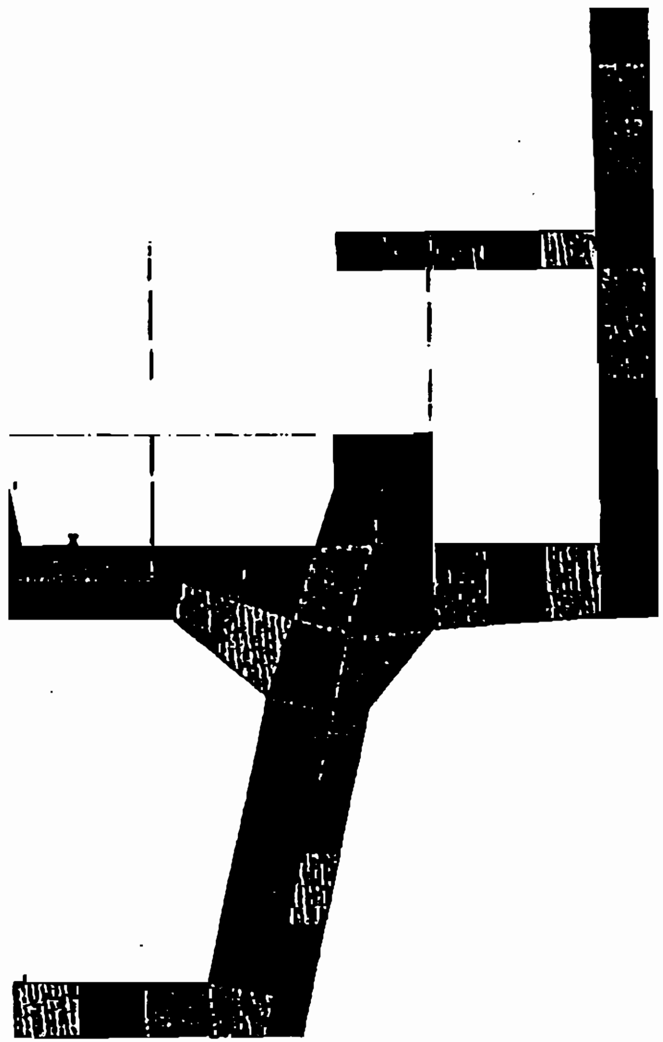
FIGURE 34

Contract/C1588/C1588_64

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



FINITE ELEMENT MODEL OF SINGLE TRACK VIADUCT WITH STRENGTHENED CELL

FIGURE 35

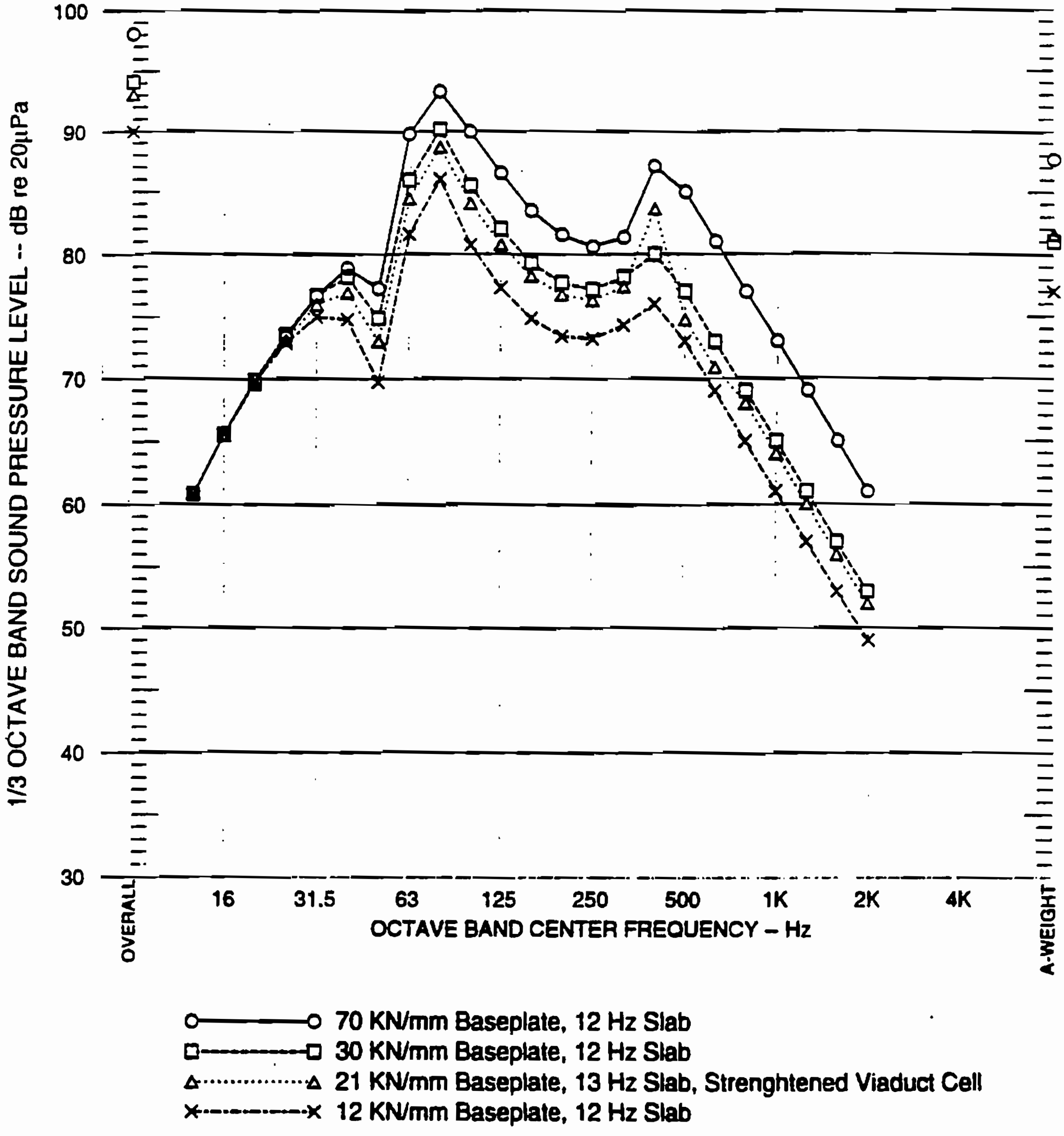
Contract/C1588/C1588_65

W I A

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED RADIATED NOISE FROM THE FLOATING SLAB - re: 12 TRANSIT CAR 130 kmh, 25m DISTANCE

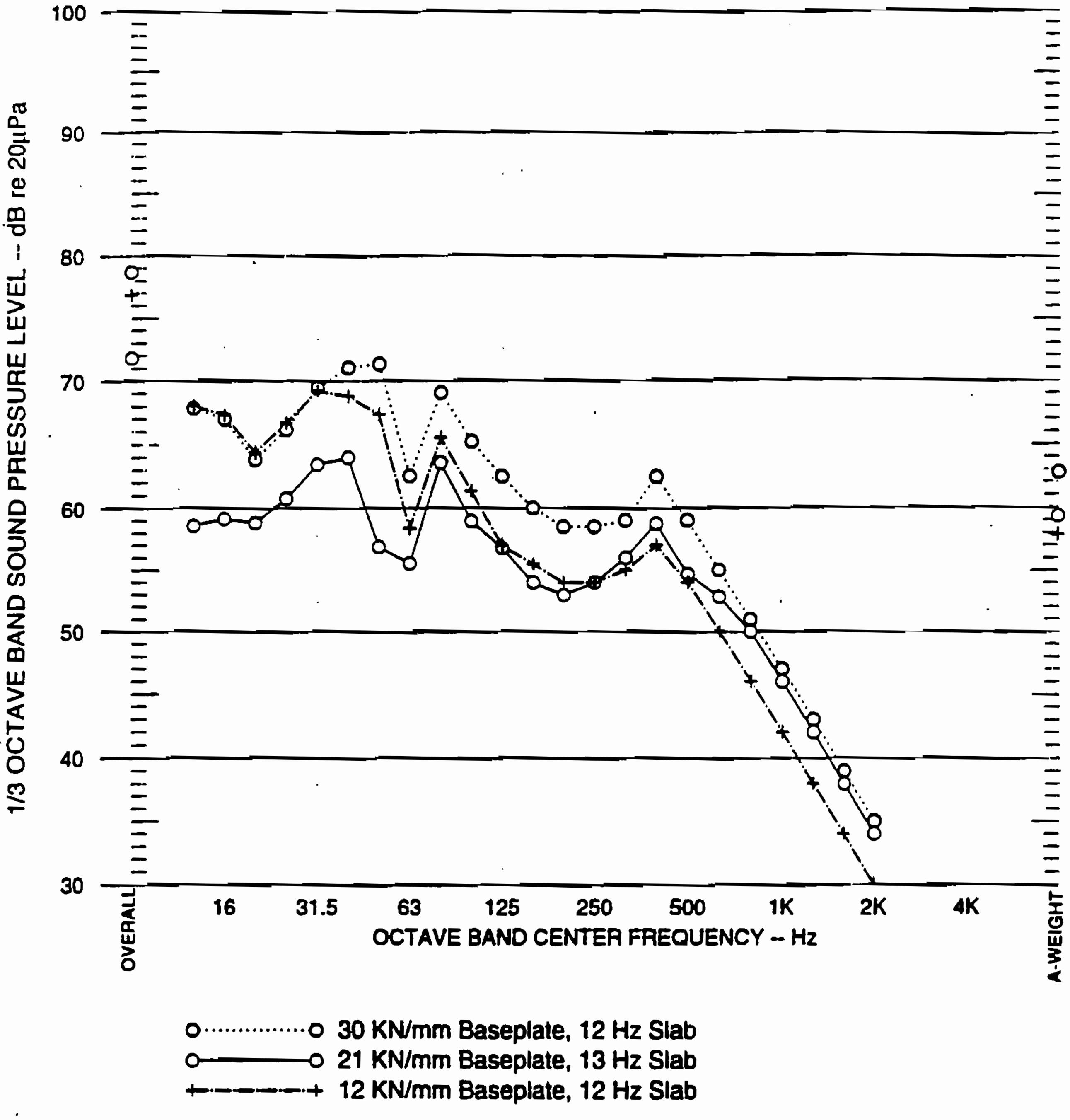
FIGURE 36

Contract/C1500/C1500_06

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A

ESTIMATED RADIATED NOISE FROM THE TWO TRACK VIADUCT - re: 12 TRANSIT CAR 130 kmh, 25m DISTANCE

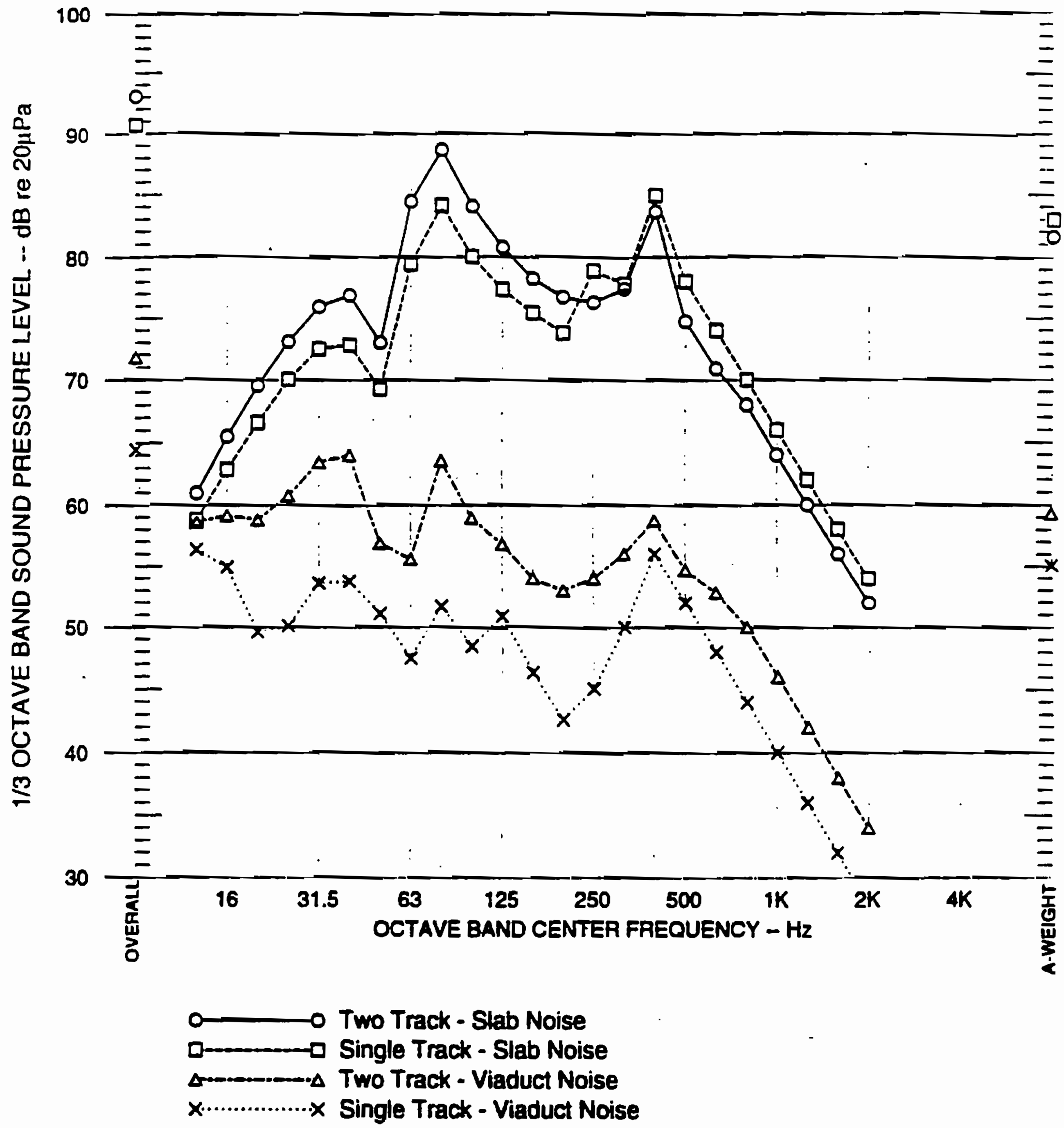
FIGURE 37

Contract/C1588/C1588_67

ERM

KOWLOON - CANTON RAILWAY CORPORATION

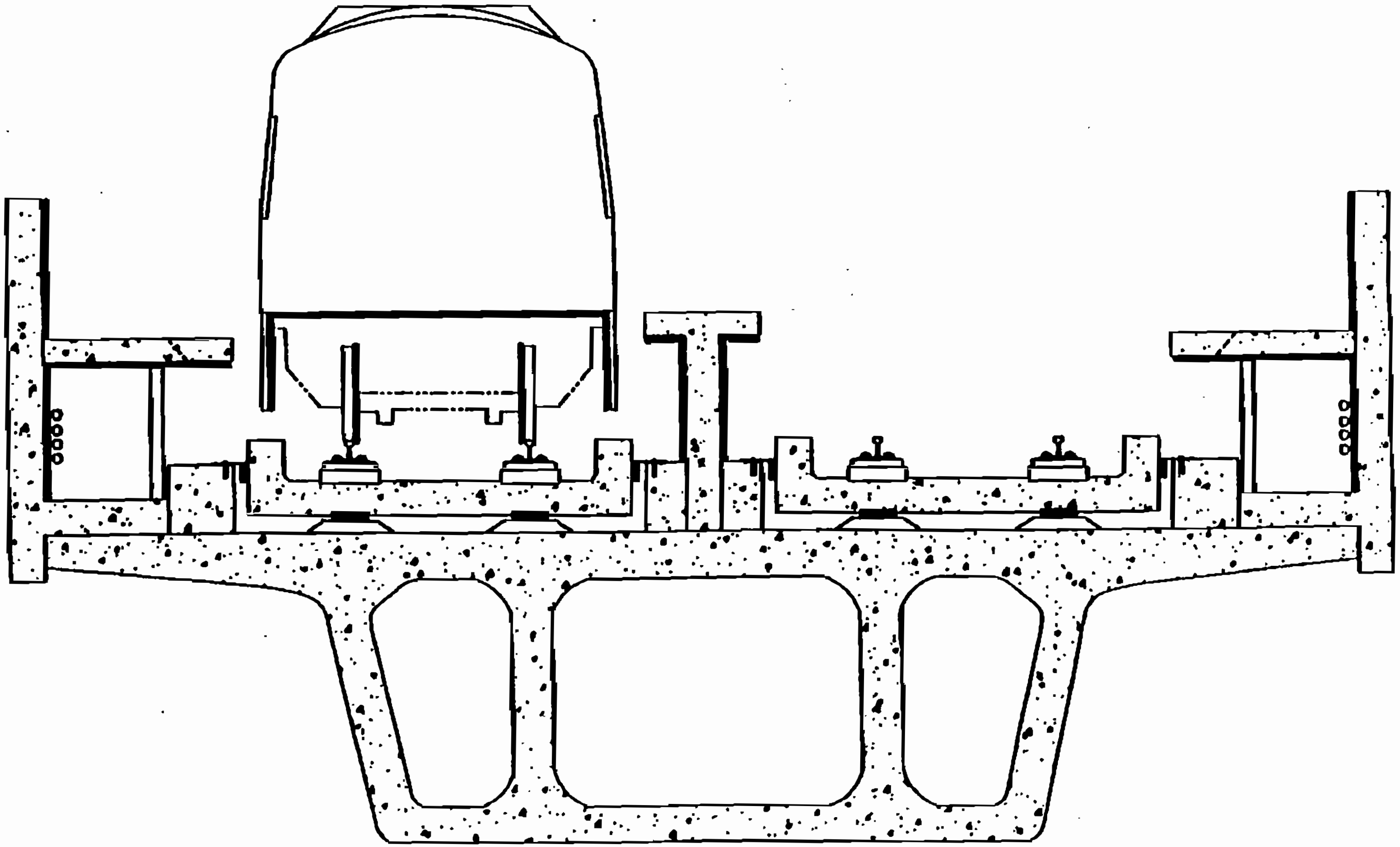
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA	ESTIMATED STRUCTURE RADIATED NOISE FROM THE KCR VIADUCT - re: 12 TRANSIT CAR 130 kmh, 25m DISTANCE	FIGURE 38	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY

Contract/C1500/C1500_00



WIA

STRENGTHENED THREE-CELL CROSS-SECTION WITH CELL WALLS UNDER TRACKFORM MODEL

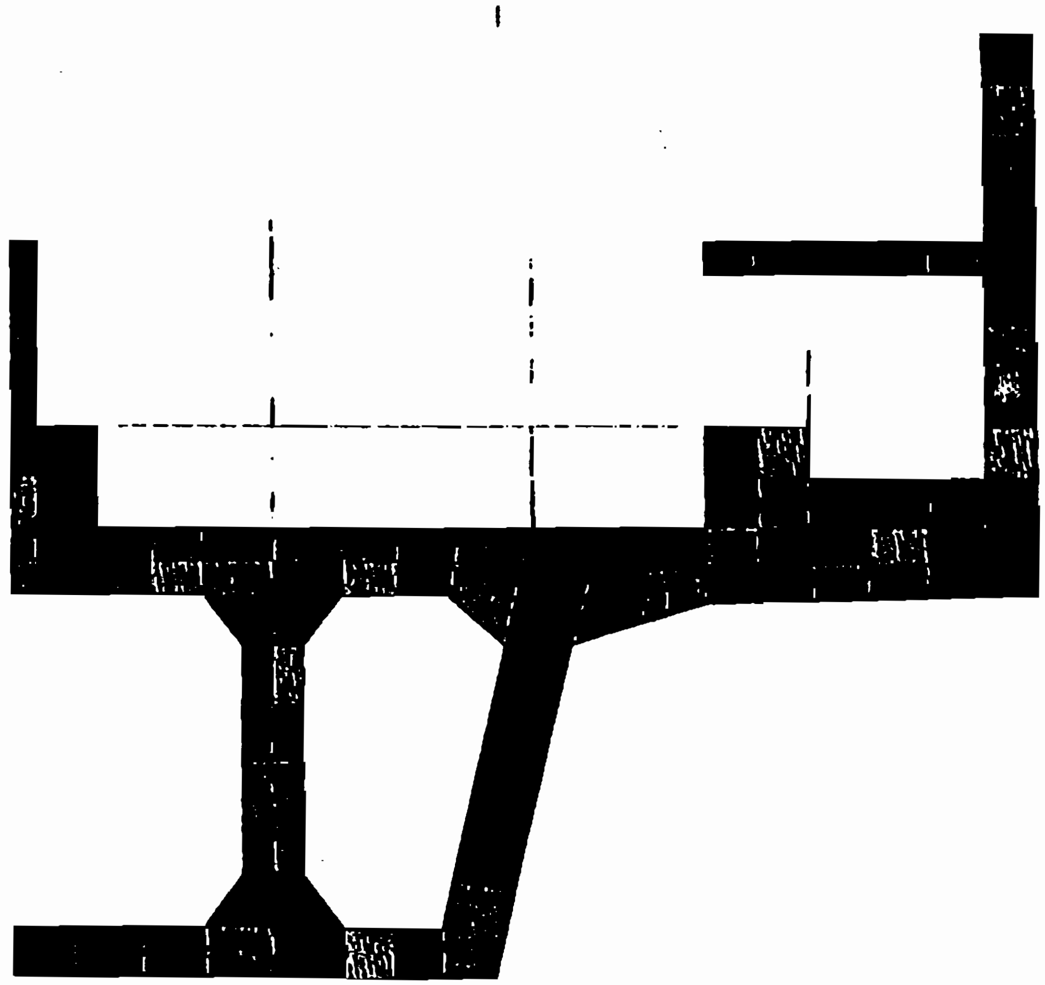
FIGURE 39

Contract/C1588/C1588_69

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL TS900 EIA STUDY



W I A

FINITE ELEMENT MODEL CROSS-SECTION OF THE THREE-CELL VIADUCT

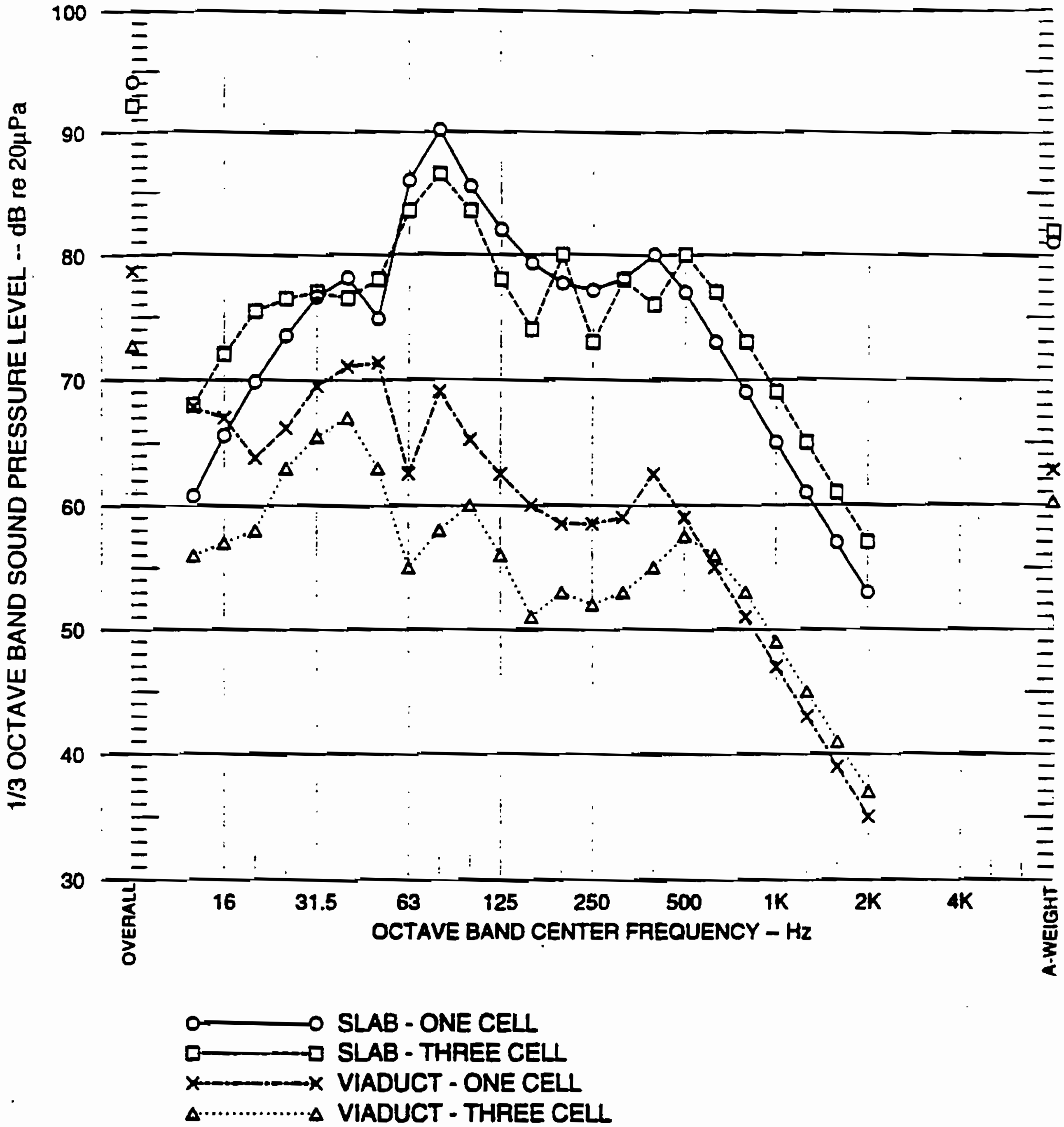
FIGURE 40

Contract/C1588/C1588_70

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

COMPARISON OF RE-RADIATED NOISE FOR ONE VS THREE-CELL VIADUCT STRUCTURE - 12 Hz SLAB, 30 kN/mm BASEPLATE (DYNAMIC)

FIGURE 41

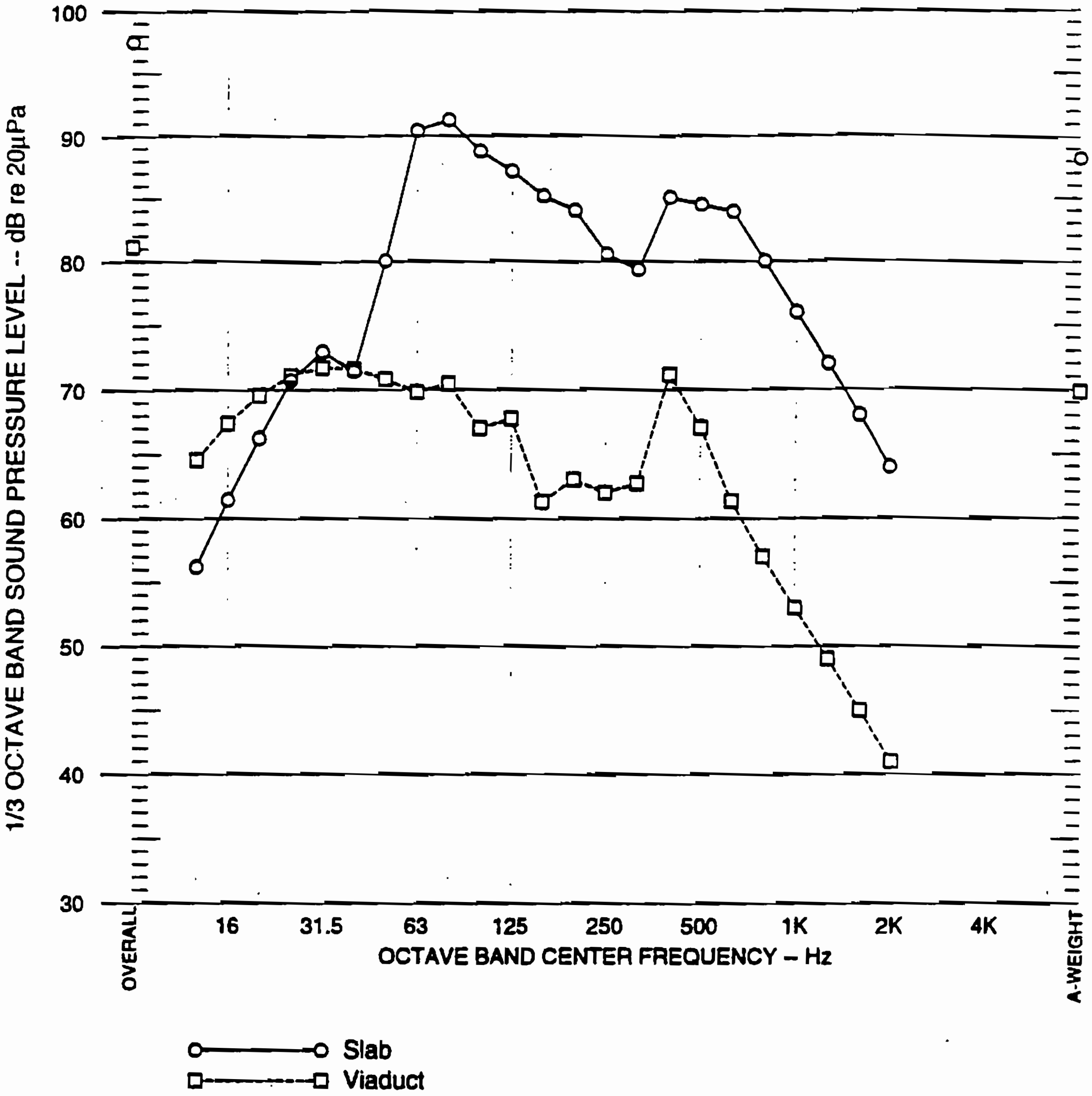
Contract/C1586/C1586_71

WIA

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RE-RADIATED (32T FREIGHT) NOISE FROM TWO TRACK VIADUCTS - 20.5Hz, 2844kg/m FLOATING SLAB: ACOUSTIC LOADMASTER

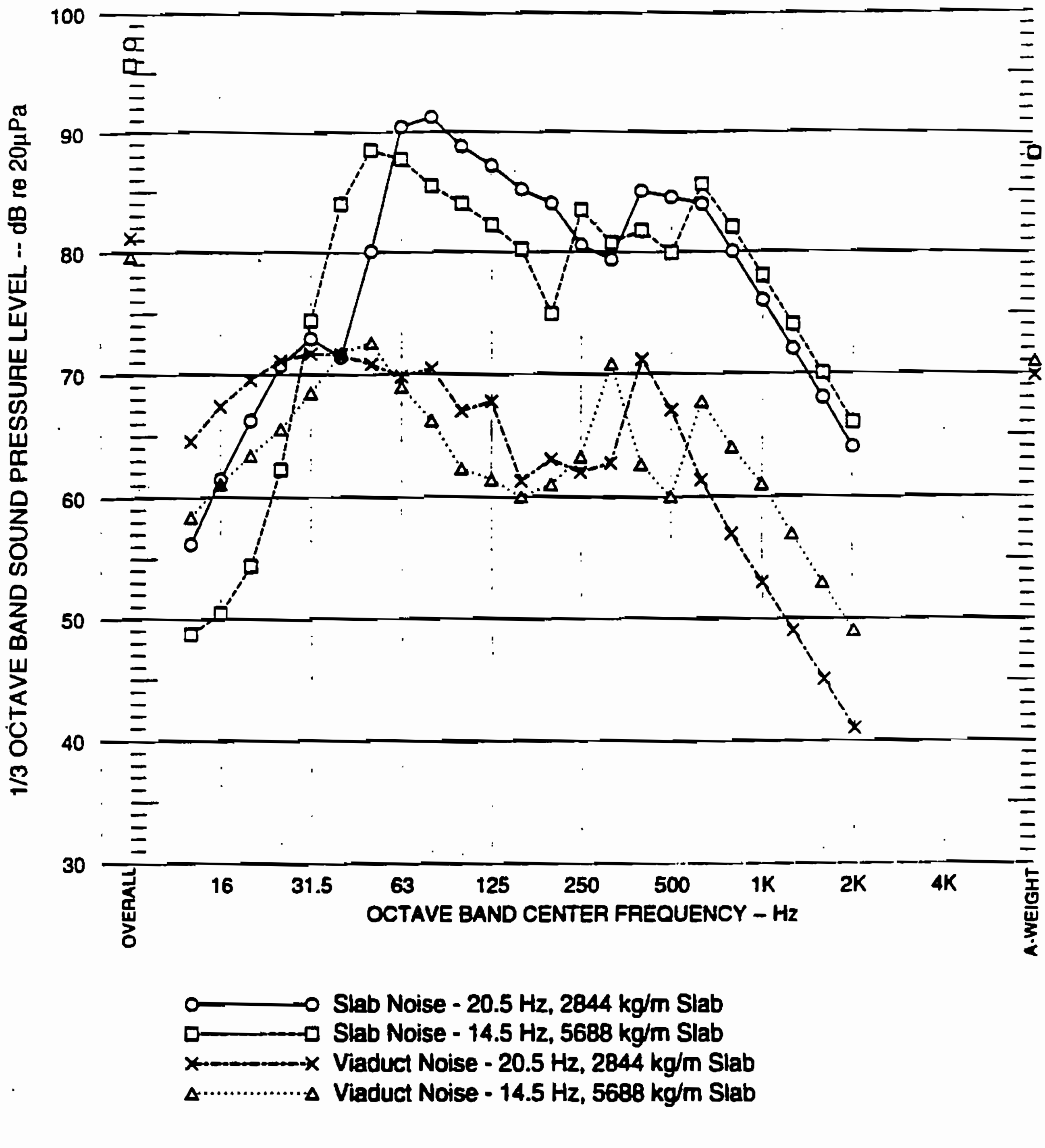
FIGURE 42

Contract/C1588/C1588_72

ERM

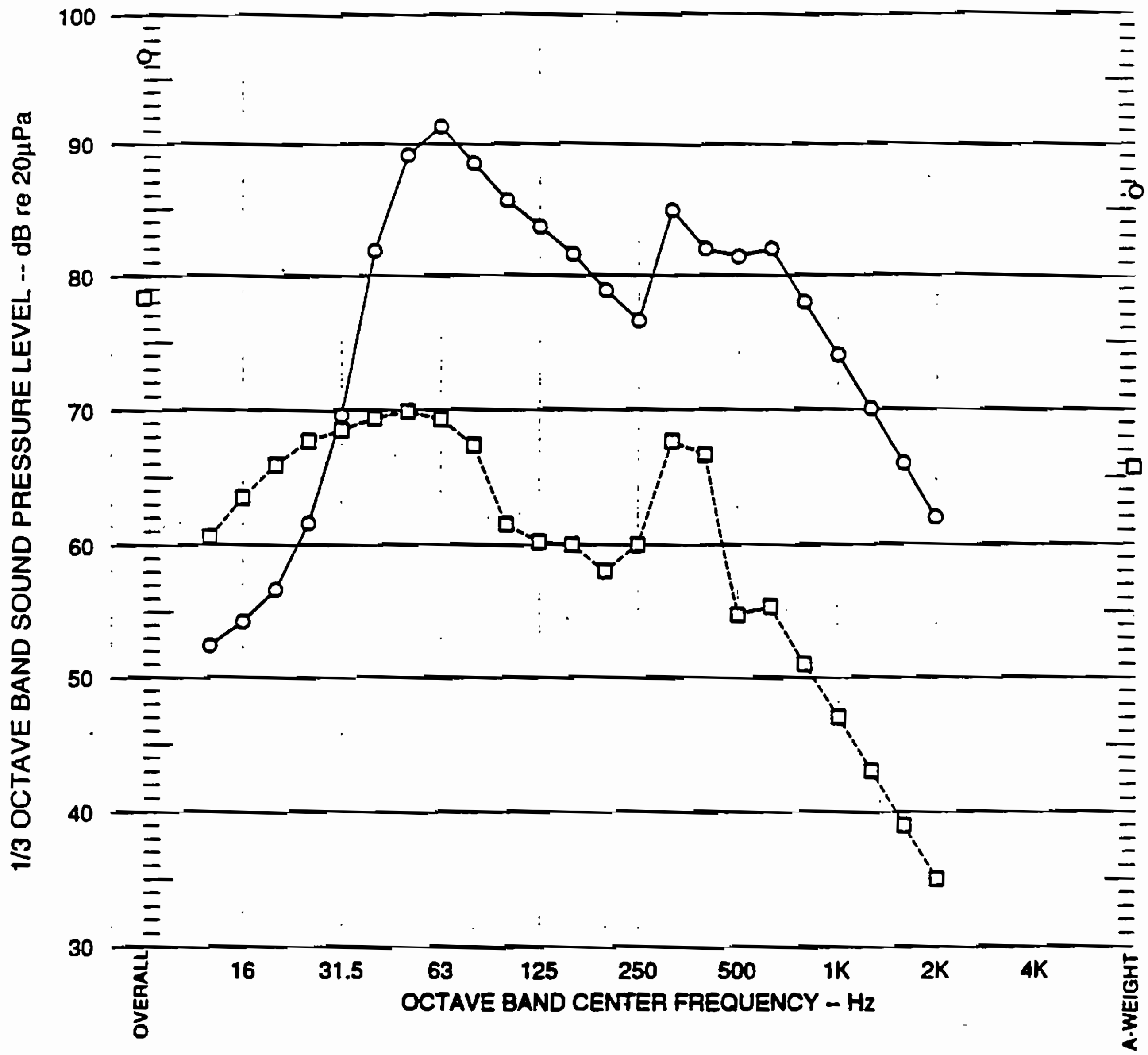
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A	COMPARISON OF RE-RADIATED (32T FRIEGHT) NOISE ON A TWO TRACK VAIDUCT FOR DIFFERENT MASS FLOATING SLAB: ACOUSTIC LOADMASTER BASEPLATE	FIGURE 43 Contract/C1500/C1500_73	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

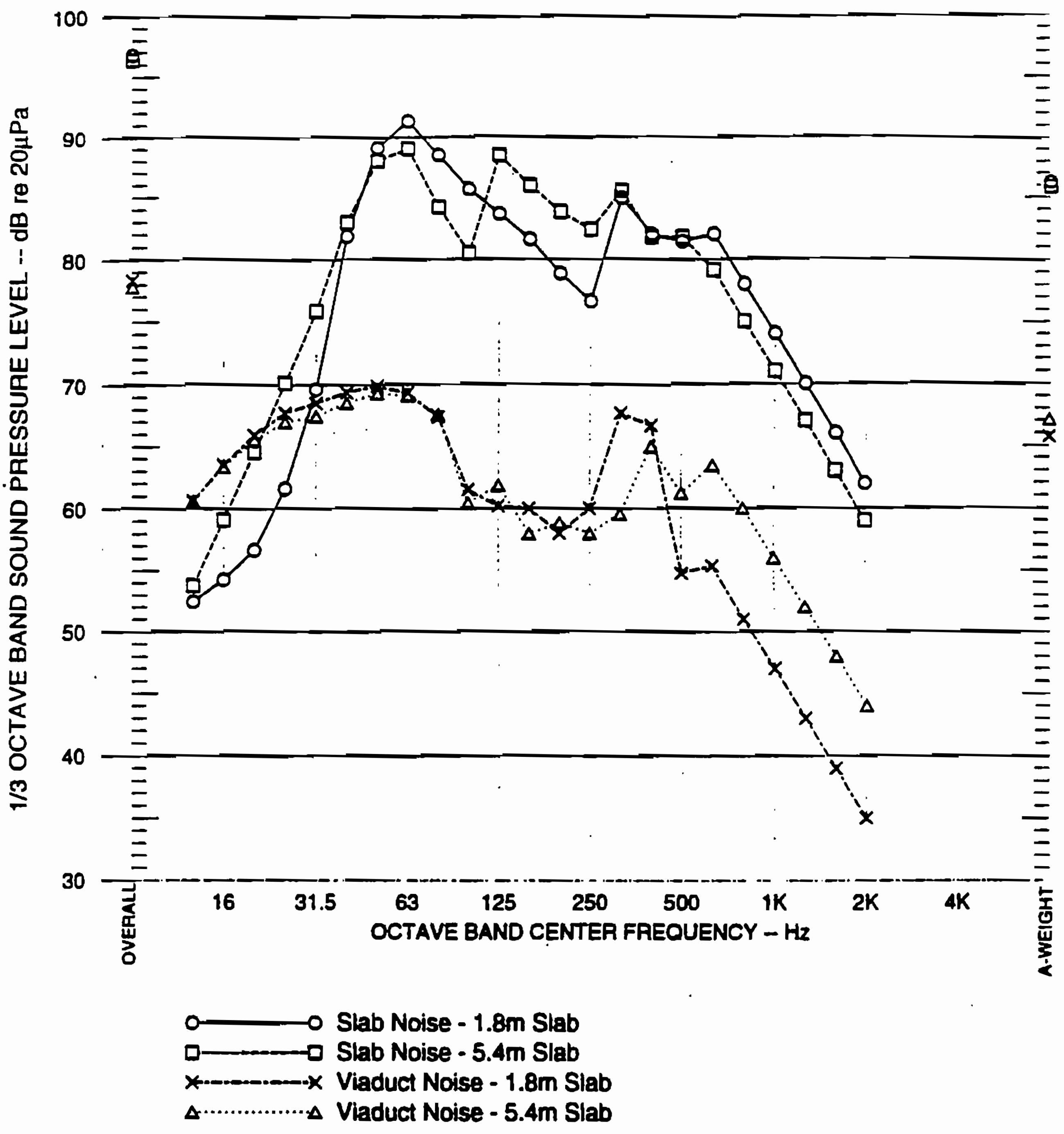
RE-RADIATED (22T FRIEGHT) NOISE FROM TWO TRACK VAIDUCTS - 13.2Hz, 4266 kg/m Floating Slab - ACOUSTIC LOADMASTER

FIGURE 44

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

COMPARISON OF RE-RADIATED (22T FRIEGHT): 1.8m VS 5.4m SLAB LENGTH - 13.2Hz, 4266 kg/m FLOATING SLAB. - ACOUSTIC LOADMASTER BASEPLATE

FIGURE 45

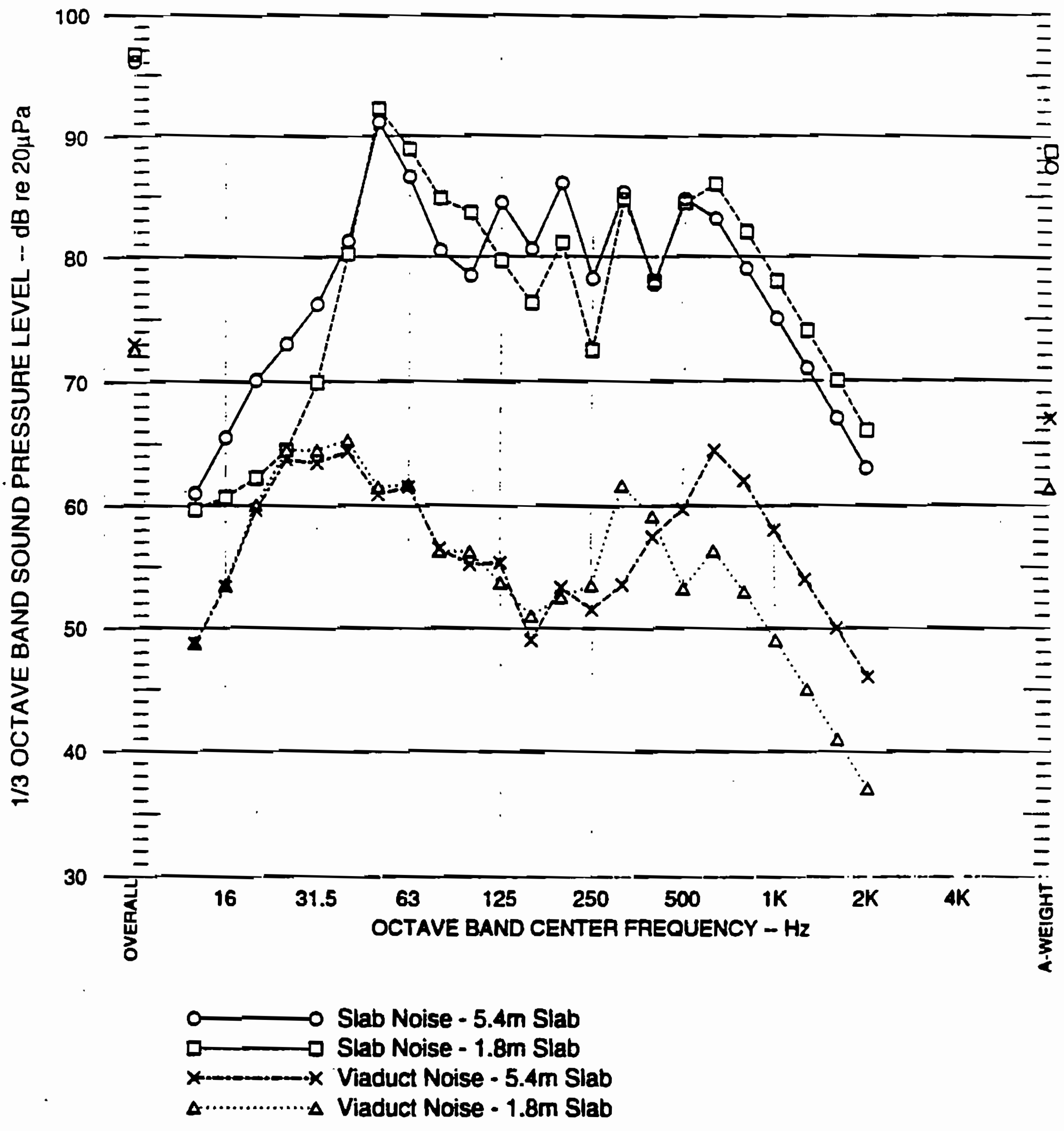
Contract/C1500/C1500_75

WIA

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA

RE-RADIATED NOISE FOR 22T AXLE FREIGHT ON A STRENGTHENED THREE CELL VIADUCT - 13.2 Hz, 4266 kg/m FLOATING SLAB WITH ACOUSTIC LOADMASTER BASEPLATE

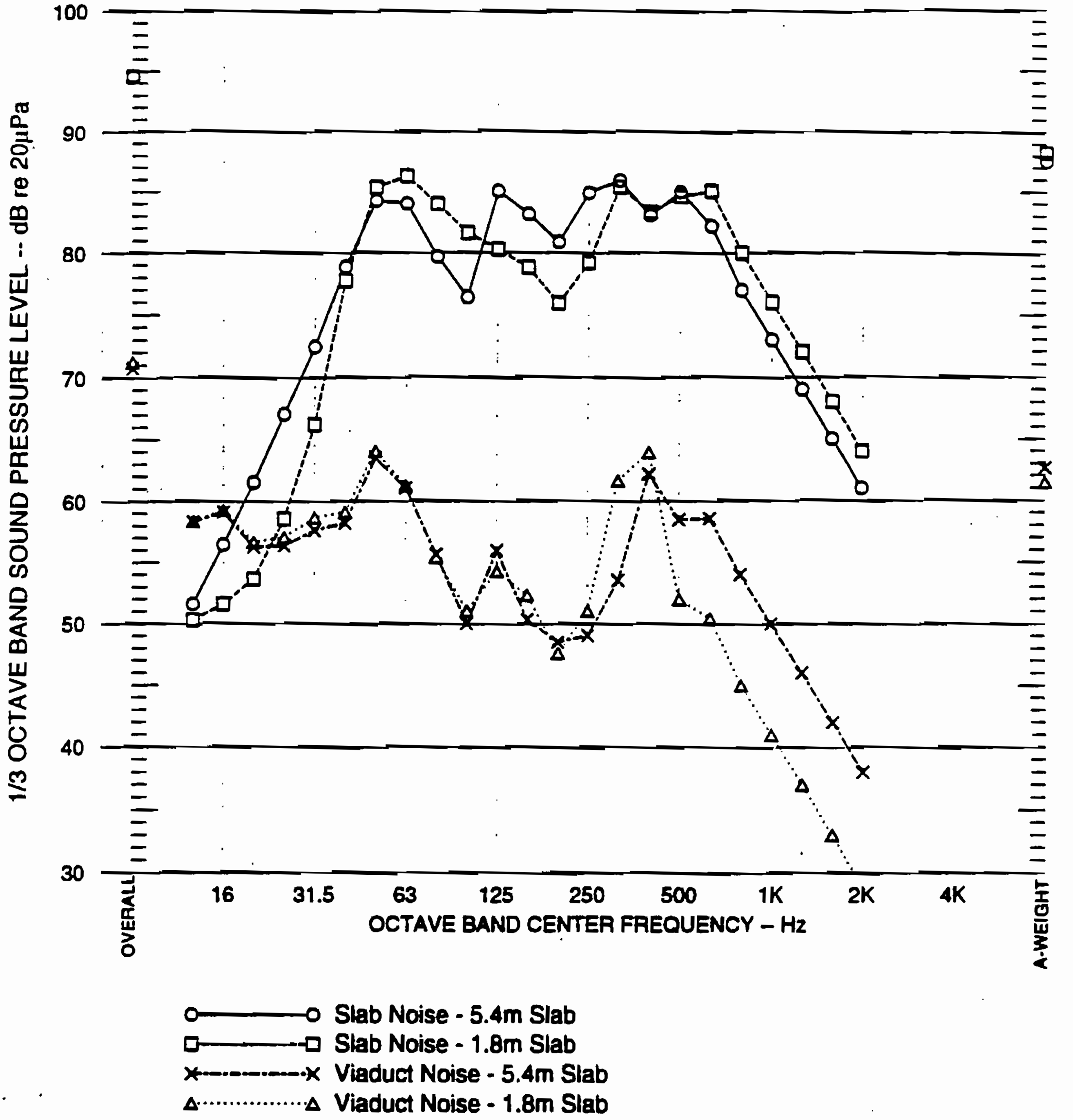
FIGURE 46

Centres/C1568/C1568_78

ERM

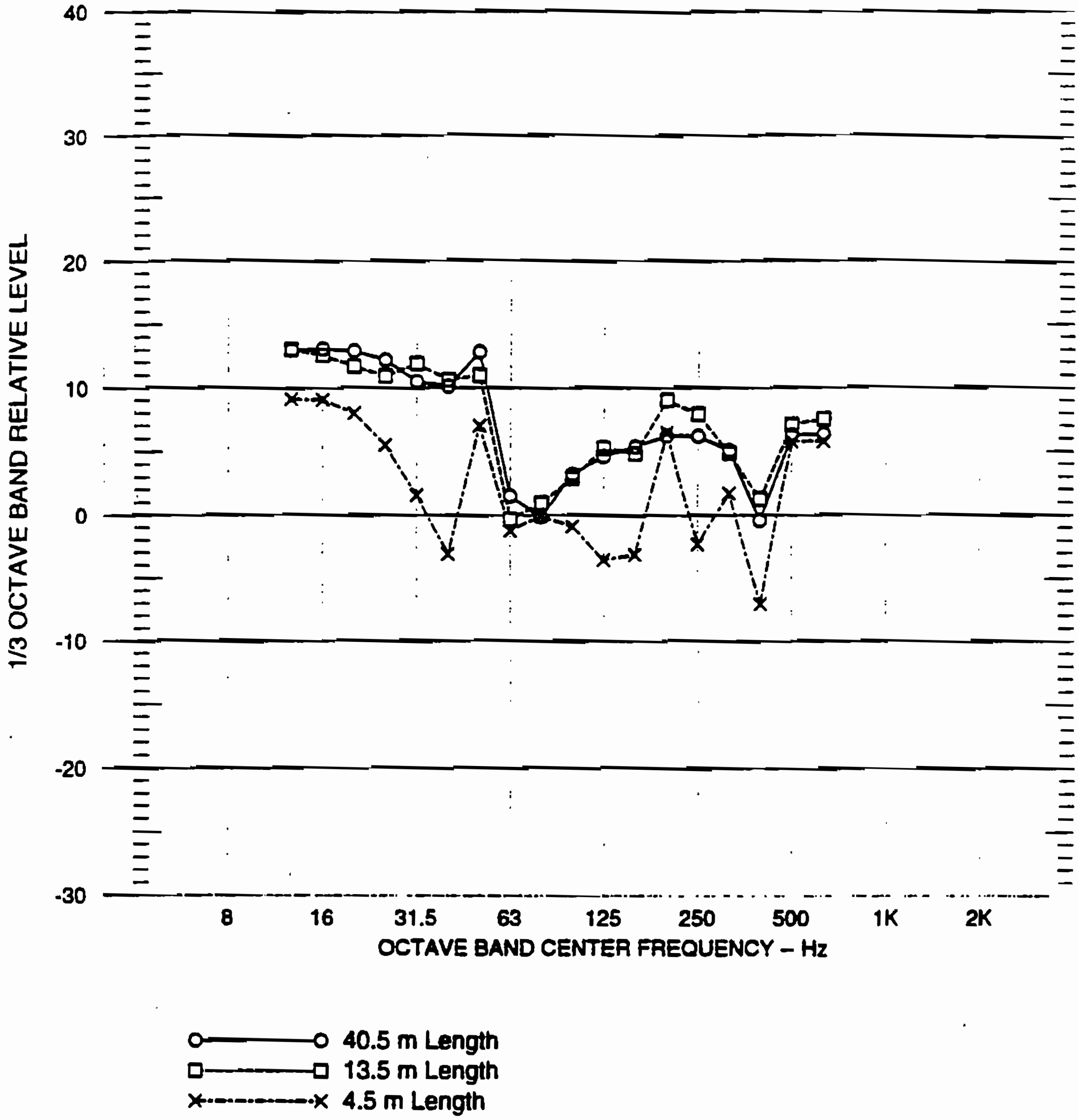
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS800 EIA STUDY



NOT TO SCALE

WIA	RE-RADIATED NOISE FOR A SINGLE TRACK VIADUCT FOR 22T FREIGHT - 13.2 Hz, 4266 kg/m FLOATING SLAB WITH ACOUSTIC LOADMASTER BASEPLATE	FIGURE 47 Contract/C1588/C1588_77	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

NOISE RADIATED FROM 12 Hz FLOATING SLABS OF DIFFERENT LENGTHS - RELATIVE TO THE 1.5m MINI-SLAB MODULE (BASEPLATE STIFFNESS: 30 kN/mm)

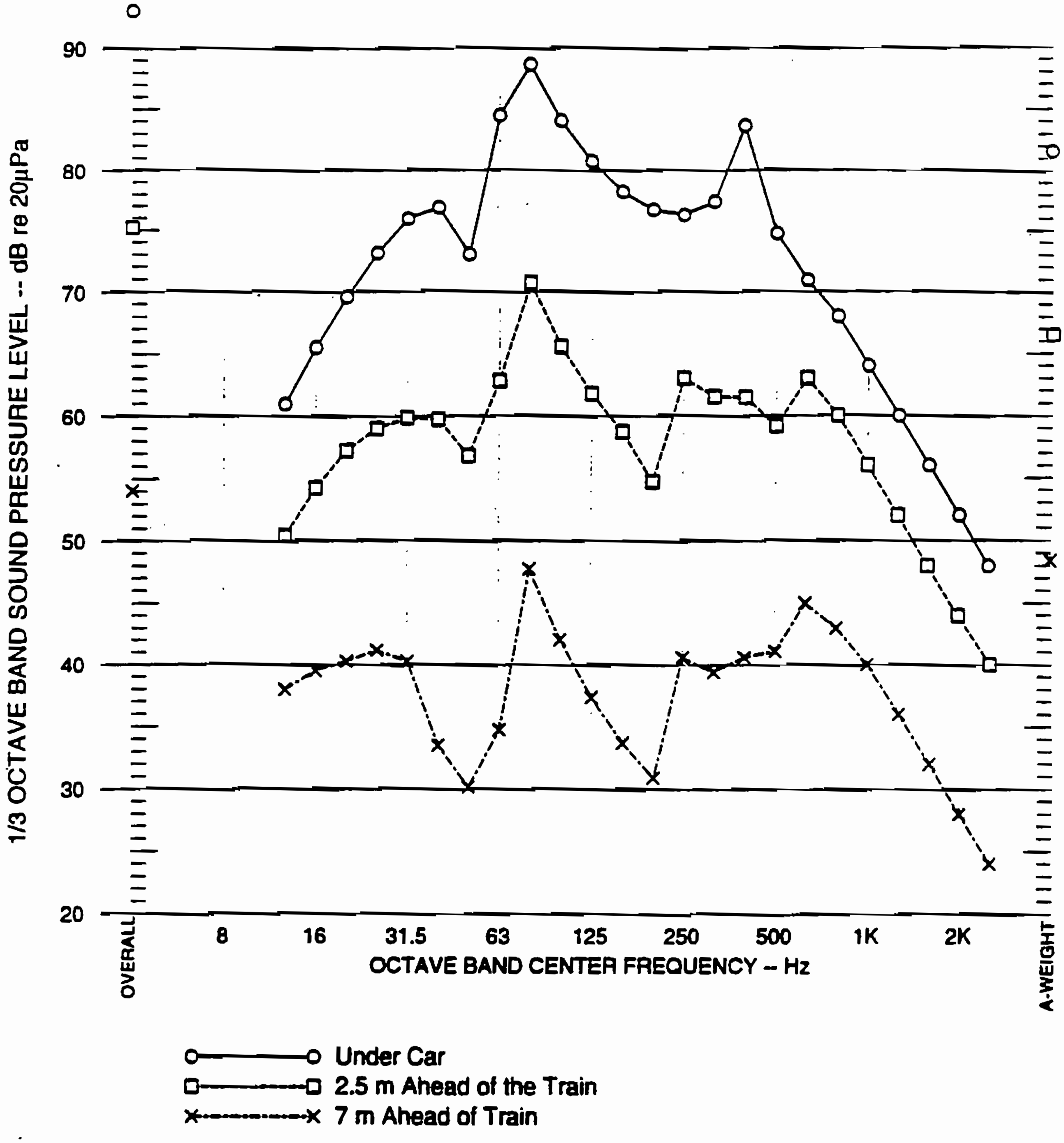
FIGURE 48

Contract/C1588/C1588_78

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ESTIMATED NOISE RADIATED FROM THE FLOATING SLAB - 13 Hz RESONANCE FREQUENCY WITH 21 kN/mm BASEPLATES

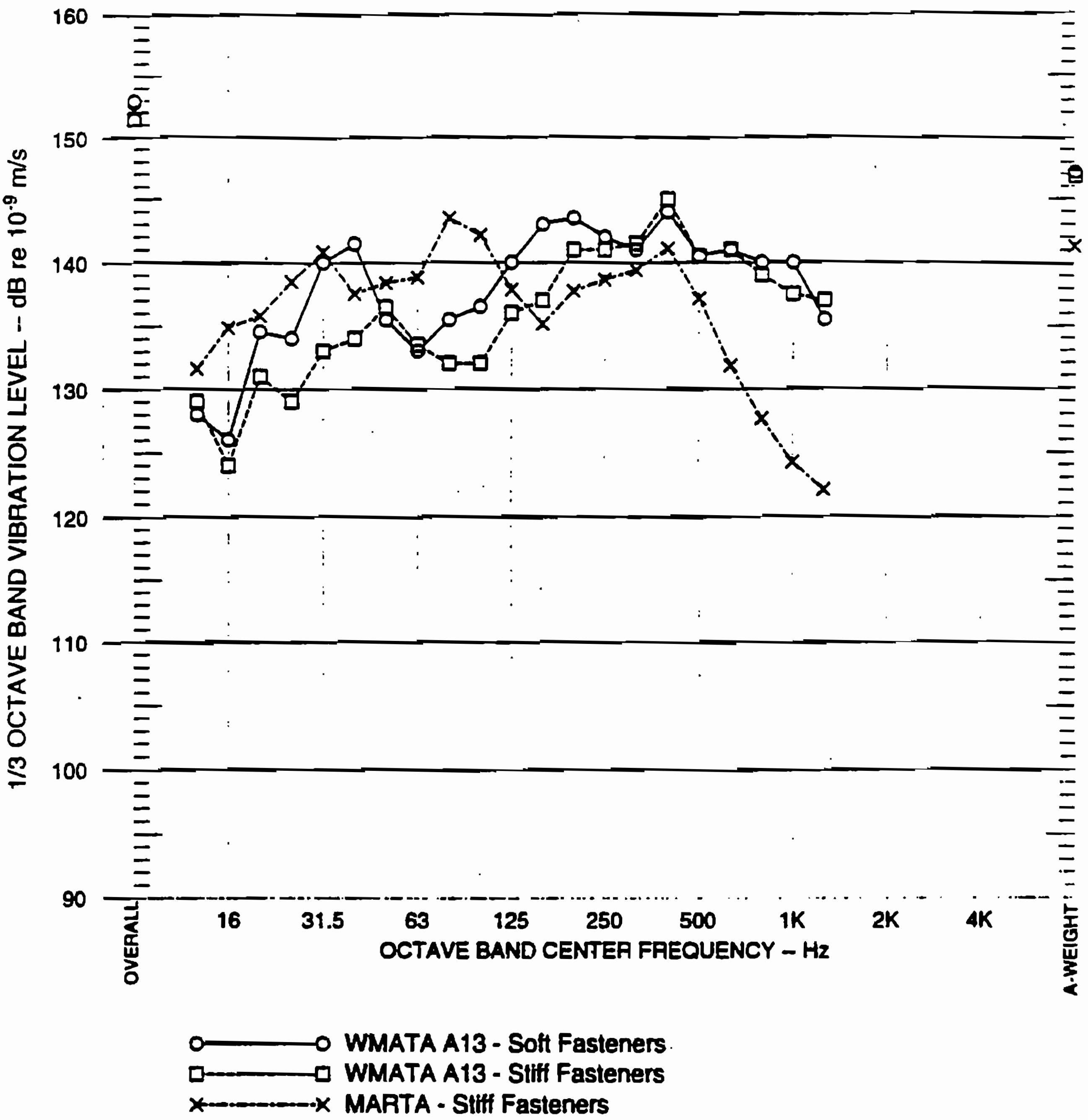
FIGURE 49

Contract/C1588/C1588_79

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RAIL VIBRATION MEASUREMENT DATA TAKEN ON VIADUCTS AND ADJUSTED TO 130 kmh

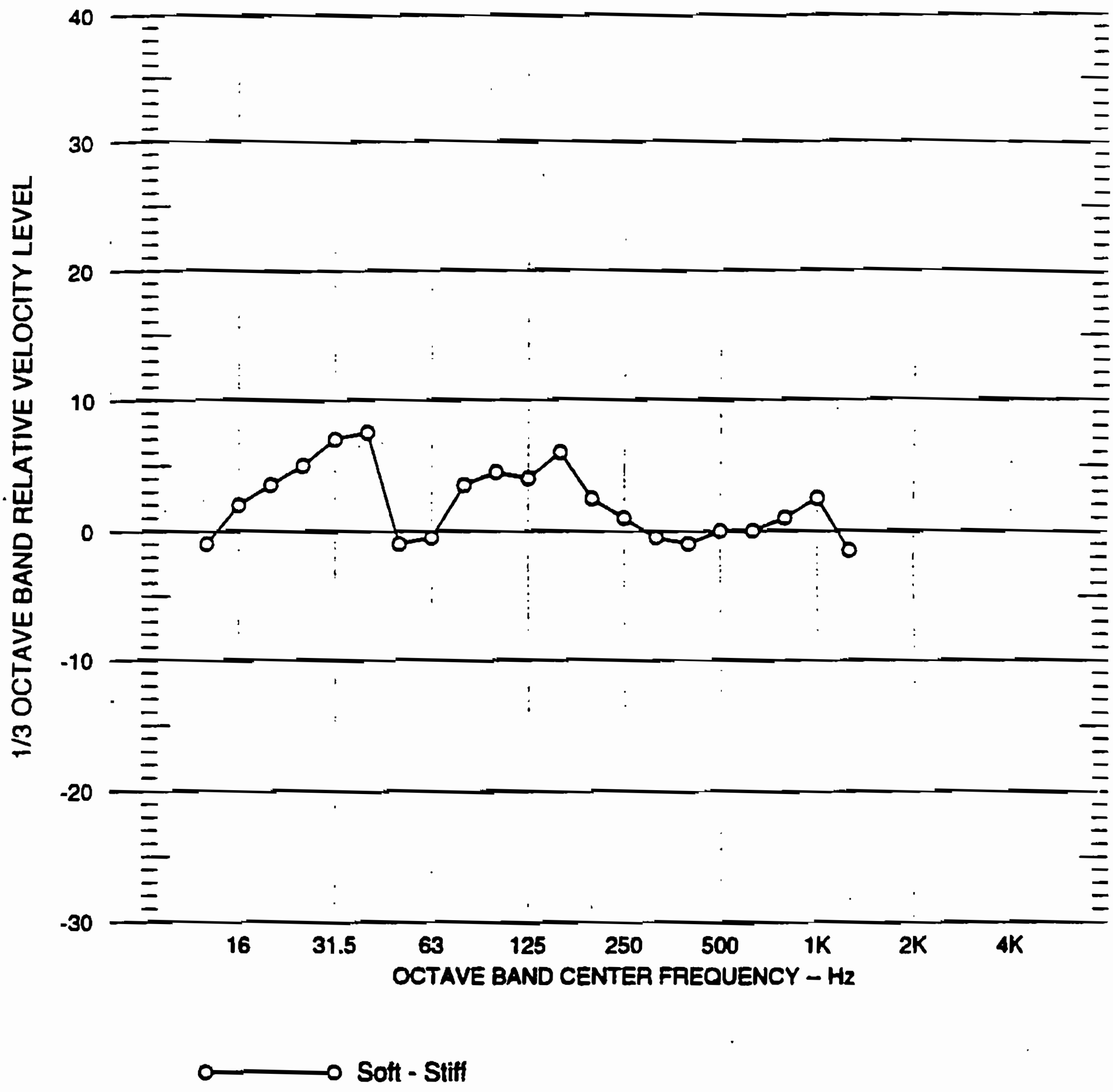
FIGURE 50

Contract/C1588/C1588_80

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

RELATIVE RAIL VIBRATION - SOFT VS STIFF BASEPLATES

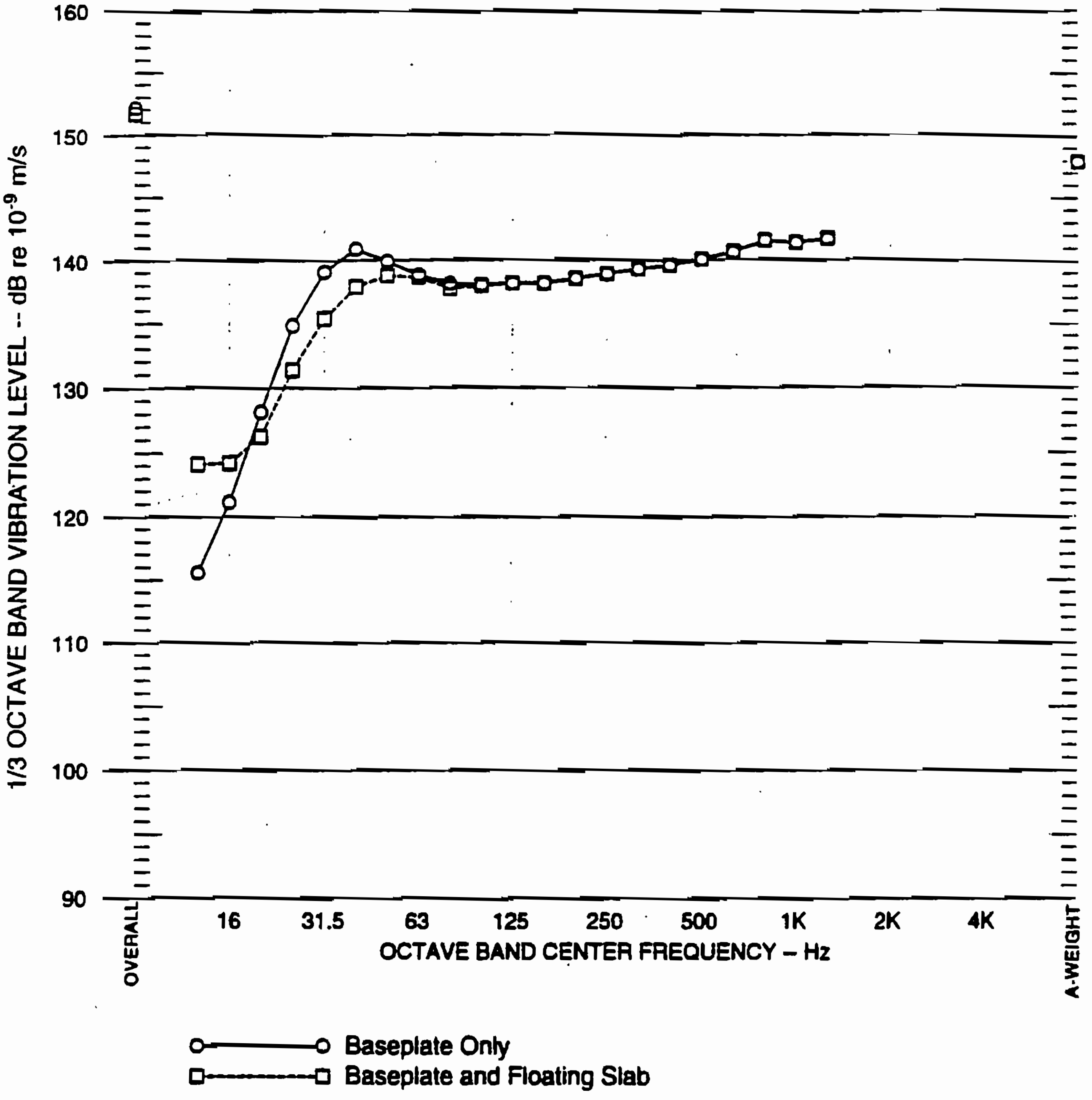
FIGURE 51

Contract/C1588/C1588_81

ERM

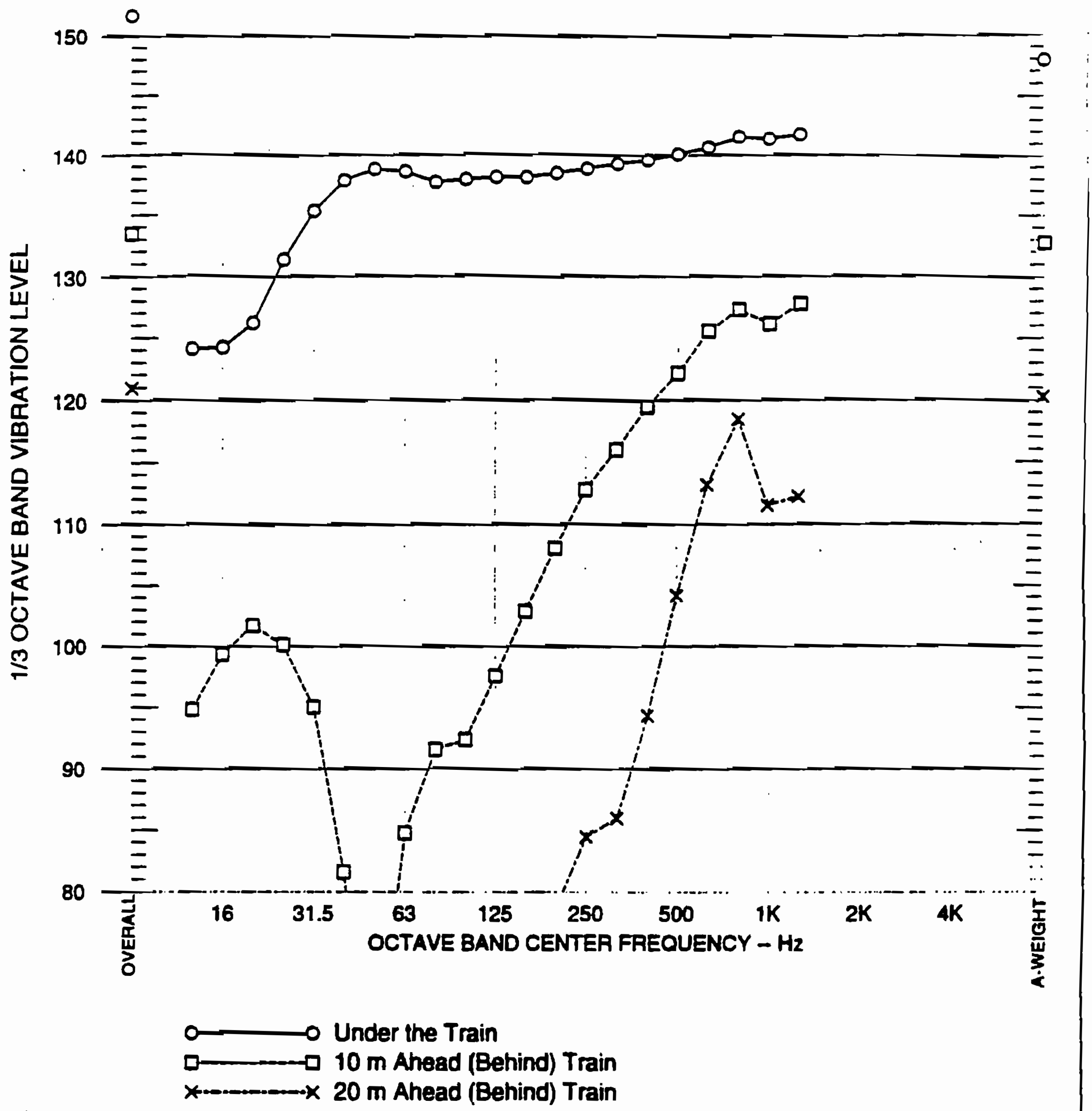
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA	CALCULATED RAIL VIBRATION WITH AND WITHOUT FLOATING SLAB	FIGURE 52 Contract/C1500/C1500_52	ERM — KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

WIA

COMPARISON OF RAIL VIBRATION UNDER AND IN FRONT (BACK) OF THE TRAIN

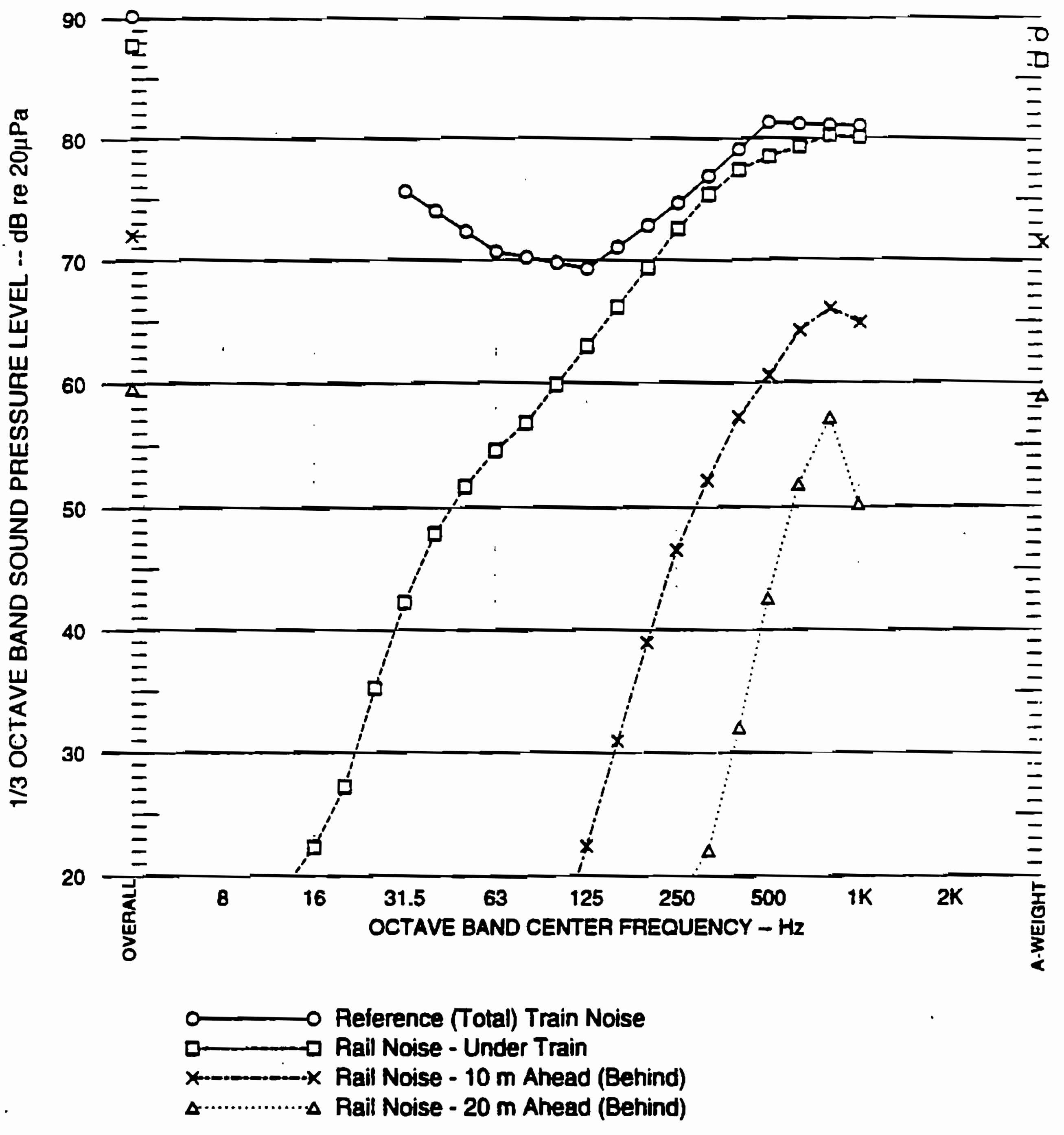
FIGURE 53

Contract/C1588/C1589_53

ERM

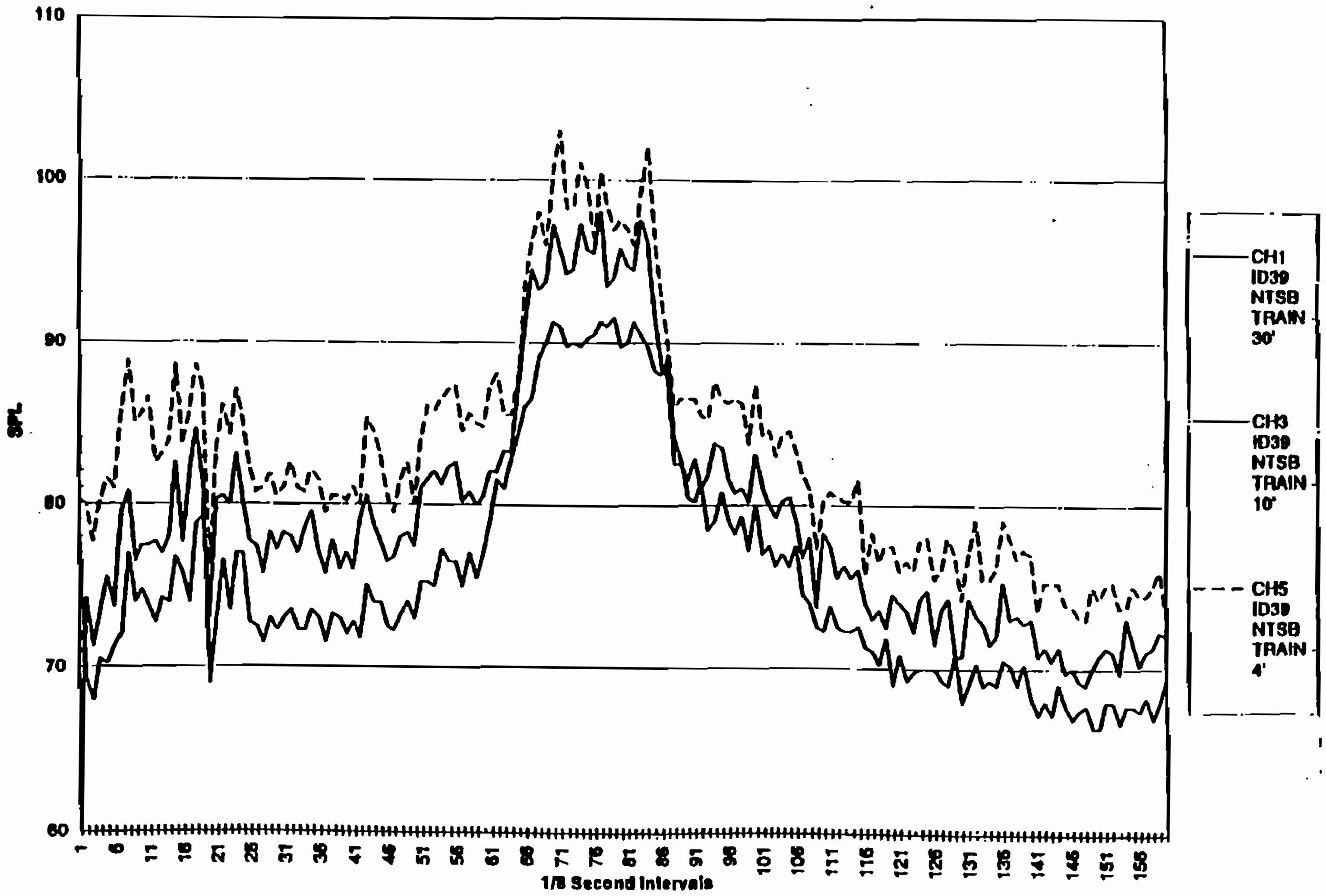
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

W I A	COMPARISON OF NOISE RADIATED FROM THE RAIL UNDER AND AHEAD OF (BEHIND) THE TRAIN - re 12 CAR, 130 kmh, 25m DISTANCE	FIGURE 54 Contract/C1500/C1500_04	ERM	KOWLOON - CANTON RAILWAY CORPORATION WEST RAIL: TS900 EIA STUDY



"A" WEIGHTED NOISE LEVELS MEASURED AT 3 DISTANCES FROM THE NEAREST RAIL

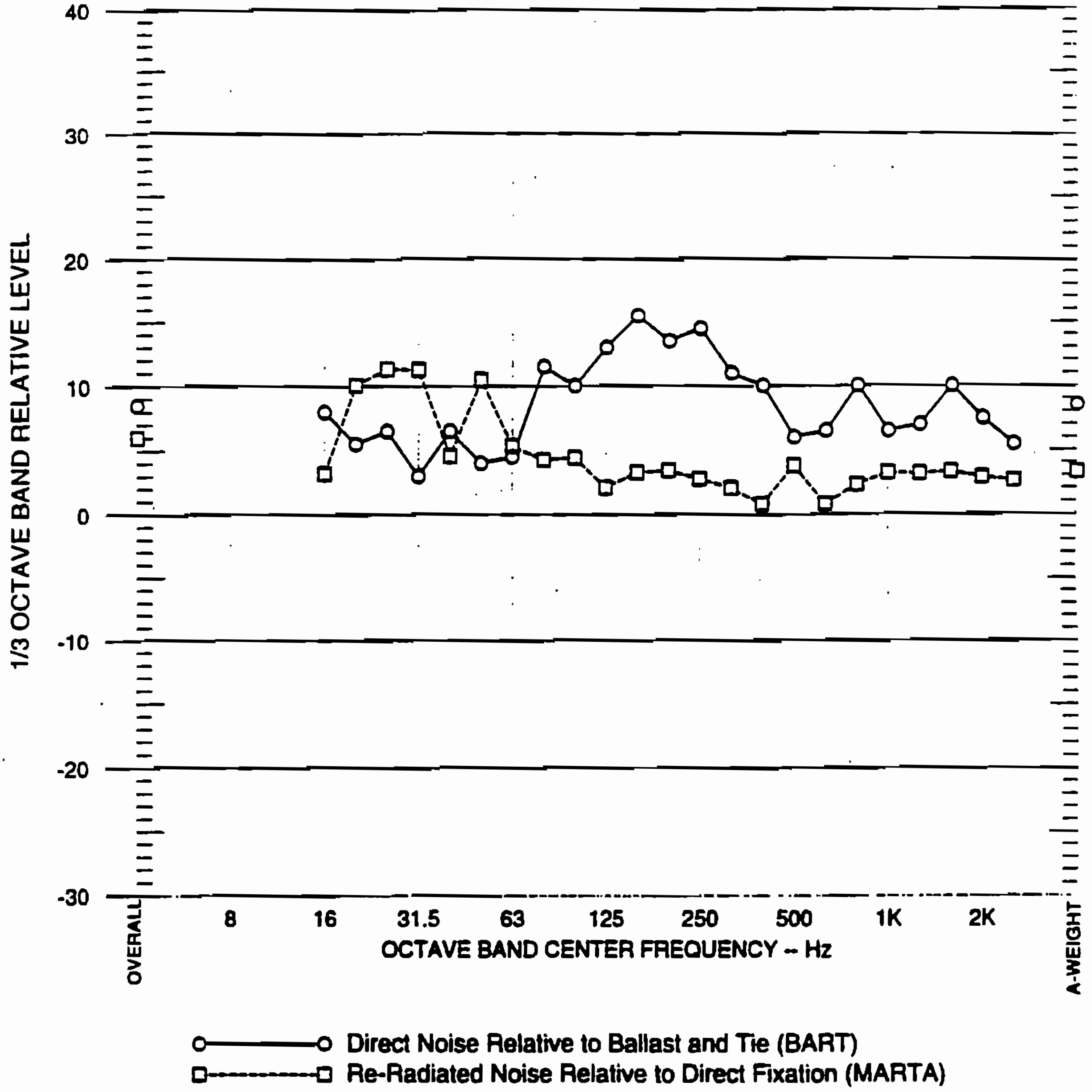
FIGURE 55

Contract/C1588/C1588_85

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

INCREASE IN NOISE DUE TO CROSSOVERS AND TURNOUTS

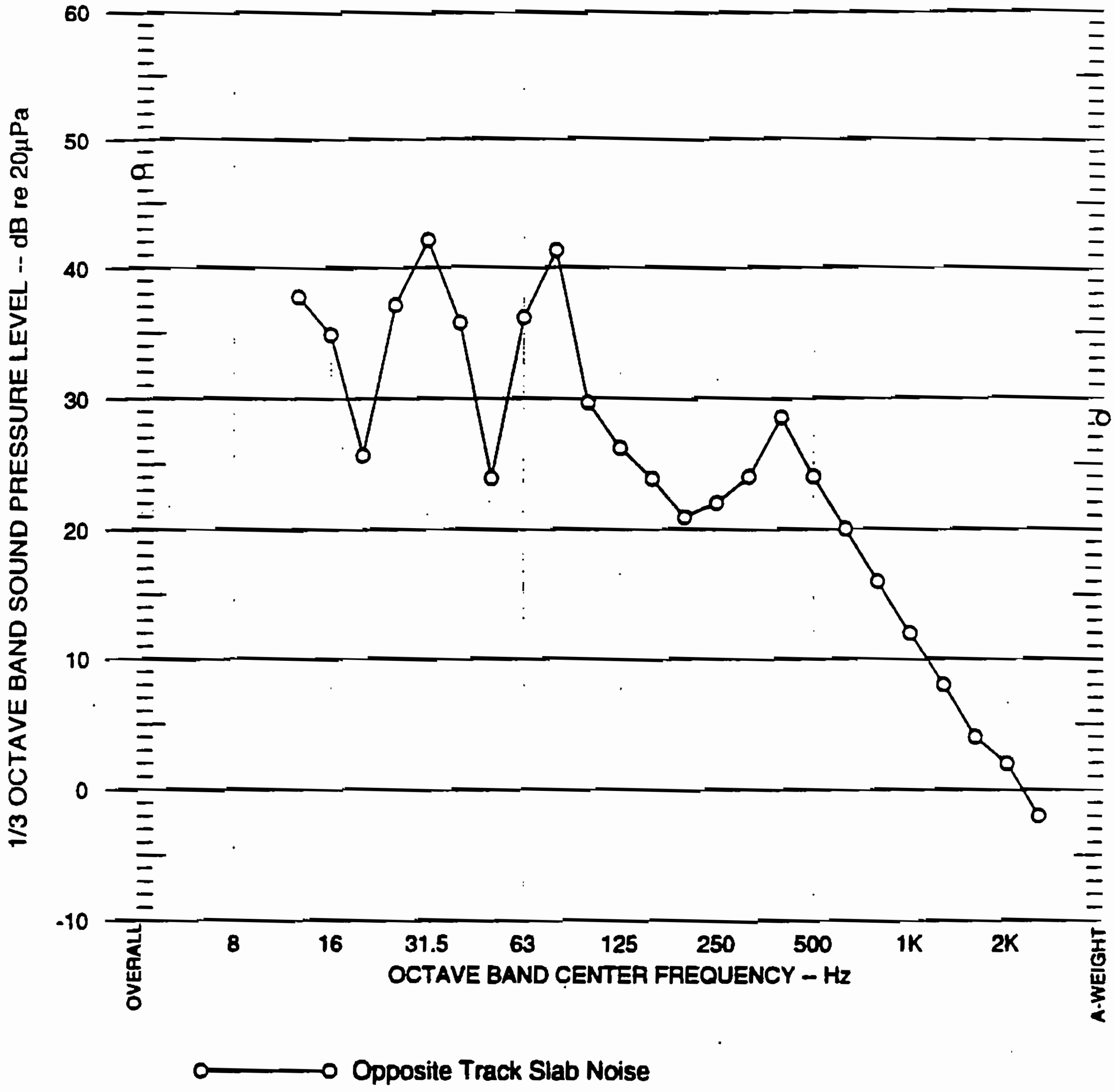
FIGURE 56

Contract/C1598/C1598_56

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

NOISE RADIATED FROM THE OPPOSITE TRACK
FLOATING SLAB - 13 Hz SLAB, 21 kN/mm
BASEPLATE, 130 kmh

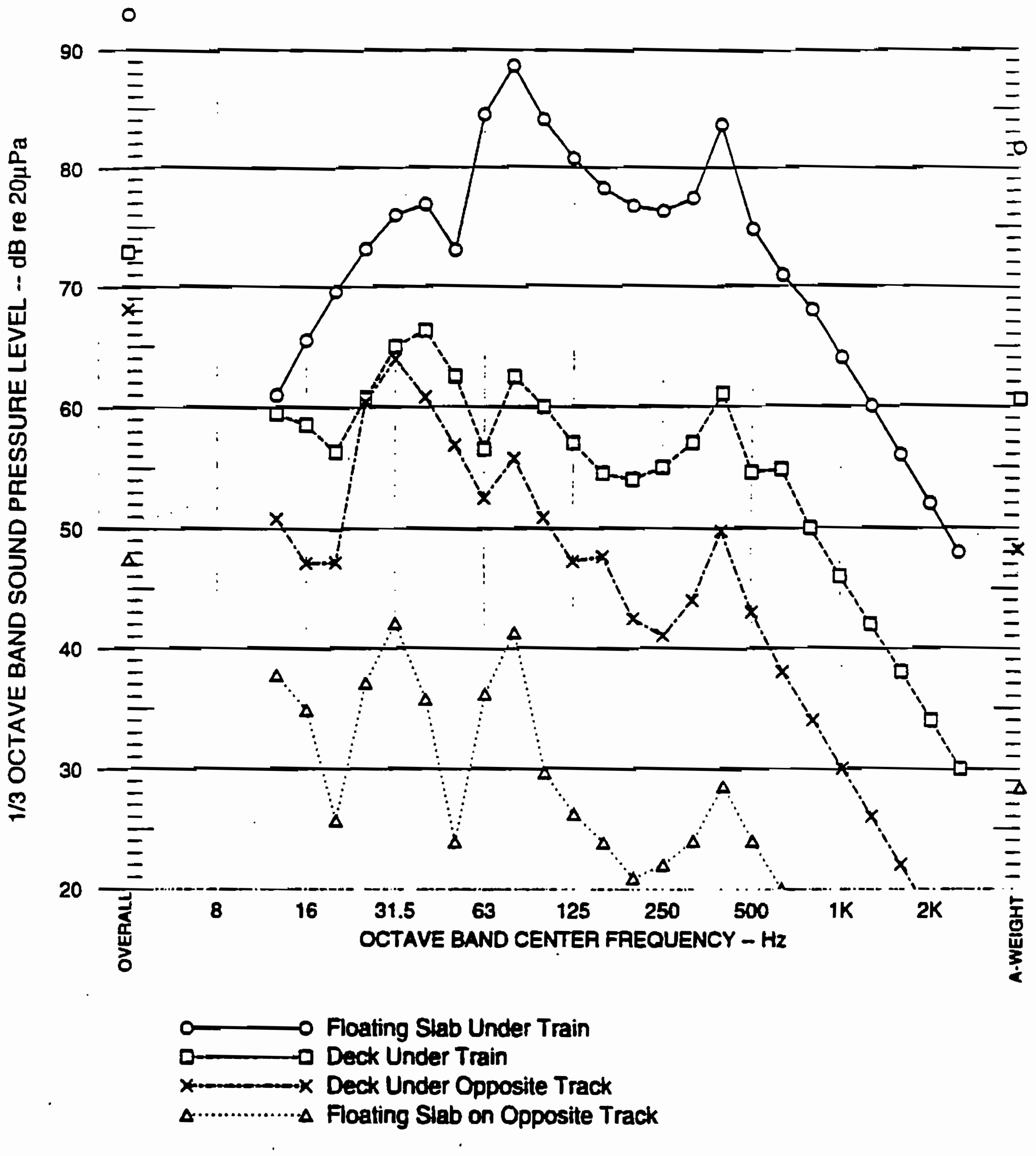
FIGURE 57

Contract/C1988/C1988_57

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

COMPARISON OF THE STRUCTURE RADIATED NOISE LEVELS - 13 Hz SLAB, 21 kN/mm BASEPLATE, 130 kmh TRAIN SPEED

FIGURE 58

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

ERM

Annex F

Calculation of TSP Emission Rates and Sample FDM Air Modelling Input/Output Files

Calculation of Dust Emission Factors for Construction Activities

(I) Material Handling

$$E = k(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

where,

E = emission factor in kilograms per tonne,
= 1.25×10^{-4} kg/Mg

k = particle size multiplier, 0.74 for TSP
U = wind speed in metres per second
M = material moisture content in percent, 4.8%

(II) Vehicle movement on unpaved Haul Road

$$E = k(1.7)\left(\frac{s}{12}\right)\left(\frac{S}{48}\right)\left(\frac{W}{2.7}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5}\left(\frac{365-p}{365}\right)$$

where,

E = emission factor in kilograms per vehicle per kilometre travelled,
= 3.85 kg/vehicle-km travelled

k = particle size multiplier, 0.8 for TSP
s = silt content of road surface in percent, 10%
S = mean vehicle speed in kilometres per hour, 35 km hr^{-1}
W = mean vehicle weight in tonnes, 20 tonnes
w = mean number of wheels, 10 wheels per vehicle
p = number of days with at least 0.254 mm of precipitation per year, 100 days

(III) Blasting

$$E = 0.0002\,A^{1.5}$$

where,

E = emission factor in grams per blast
= 3.6g/blast

A = area of the blasting area in square metres, blasting dimension of 5m x 6m is assumed

(IV) Wind Erosion

$$E \cdot 0.85$$

where,

E = emission factor in grams per square metre per second

Sample of FDM Air Modelling Input File (Works Site in Rural Area)

```
TS200 without mitigation
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  90   8   6  72
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18607.000034279.00001.50000000
15777.000030185.00001.50000000
15341.000028232.00001.50000000
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Sample of FDM Air Modelling Input File (Works Site in Urban Area)

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TS400 (Works Site A - Works Site E)
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Sample of FDM Air Modelling Output File (Works Site in Rural Area)

```
1              FDM - (DATED 91109)

               IBM-PC VERSION (1.01)
               (C) COPYRIGHT 1991, TRINITY CONSULTANTS, INC.
               SERIAL NUMBER 9142  SOLD TO ERM HONG KONG
               RUN BEGAN ON  1/07/98 AT 11:31:06


  RUN TITLE:
    TS200 without mitigation

    INPUT FILE NAME: TS2006.DAT
    OUTPUT FILE NAME: TS2006.LST


    CONVERGENCE OPTION 1=OFF, 2=ON                        1
    MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED                1
    PLOT FILE OUTPUT, 1=NO, 2=YES                      1
    MET DATA PRINT SWITCH, 1=NO, 2=YES                   1
    POST-PROCESSOR OUTPUT, 1=NO, 2=YES                   1
    DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER     1
    PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES           3
    PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES           1
    PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES           1
    PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
    PRINT LONG-TERM AVERAGE CONCEN. 1=NO, 2=YES           1
    BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES          1
    NUMBER OF SOURCES PROCESSED                    90
    NUMBER OF RECEPTORS PROCESSED                   8
    NUMBER OF PARTICLE SIZE CLASSES                 6
    NUMBER OF HOURS OF MET DATA PROCESSED              72
    LENGTH IN MINUTES OF 1-HOUR OF MET DATA           60.
    ROUGHNESS LENGTH IN CM                     60.00
    SCALING FACTOR FOR SOURCE AND RECPTORS            1.0000
    PARTICLE DENSITY IN G/CM**3                  2.50
    ANEMOMETER HEIGHT IN M                       10.00


    GENERAL PARTICLE SIZE CLASS INFORMATION

                  GRAV.          FRACTION
     PARTICLE     CHAR.  SETTLING  DEPOSITION  IN EACH
      SIZE     DIA.  VELOCITY   VELOCITY    SIZE
     CLASS     (UM)  (M/SEC)   (M/SEC)   CLASS
     ----  -----  -----  -----  -----
        1 ***********     **        **    .2000
        2 30.0000000     **        **    .3000
        3 15.0000000     **        **    .1400
        4 10.0000000     **        **    .1600
        5  5.0000000     **        **    .1050
        6  2.0000000     **        **    .0950
    ------
    ** COMPUTED BY FDM
1

    RECEPTOR COORDINATES (X,Y,Z)

( 21670.,  34035.,  2.) ( 20759.,  34198.,  2.) ( 19507.,  34494.,  2.)
( 18607.,  34279.,  2.) ( 15777.,  30185.,  2.) ( 15341.,  28232.,  2.)
( 20970.,  34209.,  2.) ( 18750.,  34447.,  2.) (
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SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
3	.000002820	.09731	.000	21951.	34099.	120.	288.	1.50	89.04
3	.000002820	.11954	.000	21680.	34124.	168.	253.	1.50	-89.70
3	.000002820	.14502	.000	21675.	33934.	212.	243.	1.50	-89.70
3	.000002820	.16218	.000	21461.	34000.	291.	198.	1.50	82.74
3	.000002700	.06851	.000	21312.	34129.	193.	131.	1.50	82.98
3	.000002700	.08073	.000	21176.	34198.	198.	151.	1.50	84.74
3	.000002700	.04494	.000	21015.	34249.	99.	168.	1.50	89.82
3	.000002700	.02911	.000	20895.	34259.	152.	71.	1.50	89.77
3	.000002700	.13279	.000	20822.	34335.	305.	162.	1.50	-89.60
3	.000002700	.10833	.000	20676.	34243.	311.	129.	1.50	89.45
3	.000002700	.14137	.000	20478.	34237.	198.	265.	1.50	89.15
3	.000002700	.08126	.000	20246.	34251.	152.	198.	1.50	-88.50
3	.000002700	.01214	.000	20132.	34307.	70.	64.	1.50	65.28
3	.000002700	.11151	.000	20019.	34349.	235.	176.	1.50	64.54
3	.000002700	.01435	.000	19890.	34399.	53.	101.	1.50	64.40
3	.000002700	.03216	.000	19756.	34461.	62.	192.	1.50	65.94
3	.000002700	.01768	.000	19602.	34517.	49.	135.	1.50	66.64
3	.000002700	.02842	.000	19452.	34570.	59.	177.	1.50	66.93
3	.000002700	.02375	.000	19293.	34629.	55.	161.	1.50	67.22
3	.000002700	.03128	.000	19148.	34652.	97.	120.	1.50	64.74
3	.000002700	.06382	.000	19013.	34641.	200.	118.	1.50	65.34
3	.000002700	.06371	.000	18870.	34644.	168.	141.	1.50	63.74
3	.000002840	.13506	.000	18681.	34458.	271.	175.	1.50	45.00
3	.000002840	.01979	.000	18632.	34255.	65.	107.	1.50	41.19
3	.000002840	.02214	.000	18559.	34341.	67.	117.	1.50	41.99
3	.000002840	.06929	.000	18456.	34251.	207.	118.	1.50	41.05
3	.000002840	.03690	.000	18330.	34080.	199.	65.	1.50	41.97
3	.000002700	.04639	.000	18171.	33951.	210.	82.	1.50	40.75
3	.000002700	.19254	.000	17951.	33816.	301.	237.	1.50	40.00
3	.000002700	.03348	.000	17736.	33720.	221.	56.	1.50	29.00
3	.000002700	.06334	.000	17534.	33582.	264.	89.	1.50	32.85
3	.000002700	.02627	.000	17362.	33441.	180.	54.	1.50	49.09
3	.000002700	.13430	.000	17221.	33285.	238.	209.	1.50	45.83
3	.000002700	.09460	.000	17130.	33043.	229.	153.	1.50	46.44
3	.000002900	.06498	.000	17036.	32869.	152.	147.	1.50	46.37
3	.000002900	.10749	.000	16942.	32721.	206.	180.	1.50	76.18
3	.000002900	.10822	.000	16872.	32533.	190.	197.	1.50	78.03
3	.000002900	.06762	.000	16818.	32399.	95.	245.	1.50	77.28
3	.000002900	.03965	.000	16731.	32339.	59.	231.	1.50	75.96
3	.000002900	.10027	.000	16706.	32238.	149.	231.	1.50	75.69
3	.000002900	.14452	.000	16943.	32161.	187.	267.	1.50	76.04
3	.000002900	.01678	.000	16701.	32106.	93.	63.	1.50	62.24
3	.000002900	.07468	.000	16639.	31956.	234.	110.	1.50	55.43
3	.000002900	.04236	.000	16559.	31769.	164.	89.	1.50	55.44
3	.000002700	.08699	.000	16485.	31581.	226.	143.	1.50	57.36
3	.000002700	.06761	.000	16365.	31415.	181.	139.	1.50	55.59
3	.000002700	.04404	.000	16290.	31218.	229.	71.	1.50	57.14
3	.000002700	.13153	.000	16128.	31063.	209.	233.	1.50	55.30
3	.000002700	.04790	.000	16074.	30937.	102.	174.	1.50	68.30
3	.000002700	.03200	.000	16062.	30776.	210.	56.	1.50	69.25
3	.000003000	.14352	.000	15947.	30556.	281.	171.	1.50	70.12
3	.000003000	.14681	.000	15887.	30337.	170.	288.	1.50	72.63
3	.000003000	.12718	.000	15843.	30126.	260.	163.	1.50	74.24
3	.000002800	.14403	.000	15748.	29898.	225.	228.	1.50	74.81
3	.000002800	.03468	.000	15679.	29689.	211.	59.	1.50	75.23
3	.000002800	.03675	.000	15622.	29484.	214.	61.	1.50	74.89
3	.000002800	.04195	.000	15564.	29269.	234.	64.	1.50	75.49
3	.000002800	.04589	.000	15484.	29055.	218.	75.	1.50	72.06
3	.000002800	.08335	.000	15427.	28837.	231.	129.	1.50	75.29
3	.000003000	.14631	.000	15388.	28621.	207.	235.	1.50	77.87
3	.000003000	.02756	.000	15385.	28476.	83.	111.	1.50	76.95
3	.000003000	.02945	.000	15272.	28503.	81.	121.	1.50	75.11
3	.000003000	.11501	.000	15293.	28387.	133.	288.	1.50	75.65

3	.000003000	.04742	.000	15209.	28284.	108.	147.	1.50	76.61
2	.009790000	7.61844	.000	22090.	34075.	21312.	34092.	.50	5.00
2	.001450000	.38012	.000	21312.	34092.	21097.	34242.	.50	5.00
2	.004710000	4.41411	.000	21097.	34242.	20161.	34289.	.50	5.00
2	.001450000	1.39019	.000	20161.	34289.	19272.	34648.	.50	5.00
2	.008990000	4.11849	.000	19272.	34648.	18815.	34616.	.50	5.00
2	.008990000	8.32294	.000	18815.	34616.	18174.	33948.	.50	5.00
2	.008990000	5.44370	.000	18174.	33948.	17632.	33678.	.50	5.00
2	.001450000	.65121	.000	17632.	33678.	17296.	33380.	.50	5.00
2	.001450000	3.65115	.000	17296.	33380.	16674.	30940.	.50	5.00
2	.004660000	6.24535	.000	16674.	30940.	16792.	32275.	.50	5.00
2	.004660000	.98881	.000	16792.	32275.	16591.	32343.	.50	5.00
2	.009960000	1.49943	.000	16792.	32275.	16742.	32133.	.50	5.00
2	.009960000	7.07933	.000	16742.	32133.	16411.	31504.	.50	5.00
2	.013900000	16.56216	.000	16411.	31504.	15912.	30422.	.50	5.00
2	.013900000	2.72741	.000	15912.	30422.	15863.	30232.	.50	5.00
2	.013900000	8.60226	.000	15863.	30232.	15664.	29646.	.50	5.00
2	.009960000	5.94888	.000	15664.	29646.	15506.	29070.	.50	5.00
2	.015900000	14.24005	.000	15506.	29070.	15190.	28232.	.50	5.00
1	1.520000000	1.52000	.000	21690.	34173.	0.	0.	.50	.00
1	.196000000	.19600	.000	21299.	34176.	0.	0.	.50	.00
1	.500000000	.50000	.000	20828.	34361.	0.	0.	.50	.00
1	.690000000	.69000	.000	20683.	34177.	0.	0.	.50	.00
1	1.900000000	1.90000	.000	18432.	34037.	0.	0.	.50	.00
1	2.280000000	2.28000	.000	16017.	30624.	0.	0.	.50	.00
1	1.425000000	1.42500	.000	15371.	28433.	0.	0.	.50	.00
1	1.425000000	1.42500	.000	15397.	28598.	0.	0.	.50	.00

TOTAL EMISSIONS 114.65060

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	1	21670.0	34035.0	3	1754.0970	29.1189
2	1	21670.0	34035.0	2	1567.2350	23.0651
3	1	21670.0	34035.0	4	1476.5080	21.2842
4	1	21670.0	34035.0	1	1448.1290	21.4644
5	5	15777.0	30185.0	8	1332.2660	14.9896
6	1	21670.0	34035.0	5	1318.8590	19.3630
7	5	15777.0	30185.0	37	1312.9420	18.4306
8	1	21670.0	34035.0	72	1302.0570	20.1351
9	5	15777.0	30185.0	7	1291.5380	14.2451
10	5	15777.0	30185.0	9	1258.4750	14.6273
11	5	15777.0	30185.0	10	1255.1320	18.0332
12	1	21670.0	34035.0	62	1194.9550	20.3957
13	1	21670.0	34035.0	6	1176.3080	17.8762
14	5	15777.0	30185.0	36	1175.0390	17.0723
15	5	15777.0	30185.0	21	1143.1990	18.7016
16	1	21670.0	34035.0	71	1126.3270	17.5167
17	5	15777.0	30185.0	17	1122.5250	19.3104
18	5	15777.0	30185.0	35	1121.9040	15.5507
19	5	15777.0	30185.0	11	1120.6480	15.1473
20	5	15777.0	30185.0	6	1116.9870	12.2950
21	5	15777.0	30185.0	34	1093.5160	15.0962
22	1	21670.0	34035.0	11	1088.7220	19.2676
23	5	15777.0	30185.0	24	1076.9460	18.1514
24	5	15777.0	30185.0	33	1073.0500	14.9403
25	5	15777.0	30185.0	12	1067.4530	14.5400
26	1	21670.0	34035.0	61	1061.2500	15.2632
27	5	15777.0	30185.0	32	1058.4880	14.9354
28	1	21670.0	34035.0	60	1053.7130	14.0392
29	1	21670.0	34035.0	7	1052.8200	16.3890
30	5	15777.0	30185.0	31	1045.7240	14.9469
31	5	15777.0	30185.0	13	1042.0770	14.3759
32	5	15777.0	30185.0	38	1040.2900	11.8187
33	6	15341.0	28232.0	2	1036.5600	10.7569
34	1	21670.0	34035.0	59	1035.0350	13.2966
35	5	15777.0	30185.0	18	1029.0350	15.9247
36	5	15777.0	30185.0	23	1027.5650	16.2053
37	5	15777.0	30185.0	30	1021.5580	14.7309
38	5	15777.0	30185.0	22	1020.3110	15.9258
39	5	15777.0	30185.0	15	1016.1010	14.3706
40	5	15777.0	30185.0	14	1011.3960	14.1283
41	5	15777.0	30185.0	29	1010.7520	14.7347
42	1	21670.0	34035.0	70	1008.0200	16.0469
43	5	15777.0	30185.0	16	1006.3010	14.4098
44	5	15777.0	30185.0	28	1004.4770	14.8013
45	5	15777.0	30185.0	27	1002.1290	14.9084
46	6	15341.0	28232.0	3	1002.0140	10.2402
47	5	15777.0	30185.0	20	998.7000	15.1128
48	5	15777.0	30185.0	19	994.6909	15.1031
49	5	15777.0	30185.0	25	992.5470	14.8973
50	1	21670.0	34035.0	10	985.9693	15.6880

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	21670.0	34035.0	1754.0970	3.	29.1189	1567.2350	2.	23.0651
2	20759.0	34198.0	925.2602	52.	11.9678	874.0594	53.	11.1320
3	19507.0	34494.0	258.4281	59.	2.7437	255.2090	60.	2.7756
4	18607.0	34279.0	654.6292	54.	9.6689	647.8062	50.	8.2525
5	15777.0	30185.0	1332.2660	8.	14.9896	1312.9420	37.	18.4306
6	15341.0	28232.0	1036.5600	2.	10.7569	1002.0140	3.	10.2402
7	20969.7	34209.0	789.7899	65.	14.0620	687.9067	64.	10.4076
8	18750.0	34447.0	832.2402	53.	14.8413	759.0994	54.	13.1437

RUN ENDED ON 1/07/98 AT 11:31:50

Sample of FDM Air Modelling Input File (Work Site in Urban Area)

```
1            FDM - (DATED 91109)

             IBM-PC VERSION (1.01)
             (C) COPYRIGHT 1991, TRINITY CONSULTANTS, INC.
             SERIAL NUMBER 9142  SOLD TO ERM HONG KONG
             RUN BEGAN ON 12/05/97 AT 14:13:43



   RUN TITLE:
     TS400 (Works Site A - Works Site E)

     INPUT FILE NAME: TS400N.DAT
     OUTPUT FILE NAME: TS400N.LST


     CONVERGENCE OPTION 1=OFF, 2=ON                    1
     MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED        1
     PLOT FILE OUTPUT, 1=NO, 2=YES                     1
     MET DATA PRINT SWITCH, 1=NO, 2=YES                1
     POST-PROCESSOR OUTPUT, 1=NO, 2=YES                1
     DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER     1
     PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES          3
     PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
     PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES          1
     PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES         1
     PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES       1
     BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES      1
     NUMBER OF SOURCES PROCESSED                       89
     NUMBER OF RECEPTORS PROCESSED                     12
     NUMBER OF PARTICLE SIZE CLASSES                   6
     NUMBER OF HOURS OF MET DATA PROCESSED             72
     LENGTH IN MINUTES OF 1-HOUR OF MET DATA           60.
     ROUGHNESS LENGTH IN CM                            200.00
     SCALING FACTOR FOR SOURCE AND RECPTORS            1.0000
     PARTICLE DENSITY IN G/CM**3                       2.50
     ANEMOMETER HEIGHT IN M                            10.00


     GENERAL PARTICLE SIZE CLASS INFORMATION

                     GRAV.          FRACTION
      PARTICLE   CHAR. SETTLING DEPOSITION  IN EACH
        SIZE     DIA.  VELOCITY  VELOCITY    SIZE
       CLASS     (UM)  (M/SEC)   (M/SEC)    CLASS
       -----  -------- -------  -------- --------
         1 **********    **       **     .2000
         2 30.0000000    **       **     .3000
         3 15.0000000    **       **     .1400
         4 10.0000000    **       **     .1600
         5  5.0000000    **       **     .1050
         6  2.0000000    **       **     .0950
     -------
     ** COMPUTED BY FDM
1

     RECEPTOR COORDINATES (X,Y,Z)

( 34415., 20318., 2.) ( 34529., 20401., 2.) ( 34185., 20783., 2.)
( 33966., 20973., 2.) ( 33631., 20823., 2.) ( 33771., 21167., 2.)
( 33712., 21195., 2.) ( 33142., 21614., 2.) ( 32845., 21812., 2.)
( 32681., 21552., 2.) ( 32329., 21818., 2.) ( 32174., 21888., 2.)
```

1

SOURCE INFORMATION

TYPE	ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	TOTAL EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
3	.000000037	.00085	1.300	34297.	20438.	213.	108.	1.50	-52.40
3	.000000037	.00050	1.300	34166.	20577.	82.	165.	1.50	36.19
3	.000000037	.00021	1.300	34082.	20660.	63.	89.	1.50	44.76
3	.000000260	.00108	1.300	34053.	20722.	115.	36.	1.50	47.32
3	.000000260	.01089	1.300	33881.	20824.	118.	356.	1.50	48.82
3	.000000059	.00053	1.300	33693.	20998.	58.	153.	1.50	48.56
3	.000000059	.00083	1.300	33531.	21113.	58.	241.	1.50	55.25
3	.000000059	.00068	1.300	33363.	21209.	80.	144.	1.50	60.37
3	.000000009	.00005	1.300	33263.	21305.	48.	118.	1.50	65.03
3	.000000009	.00013	1.300	33185.	21278.	62.	236.	1.50	64.36
3	.000000009	.00004	1.300	33045.	21348.	55.	75.	1.50	65.32
3	.000000009	.00007	1.300	32963.	21489.	55.	135.	1.50	67.50
3	.000000009	.00004	1.300	32980.	21430.	39.	111.	1.50	66.26
3	.000000009	.00005	1.300	32962.	21389.	48.	109.	1.50	65.95
3	.000000017	.00007	1.300	32876.	21475.	39.	113.	1.50	66.53
3	.000000017	.00014	1.300	32838.	21441.	52.	157.	1.50	68.13
3	.000000017	.00014	1.300	32680.	21500.	47.	178.	1.50	66.82
3	.000000017	.00016	1.300	32503.	21568.	47.	199.	1.50	66.85
3	.000000017	.00051	1.300	32846.	21712.	156.	193.	1.50	85.43
3	.000000017	.00009	1.300	32358.	21631.	47.	113.	1.50	69.01
3	.000000017	.00001	1.300	32350.	21600.	15.	39.	1.50	59.95
3	.000000017	.00001	1.300	32312.	21619.	14.	46.	1.50	63.21
3	.000000017	.00007	1.300	32274.	21682.	50.	81.	1.50	58.17
3	.000000017	.00007	1.300	32212.	21740.	48.	89.	1.50	47.82
3	.000000017	.00011	1.300	32157.	21837.	47.	136.	1.50	34.91
3	.000000017	.00004	1.300	32133.	21944.	29.	80.	1.50	19.10
2	.001430000	.14786	.000	34505.	20387.	34466.	20482.	.50	5.00
2	.001430000	.04961	.000	34466.	20482.	34442.	20458.	.50	5.00
2	.001430000	.13470	.000	34442.	20458.	34406.	20370.	.50	5.00
2	.001430000	.14874	.000	34406.	20370.	34345.	20286.	.50	5.00
2	.001430000	.60375	.000	34345.	20286.	34092.	20624.	.50	5.00
2	.001430000	.10432	.000	34092.	20624.	34042.	20677.	.50	5.00
2	.016200000	2.12191	.000	34188.	20884.	34104.	20783.	.50	5.00
2	.016200000	2.75651	.000	34104.	20783.	33995.	20653.	.50	5.00
2	.016200000	4.85468	.000	33995.	20653.	33768.	20849.	.50	5.00
2	.016200000	1.23800	.000	33768.	20849.	33716.	20905.	.50	5.00
2	.004240000	.49304	.000	33763.	21096.	33691.	21005.	.50	5.00
2	.004240000	.30509	.000	33691.	21005.	33632.	21046.	.50	5.00
2	.004240000	.45324	.000	33632.	21046.	33534.	21090.	.50	5.00
2	.004240000	.28231	.000	33534.	21090.	33480.	21129.	.50	5.00
2	.004240000	.22496	.000	33480.	21129.	33434.	21155.	.50	5.00
2	.004240000	.58838	.000	33434.	21155.	33303.	21202.	.50	5.00
2	.000655000	.07125	.000	33321.	21315.	33276.	21216.	.50	5.00
2	.000655000	.14836	.000	33276.	21216.	33069.	21309.	.50	5.00
2	.000655000	.03843	.000	33069.	21309.	33018.	21337.	.50	5.00
2	.000655000	.02524	.000	33018.	21337.	32991.	21364.	.50	5.00
2	.000655000	.03263	.000	32991.	21364.	32972.	21411.	.50	5.00
2	.000655000	.10783	.000	32972.	21411.	32961.	21575.	.50	5.00
2	.001230000	.09192	.000	32938.	21590.	32914.	21519.	.50	5.00
2	.001230000	.06647	.000	32914.	21519.	32864.	21499.	.50	5.00
2	.001230000	.07196	.000	32864.	21499.	32805.	21499.	.50	5.00
2	.001230000	.03287	.000	32805.	21499.	32780.	21491.	.50	5.00
2	.001230000	.01347	.000	32780.	21491.	32771.	21484.	.50	5.00
2	.001230000	.09377	.000	32771.	21484.	32700.	21512.	.50	5.00
2	.001230000	.18781	.000	32700.	21512.	32729.	21662.	.50	5.00
2	.001230000	.05021	.000	32729.	21662.	32770.	21669.	.50	5.00
2	.001230000	.37343	.000	32700.	21512.	32417.	21622.	.50	5.00
2	.001230000	.13094	.000	32417.	21622.	32321.	21668.	.50	5.00
2	.001230000	.10420	.000	32321.	21668.	32254.	21720.	.50	5.00
2	.001230000	.08923	.000	32254.	21720.	32209.	21777.	.50	5.00
2	.001230000	.07682	.000	32209.	21777.	32178.	21831.	.50	5.00
2	.001230000	.08124	.000	32178.	21831.	32156.	21893.	.50	5.00
2	.001230000	.12379	.000	32156.	21893.	32138.	21992.	.50	5.00

3	.000002700	.06212	.000	34297.	20438.	213.	108.	1.50	-52.40
3	.000002700	.03645	.000	34166.	20577.	82.	165.	1.50	36.19
3	.000002700	.01524	.000	34082.	20660.	63.	89.	1.50	44.76
3	.000002700	.01122	.000	34053.	20722.	115.	36.	1.50	47.32
3	.000002700	.11308	.000	33881.	20824.	118.	356.	1.50	48.82
3	.000002700	.02414	.000	33693.	20998.	58.	153.	1.50	48.56
3	.000002700	.03764	.000	33531.	21113.	58.	241.	1.50	55.25
3	.000002700	.03083	.000	33363.	21209.	80.	144.	1.50	60.37
3	.000002700	.01543	.000	33263.	21305.	48.	118.	1.50	65.03
3	.000002700	.03971	.000	33185.	21278.	62.	236.	1.50	64.36
3	.000002700	.01114	.000	33045.	21348.	55.	75.	1.50	65.32
3	.000002700	.02002	.000	32963.	21489.	55.	135.	1.50	67.50
3	.000002700	.01156	.000	32980.	21430.	39.	111.	1.50	66.26
3	.000002700	.01431	.000	32962.	21389.	48.	109.	1.50	65.95
3	.000002700	.01181	.000	32876.	21475.	39.	113.	1.50	66.53
3	.000002700	.02202	.000	32838.	21441.	52.	157.	1.50	68.13
3	.000002700	.02248	.000	32680.	21500.	47.	178.	1.50	66.82
3	.000002700	.02549	.000	32503.	21568.	47.	199.	1.50	66.85
3	.000002700	.08124	.000	32846.	21712.	156.	193.	1.50	85.43
3	.000002700	.01448	.000	32358.	21631.	47.	113.	1.50	69.01
3	.000002700	.00154	.000	32350.	21600.	15.	39.	1.50	59.95
3	.000002700	.00174	.000	32312.	21619.	14.	46.	1.50	63.21
3	.000002700	.01092	.000	32274.	21682.	50.	81.	1.50	58.17
3	.000002700	.01137	.000	32212.	21740.	48.	89.	1.50	47.82
3	.000002700	.01738	.000	32157.	21837.	47.	136.	1.50	34.91
3	.000002700	.00630	.000	32133.	21944.	29.	80.	1.50	19.10

TOTAL EMISSIONS 17.20598

NOTE: SOME SOURCE EMISSION RATES ARE A FUNCTION OF WIND SPEED AND TOTAL IS NOT CORRECT

TOP 50 TABLE FOR 1 HOUR AVERAGES

RANK	RECEPTOR	X-COORDINATE	Y-COORDINATE	ENDING HOUR	CONCENTRATION	DEPOSITION
1	3	34184.5	20782.5	54	1306.0350	21.1120
2	3	34184.5	20782.5	55	1305.3870	21.4481
3	3	34184.5	20782.5	53	1284.8360	20.4680
4	3	34184.5	20782.5	56	1276.2180	21.2713
5	3	34184.5	20782.5	57	1250.6410	21.1806
6	3	34184.5	20782.5	52	1238.2110	19.4545
7	3	34184.5	20782.5	58	1212.7840	20.8726
8	3	34184.5	20782.5	59	1166.1760	20.3929
9	3	34184.5	20782.5	51	1158.9340	17.9804
10	3	34184.5	20782.5	60	1123.4490	19.9436
11	3	34184.5	20782.5	61	1087.5760	19.5775
12	3	34184.5	20782.5	62	1057.9030	19.2644
13	3	34184.5	20782.5	50	1043.8560	16.0177
14	3	34184.5	20782.5	63	1034.9610	18.9977
15	3	34184.5	20782.5	64	1015.2920	18.7045
16	3	34184.5	20782.5	65	994.5848	18.3092
17	3	34184.5	20782.5	66	970.3546	17.7815
18	3	34184.5	20782.5	67	967.5450	17.6438
19	3	34184.5	20782.5	68	944.0978	17.0675
20	3	34184.5	20782.5	69	909.4353	16.2883
21	3	34184.5	20782.5	49	883.6837	13.4489
22	3	34184.5	20782.5	70	858.7692	15.2419
23	3	34184.5	20782.5	71	793.4615	13.9886
24	5	33630.6	20823.4	20	732.1832	10.4080
25	5	33630.6	20823.4	19	726.5575	10.4769
26	3	34184.5	20782.5	48	714.4967	10.7888
27	5	33630.6	20823.4	21	710.0115	9.9704
28	5	33630.6	20823.4	18	706.9260	10.3620
29	3	34184.5	20782.5	72	692.6948	12.1285
30	5	33630.6	20823.4	17	660.3378	9.8197
31	5	33630.6	20823.4	22	656.3811	9.1235
32	5	33630.6	20823.4	16	622.6141	9.4051
33	5	33630.6	20823.4	15	579.2432	8.8740
34	3	34184.5	20782.5	1	574.1581	10.0001
35	5	33630.6	20823.4	23	572.1684	7.8858
36	3	34184.5	20782.5	47	538.8942	8.0929
37	5	33630.6	20823.4	14	528.5222	8.1892
38	5	33630.6	20823.4	13	482.1731	7.5146
39	5	33630.6	20823.4	24	460.9150	6.3095
40	2	34529.1	20401.4	61	455.2852	7.3253
41	3	34184.5	20782.5	2	446.8819	7.7563
42	2	34529.1	20401.4	60	443.0064	7.3342
43	2	34529.1	20401.4	62	441.4934	6.9725
44	1	34415.1	20317.5	63	426.5045	6.8374
45	1	34415.1	20317.5	64	422.7290	6.7489
46	5	33630.6	20823.4	12	417.6794	6.5585
47	2	34529.1	20401.4	59	408.1915	7.0391
48	1	34415.1	20317.5	62	407.7552	6.6419
49	2	34529.1	20401.4	63	401.9568	6.2837
50	1	34415.1	20317.5	65	397.9936	6.3970

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

RECEPTOR	X-COORDINATE	Y-COORDINATE	HIGHEST VALUE	ENDING HOUR	DEPOSITION	SECOND HIGH	ENDING HOUR	DEPOSTION
1	34415.1	20317.5	426.5045	63.	6.8374	422.7290	64.	6.7489
2	34529.1	20401.4	455.2852	61.	7.3253	443.0064	60.	7.3342
3	34184.5	20782.5	1306.0350	54.	21.1120	1305.3870	55.	21.4481
4	33965.6	20972.9	352.4047	34.	4.8623	352.3206	35.	4.8652
5	33630.6	20823.4	732.1832	20.	10.4080	726.5575	19.	10.4769
6	33770.6	21167.4	384.6844	38.	5.6721	380.5229	37.	5.5086
7	33711.6	21194.9	395.2981	34.	5.4565	388.1420	33.	5.3142
8	33141.8	21614.4	134.7932	29.	1.6355	127.8509	28.	1.5425
9	32845.1	21812.1	109.5231	29.	1.5958	106.2079	28.	1.4446
10	32681.4	21552.1	369.8672	26.	7.0597	362.2661	25.	6.8652
11	32329.1	21817.9	94.7912	26.	1.1534	90.7113	25.	1.0967
12	32174.4	21888.0	273.6244	41.	7.0942	272.5778	40.	6.8253

RUN ENDED ON 12/05/97 AT 14:14:47

Annex G

Tables and Figures relating to Landscape and Visual Issues

Magnitude of Impact	=	Nil, Low, Medium or High (Positive or Negative)
Receptor Sensitivity	=	Low, Medium or High
Impact Significance Thresholds	=	Nil, Very Slight, Slight, Moderate, Substantial or Very Substantial (Positive or Negative)
Types of Key visually Sensitive Receivers (VSR)	=	I=Industrial (including Agricultural), R=Residential, C=Commercial, C/I=Mixed Commercial/Industrial, R/I=Mixed Residential/Industrial, C/R=Mixed Commercial/Residential, OS=Open Space, M=Community, T=Transport Related

(*For ease of cross-referencing between Tables and Plans, each key VSR is given an Identity Number according to the above categories, starting at the southern end of West Rail - see column 4 of Tables.)

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
West Kowloon to Tai Kok Tsui	Cut and cover tunnel (profile not visible at ground level)	West facing properties on Man Cheong Street	R 1	0-50m	High	Low	High	Very Substantial negative	Nil
	Cut and cover tunnel	Proposed Residential Development at Roads D10 and D1B	R 2	100-200m	Medium	Nil	High	Substantial negative	Nil

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel	G/I/C Use south of Yau Ma Tei Interchange	M 1	50-200m	Medium	Nil	Medium	Moderate negative	Nil
	Cut and cover tunnel	Telephone Exchange	M 2	0-50m	High	Nil	Medium	Substantial negative	Nil
	Cut and cover tunnel	G/I/C Uses east of Yau Ma Tei Interchange	M 3A and M 3B	100-300m	Medium	Nil	Medium	Moderate negative	Nil
	Cut and cover tunnel	Proposed G/I/C Use	M 4	50-150m	Medium	Nil	High	Substantial negative	Nil
	Cut and cover tunnel	Proposed Residential Development	R 3	50-150m	Medium	Nil	High	Substantial negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Yau Ma Tei Interchange	T 1	0-200m	Low	Nil	Low	Very slight negative	Nil

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
Tai Kok Tsui to Mei Foo Station	Cut and cover tunnel	Olympic Station Hotel Development	C 1	0-150m	High	Nil	High	Very Substantial negative	Nil
	Cut and cover tunnel (top of tunnel approx. 8 to 15m above surrounding ground level)	West Kowloon Regional Operational Base (Police Department)	M 5	50-150m	Medium	Low	Medium	Moderate negative	Slight positive
	Cut and cover tunnel and station (top of tunnel approx. 8-16m above surrounding ground level)	Nam Cheong Estate	R 4	150m	High	Low	Medium	Substantial negative	Slight positive

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel, station and ventilation building (top of tunnel approx. 5m above surrounding ground level)	Nam Cheong Buffer Zone	OS 1	10-100m	High	Low	High	Very Substantial negative	Slight positive
	Cut and cover tunnel, station and ventilation building (top of tunnel approx. 5m above surrounding ground level)	Urban development area in-between Yen Chow Street Station and Lai Chi Kok Park stage 1 and adjacent to railway	I 1	10-350m	High	Low	Low	Moderate negative	Very slight positive
	Cut and cover tunnel, station and ventilation building (top of tunnel approx. 5m above surrounding ground level)	Urban development area north of Yen Chow Street Station	I 44	10-150m	High	Low	Low	Moderate negative	Very slight positive

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel, station and ventilation building (top of tunnel approx. 5m above surrounding ground level)	Bus Depot	T 3	100-200m	Low	Low	Low	Very slight negative	Very Slight positive
	Cut and cover tunnel, station and ventilation building (top of tunnel approx. 5m above surrounding ground level)	Proposed Residential Estate	R 5	100-250m	Medium	Low	Medium	Moderate negative	Slight positive
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level) and adjacent construction site	Proposed Primary School and Community Centres	M 6	150-250m	Medium	Nil	Low	Slight negative	Nil

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel and station (top of tunnel approx. 5m above surrounding ground level)	Lantau and Airport Railway Lines and West Kowloon Expressway	T 2	10-30m	Low	Nil	Low	Very slight negative	Nil
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level)	Temporary Sports Fields (construction stage) and Proposed Stadium Development (Operational stage)	M 7	50-400m	High	Low	Medium	Substantial negative	Slight positive
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level)	Lai Chi Kok Park Stages 2 (Part) and 3	OS 2	0-100m	High	Low	High	Very Substantial negative	Slight positive

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level)	Mei Foo Sun Chuen	R 6	50-200m	High	Low	High	Very Substantial negative	Slight positive
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level) and adjacent construction site	Industrial sites 2.5, 2.8 and 2.10 around future Port Rail Terminal	I 37-39	0-50m	Medium	Low	Low	Slight negative	Very Slight negative
	Cut and cover tunnel (top of tunnel approx. 5m above surrounding ground level) and adjacent construction site	Road CP2	T 21	0-50m	Medium	Low	Low	Slight negative	Very Slight negative

Table 5.6a SOUTHERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Ching Cheung and Kwai Chung Road	T 4	10-400m	Low	Nil	Low	Very Slight negative	Nil

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
Mei Foo station to Hing Shing Road	Station	Mei Foo Sun Chuen	R 6	50-200m	High	Low	High	Very substantial negative	Slight positive
	Raised ground level (0.5m) out side Mount Sterling Mall on top of underground pedestrian link	Mei Foo Sun Chuen and users of Lai Chi Kok Park Stages 1 and 2 (Part)	R 6 and OS 3	0m	Low	Nil	Medium	Slight negative	Nil
	Station	Ching Cheung Road	T 5	10-400m	Low	Nil	Low	Very slight negative	Nil
	Station	Lai Chi Kok Park Stages 1 and 2 (Part)	OS 3	0-100m	High	Low	High	Very substantial negative	Slight positive
	Station	Ching Lai Court	R 7	100-150m	High	Low	Medium	substantial negative	Slight positive
	Station	Princess Margaret hospital	M 8	100-200m	Low	Nil	Medium	Slight negative	Nil

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Station	Lai Chi Kok Pool and Indoor Games Hall	M 9	50-250m	High	Low	High	Very Substantial negative	Slight positive
	Station	Proposed Public and Private Housing Estate	R 8	200-300	Low	Nil	Medium	Slight negative	Nil
	Ha Kwai Chung Ventilation Building	Kwai Chung Hospital	M 31	150m	Low	Nil	Low	Very slight negative	Nil
	Ha Kwai Chung Ventilation Building	Kau Wa Keng San Tsuen	R 100	100m	Medium	Low	Medium	Moderate negative	Slight negative
	Ha Kwai Chung Ventilation Building	WSD Reservoir and land allocation	I 36	0m	High	Low	Low	Moderate negative	Very Slight negative
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Lai Yui Estate	R 9	200-400m	Low	Nil	Medium	Slight negative	Nil

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level) and Kwai Fong Ventilation Building	Kwai Chung Methodist College and Lai King Catholic Secondary School	M 10	100m	High	Low	Medium	Substantial negative	Slight negative
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Industrial buildings on western side of Kwai Fuk Road	I 2	10-100m	High	Nil	Low	Moderate negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Kwai Fong Court	R 10	50-200m	Medium	Nil	High	substantial negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	New Kwai Fong Garden	R 11	100-250m	Low	Nil	Low	Very slight negative	Nil

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Civic Centre next to Metroplaza	M 10A	10-200m	High	Nil	High	Very substantial negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Outdoor recreational and sports area on eastern side of Kwai Fuk Road	OS 4	10-200m	High	Nil	High	Very substantial negative	Nil
	Cut and cover tunnel	Kwai Yan Road and MTR station	T 6	0-100m	Low	Nil	Low	Very slight negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Hing Fong Road	T 7	0-200m	Medium	Nil	Low	Moderate negative	Nil

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Kwai Shing Swimming Pool Complex	M 11	0-150m	Low	Nil	Medium	Slight negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Kwai Shing Estate West and Hibiscus Park	R 97	200-400m	Low	Nil	High	Moderate negative	Nil
	Bored tunnel (profile of tunnel not visible at ground level)	Yui Lam industrial Centre	I 3	0-100m	Medium	Nil	Low	Slight negative	Nil
Hing Shing Road to Tai Lam South Portal	Cut and cover tunnel (profile of tunnel not visible at ground level)	Waterside Plaza	R 12	30m	High	Low	High	Very substantial negative	Slight positive

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Recreational area at Riviera Garden	OS 5	10-250m	Medium	Nil	High	substantial negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Riviera Garden	R 13	150m	Medium	Nil	High	substantial negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Tsuen Wan Road	T 8	20m	Low	Nil	Low	Very slight negative	Nil
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Tsuen Wan District Open Space, Area 35 (Tsuen Wan Town Plaza Phase 1)	OS 6	50m	Medium	Low	High	substantial negative	Slight positive

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel (profile of tunnel not visible at ground level) and South Portal Ventilation Building	Tsuen Wan District Open Space Area 2. Tsuen Wan RC Project 244LS	OS 27	50-250m	High	Medium	Medium	Substantial negative	Moderate positive
	Cut and cover tunnel (profile of tunnel not visible at ground level), bored tunnel under Tai Lam Country Park and tunnel Portal (under ground).	Proposed Tsuen Wan District Open Space Area 3. Tsuen Wan RC Project 245 LS	OS 28	50-250m	High	Low	Medium	Substantial negative	Slight negative
	Cut and cover tunnel (profile of tunnel not visible at ground level)	Bus Terminus (to be replaced by C/R development in long term)	I 4	50-100m	Low	Nil	Low/High	Very slight negative	Moderate positive

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	Cut and cover tunnel and station (profile of tunnel not visible at ground level)	Clague Gardens	R 14	30m	High	Low	High	Very substantial negative	Moderate positive
	Cut and cover tunnel (profile of tunnel not visible at ground level) and South Portal Ventilation Building	Industrial buildings on Hoi Shing Road, Chai Wan Kok Street and Hoi On Road	I 5	30-100m	Low Medium	Nil Medium	Low	Very slight negative	Nil Slight positive
	North Portal (ventilation building and ramped access road visible from ground level in valley) and surrounding construction site	Ho Pui	R 15	300m	High	Low	High Medium	Very substantial negative	Moderate negative

Table 6.6a CENTRAL SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key Visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During Operational Phase
					Cons.	Oper.			
	North Portal (ventilation building and ramped access road visible from ground level in valley) and surrounding construction site	Farmland around North Portal	I 46	0-150m	High	Low	Medium	Substantial negative	Slight negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
West Rail Depot to Kam Tin station									
	West Rail Depot (part shallow cutting part low embankment)	Farm land in Kam Tin valley	I 6	0-500m	High	Low	Low	Moderate negative	Very slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Route 3	T 9	200-300 m	Medium	Low	Low	Slight negative	Very slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Tai Lam Country Park	OS 8	0m+	Medium	Low	Medium	Moderate negative	Slight negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	West Rail Depot (part shallow cutting, part low embankment)	Tin Sam San Tsuen	R 16	500m	Medium	Low	Medium	Moderate	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Yuen Kong	R 17	800m	Low	Low	Medium	Slight negative	Very slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Yuen Kong San Tsuen and Tai Wo	R 18	200-400m	High	Low	Medium	Substantial negative	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Ma On Kong North	R 19A	50-150m	High	Low	High	Very substantial negative	Moderate negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	West Rail Depot (part shallow cutting, part low embankment)	Ma On Kong South	R 19B	200-300m	High	Low	Medium	Substantial negative	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Shek Wu Tung	R 20	400m	High	Low	Medium	Substantial negative	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Tai Kek	R 21	0-100m	High	Low	High	Very substantial negative	Moderate negative
	West Rail Depot (part shallow cutting, part low embankment)	Cheong Po	R 22	0-200m	High	Low	High	Very substantial negative	Moderate negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	West Rail Depot (part shallow cutting, part low embankment) and new elevated road over Depot	Farmland either side of elevated road	I 47	0m	High	Low	Medium	Substantial negative	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Tin Sam Tsuen	R 23	0-200m	High	Low	High	Very substantial negative	Moderate negative
	West Rail Depot (part shallow cutting, part low embankment)	Shek Wu Tung North	R 24	50-250m	High	Low	High	Very substantial negative	Moderate negative
Kam Tin station to Yuen Long station	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Ng Ka Tsuen and surrounding farmland and industry	R/I 1	50-350m	High	Low	Medium	Substantial negative	Slight negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Kam Hing Wai West	R 25	0-250m	High	Low	Medium	Substantial negative	Slight negative
	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Kam Hing Wai East	R 26	250-500m	Low	Nil	Low	Very slight negative	Nil
	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Go Poh Tsuen	R 27	10-300m	High	Low	Medium	Substantial negative	Slight negative
	West Rail Depot (part shallow cutting, part low embankment)	Lam Tsuen Country Park	OS 9	3km+	Medium	Low	Low	Slight negative	Very slight negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Kam Tin	R 28	500m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct and Kam Tin Station (viaduct track level and station up to 10m above ground level)	Kat Hing Wai area	C/I 1	150m	High	Low	Medium	Substantial negative	Slight negative
	Viaduct (viaduct track level up to 10m above ground level)	Kam Tin Road	T 10	100-300m	Medium	Nil	Low	Slight negative	Nil

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and cutting (viaduct track level between 15-25m in height above ground level, cutting-shallow)	Au Tau Area and Tung Shing Lei	I 7	150-500m	Medium	Low	Low	Slight negative	Very slight negative
	Viaduct and cutting (viaduct track level between 15-25m in height above ground level, cutting-shallow)	Au Tau Roundabout and Tung Shing Lei Interchange	T 11	50-500m	Medium	Nil	Low	Slight negative	Nil
	Viaduct and cutting (viaduct track level between 15-25m in height above ground level, cutting-shallow) and large construction site	Rural land around construction site at northern end of Kam Tin Valley	I 48	0m	High	Low	Low	Moderate negative	Very slight negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and cutting (viaduct track level between 15-25m in height above ground level, cutting-shallow) and large construction site	Temporary construction site /Future Development site	I 54	0m	Nil	Low	Low	Nil	Very slight negative
	Viaduct and cutting (viaduct track level between 15-25m in height above ground level, cutting-shallow)	Fishponds + other agriculture	I 8	10-500m	Medium	Low	Medium	Moderate negative	Very slight negative
	Viaduct (viaduct track level between 15-25m above ground level)	Pok Oi hospital	M 12	100m	High	Low	High	Very substantial negative	Moderate negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (viaduct track level between 15-25m above ground level)	Small Traders New Village	R 29	0-100m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (viaduct track level between 15-25m above ground level)	Au Tau South	R 30	500m	Medium	Low	Medium	Moderate negative	Very slight negative
	Viaduct (viaduct track level between 15-25m above ground level)	Au Tau North	R 31	0-250m	High	Low	Medium	substantial negative	Slight negative
	Viaduct (viaduct track level between 15-25m above ground level)	Castle Peak Road	T 12	200m	Medium	Nil	Low	Slight-negative	Nil

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (viaduct track level between 15-25m above ground level)	Wong Uk Tsuen	R 32	250m	High	Low	Medium	substantial negative	Slight negative
	Viaduct (viaduct track level between 15-25m above ground level)	Farmland East of Yuen Long	I 9	0-500m	High	Low	Medium	Substantial negative	Slight negative
	Elevated station (station track level 20m above ground level) and viaduct	Temporary construction area /future development site	C/R 11	10m	Nil	Medium	Medium	Nil	Moderate negative
	Elevated station (station track level 20m above ground level) and viaduct	Temporary construction area /future development site	C/R/ 12	10m	Nil	Medium	Medium	Nil	Moderate negative

Table 7.6a NORTHERN SECTION AND DEPOT VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	Residual Impact During Construction Phase	Residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (viaduct track level between 15-25m above ground level) and Temporary Works Area	Tsoi Uk Tsuen	R 33	200-250m	High	Low	High	Very substantial negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
Yuen Long to Long Ping	Elevated station (station track level 20m above ground level)	Sun Yuen Long Plaza	R 34	10-100m	High	Medium	High	Very substantial negative	Moderate negative
	Elevated station (station track level 20m above ground level) and temporary construction area	Yuen Long Kau Hui	R 35	0-100m	High	Low	High	Very substantial negative	Moderate negative
	Elevated station (station track level 20m above ground level)	Temporary construction are/ future development site	C/R 10	20m	High	Nil	High	Nil	Very substantial negative
	Elevated station (station track level 20m above ground level)	Temporary construction are/ future development site	C/R 9	0m	High	Nil	High	Nil	Very substantial negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Elevated station (station track level 20m above ground level) temporary construction area	Tung Tau Tsuen	R 36	300m	High	Low	High	Very substantial negative	Moderate negative
	Elevated station (station track level 20m above ground level) and temporary construction area	Kwan Lok San Tsuen	R 37	50-150m	High	Low	High	Very substantial negative	Moderate negative
	Elevated station (station track level 20m above ground level)	Properties south of Yuen Long On Lok Road	R 38	20-150m	Medium	Low	High	substantial negative	Slight negative
	Viaduct (viaduct track level approx. 15m above ground level)	Tung Tau industrial Area South	I 10	50-150m	Medium	Low	Medium	Moderate negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (viaduct track level approx. 15m above ground level)	Wholesale Fish Market	I 11	50-150m	High	Low	Medium	Substantial negative	Slight negative
	Viaduct (viaduct track level approx. 15m above ground level)	Yuen Long Estate	R 39	10-150m	High	Low	High	Very substantial negative	Slight negative
	Viaduct (viaduct track level approx. 15m above ground level)	Properties on Yuen Long On Lok Road	R 40	10-100m	High	Low	High	Very substantial negative	Slight negative
	Viaduct (viaduct track level approx. 15m above ground level)	Temporary construction are/ future development site	C/R 7	20m	Medium	Nil	High	Nil	Substantial negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Elevated station (station track level 15m above ground level) and temporary construction area	Long Ping Estate South	R43	20-250m	High	Low	High	Very substantial negative	Moderate negative
	Elevated station (station track level 15m above ground level)	Temporary construction are/ future development site	C/R 8	20m	High	Nil	High	Nil	Very substantial negative
	Elevated station (station track level 15m above ground level)	Mixed property in Central Yuen Long	C/R 2	20-150m	High	Low	High	Very substantial negative	Moderate negative
	Elevated Station (station track level 15m above ground level)	Properties on Ma Wang Road	C 2	10-150m	Medium	Low	Medium	Moderate negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
Long Ping to Tin Shui Wai	Viaduct (track level approx. 10m above ground level)	Shui Tin Tsuen	R 44	0-50m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (track level approx. 10m above ground level)	Fung Chi Tsuen	R 45	100m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (track level approx. 10m above ground level)	Temporary construction are/ future development site	C/R 8	20m	High	Nil	High	Nil	Very substantial negative
	Viaduct (track level approx. 10m above ground level)	Wing Ning Tsuen	R 46	0-100m	High	Low	Medium	substantial negative	Slight negative
	Viaduct (track level approx. 10m above ground level)	Farmland between Yuen Long and Tin Shui Wai	I 12	0-500m	Medium	Low	Low	Slight negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level approx. 10m above ground level)	Ha Mei San Tsuen	R 47	200-300m	Medium	Low	Medium	Moderate negative	Very slight negative
	Viaduct (track level 19m above ground level)	Long Tin Road	T 13	50-400m	Medium	Low	Low	Slight negative	Very slight negative
	Viaduct and elevated station (station track level 15m above ground level)	Tin Yiu Estate	R 48	10-100m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct and elevated station (station track level 15m above ground level) and temporary construction area	Tsui Shing Lau Pagoda area	R 49	10-500m	High	Low	High	Very substantial negative	Moderate negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and elevated station (station track level 15m above ground level) and	Temporary construction area/ future Open Space	OS 29	0m	Nil	Medium	Medium	Nil	Moderate negative
	Viaduct and elevated station (station track level 15m above ground level)	Tsui Shing Lau Pagoda	M 13	200m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct and elevated station (station track level 15m above ground level)	Kwok Yat Wei prevocational School	M 14	10-20m	High	Medium	High	Very substantial negative	Moderate negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
Tin Shui Wai to Yick Yuen Tsuen	Viaduct and elevated station (station track level 15m above ground level)	Sheung Cheung Wai	R 50	300m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level approx. 18m above ground level)	Ha Tsuen Shi	R/I 2	500m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level approx. 18m above ground level)	Sha Chau Lei	R/I 3	150-300m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level approx. 18m above ground level)	Shek Po Tsuen	R/I 4	50-250m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level approx. 18m above ground level)	San Sang Tsuen	R/I 5	100-300m	Medium	Low	Medium	Moderate negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level approx. 18m above ground level)	Farmland	I 13	0-500	Medium	Low	Low	Slight negative	Very slight negative
	Viaduct (track level 15m above ground level)	Tin Sam	R/I 6	50-200m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level 15m above ground level)	San Lee Uk Tsuen	R/I 7	100-300m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level 2-5m above ground level) and temporary construction area	Yick Yuen Tsuen, rural industry and scattered dwellings	R/I 8	0-150m	Medium	Low	Medium	Moderate negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level 2-5m above ground level) and temporary construction area	Tin Sam	R 98	0-350m	Medium	Low	High	Substantial negative	Moderate negative
	Viaduct (track level 2-5m above ground level) and temporary construction area	Residential area at junction of Tin Ha Road and Castle Peak road	R 99	200-500m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level 2-10m above ground level) and temporary construction area	Farmland	I 14	0-250	Medium	Low	Low	Slight negative	Very slight negative
Yick Yuen Tsuen to Tuen Mun North station	Viaduct (track level 2-10m above ground level)	Farmland	I 15	0-500	Medium	Low	Low	Slight negative	Very slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level 2-5m above ground level)	Tsing Chuen Wai, rural industry and scattered dwellings	R/I 9	100-200m	Medium	Low	Medium	Moderate negative	Very slight negative
	Viaduct (track level 2-5m above ground level)	Tuen Tsz Wai, rural industry and scattered dwellings	R/I 4	150-300m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct (track level 2-8m above ground level)	Castle Peak Road	T 15	20-300m	Low	Nil	Low	Very slight negative	Nil
	Viaduct (track level 2-8m above ground level)	Light Rail Transit	T 16	underneath-300m	Medium	Nil	Low	Slight negative	Nil
	Viaduct (track level 2-8m above ground level)	Tuen Tsz Wai East	R/I 11	0-150m	High	Low	Medium	Substantial negative	Slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level approx. 8m above ground level)	Tuen Mun San Tsuen and residential properties around Mui Fat Buddhist Monastery	R 51	100-200m	High	Low	Medium	Substantial negative	Slight negative
	Viaduct (track level approx. 8m above ground level)	Temporary construction site /Future Development Site	R/I 31	20m	Nil	Low	Medium	Nil	Slight negative
	Viaduct (track level approx. 8m above ground level)	Temporary construction site /Future Development Site	R/I/ 32	20m	Nil	Low	Medium	Nil	Slight negative
	Viaduct (track level approx. 8m above ground level)	Mui Fat Buddhist Monastery	M 15	100m	High	Low	Medium	substantial negative	Slight negative
	Viaduct (track level approx. 8m above ground level)	San Hing Tsuen	I 45	100-300m	High	Low	Low	Moderate negative	Very slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct (track level approx. 8m above ground level)	To Yuen Wai	R 53	150-300m	High	Low	Low	Moderate negative	Very slight negative
	Viaduct (track level approx. 8m above ground level)	Yau Tze Tin memorial College	M 16	100-200m	High	Low	Medium	substantial negative	Slight negative
	Viaduct (track level approx. 8m above ground level)	Temporary construction site /Future Development Site	I 52	0m	Nil	Low	Medium	Nil	Slight negative
	Viaduct (track level approx. 8m above ground level)	Proposed private comprehensive residential development in Area 5 on east side of area	R 52a	10-200m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (track level approx. 8m above ground level)	Proposed private comprehensive residential development in Area 5 on west side of area	R 52b	200-250m	Medium	Low	High	Substantial negative	Moderate negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
Tuen Mun North to Tuen Mun Town Park	Viaduct (track level approx. 8m above ground level)	Tai Hing Garden Estate	R 58	400m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (track level approx. 8m above ground level)	Siu Hong Court	R 55	0-100m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct (track level approx. 8m above ground level)	Tuen Mun Primary School	M 17	50-100m	High	Low	High	Very substantial negative	Moderate negative
	At grade	Tuen Mun hospital	M 18	30-50m	Medium	Low	High	Substantial negative	Moderate negative
	At grade	Tsing Tin Road	T 17	underneath-500m	Medium	Nil	Low	Slight negative	Nil
	At grade	Tuen Mun Road	T 18	100-250m	Medium	Nil	Low	Slight negative	Nil

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	At grade and viaduct	Affluence Garden	R 57	30-150m	High	Low	High	Very substantial negative	Moderate negative
	At grade	Properties Along Tsun Wen Road	I 16	20-150m	High	Low	Low	Moderate negative	Very slight negative
	Viaduct	School Children's dental Clinic	M 20	0-150m	High	Low	Medium	Substantial negative	Slight negative
	Viaduct	Tuen Mun Clinic	M 21	100m	Medium	Low	Medium	Moderate negative	Slight negative
	Viaduct	Greenland Garden	R 54	50-300m	High	Low	High	Very substantial negative	Slight negative
	At grade and viaduct	Commercial and residential properties on Tseng Choi Street	C/R 3	150m	Medium	Nil	Low	Slight negative	Nil

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Viaduct and elevated station (track level approx. 15m above ground level)	Properties on Tuen Mun Heung Sze Wui Road	C/R 13	100m	High	Low	High	Very substantial negative	Substantial negative
	Viaduct and elevated station (track level approx. 15m above ground level)	Hong Al Garden and Ngar Du Garden	R60	0-50m	High	Low	High	Very substantial negative	Moderate negative
	Viaduct and elevated station (track level approx. 15m above ground level)	St Simon's Lui Ming Choi Sec Tech School	M 22	10-100m	High	Low	Medium	Substantial negative	Slight negative
	Elevated station (track level approx. 18m above ground level)	Tuen Mun Town Park Area 35	OS 11	10-100m	Medium	Low	Medium	Moderate negative	Very slight negative

Table 8.6a WESTERN SECTION VISUAL IMPACT

Railway Sections	Nature of Route and Sources of Impacts	Key visually Sensitive Receivers (VSR) :	Type and Identity No. of VSR*	Distance Between VSR and West Rail	Magnitude of Impact		Receptor Sensitivity	residual Impact During Construction Phase	residual Impact During operational Phase
					Cons.	Oper.			
	Elevated station (track level approx. 18m above ground level)	Private residential development on Tuen Mun Heung Sze Wui Road	R61	200-300m	Medium	Low	Medium	Moderate negative	Very slight negative

Annex H

Plant Species Recorded at Various Locations along the West Rail Alignment

Annex H Plant Species Recorded at Various Locations along the West Rail Alignment

Species	Habit	Exotic	Site 1	2	3	4	5	6	7	8	9	10
Acacia confusa	T	E	+				+		+	+		+
Albizia lebbeck	T		+									
Aleurites moluccanna	T	E	+			+				+		
Alocasia macrorrhiza	T					+			+	+		+
Amaranthus viridus	S					+						
Araucaria heterophylla	T	E		+								
Bambusa spp.	B	E		+			+			+		
Bauhinia sp.	T		+							+		+
Bidens pilosa	H					+		+		+		
Bischofia javanica	T				+	+						
Blechnum orientale	F									+		
Bridelia tomemtosa	T									+		+
Callistemon rigidus	T	E			+							
Carica papaya	T	E			+		+					
Cassythra filiformis	C					+						
Casuarina equisetifolia	T	E		+						+		
Celtis sinensis	T				+				+	+		+
Cinnamomum camphora	T								+	+		
Clausena lansium	T	E			+		+		+			+
Cyclosorus interuptus	F										+	
Delonix regia	T	E	+				+		+			+
Desmos chinensis	S											+
Dimocarpus longan	T	E			+		+	+	+	+		+
Elephantopus sp.	H									+		
Erythrina sp.	T	E	+									
Eucalyptis robusta	T	E		+								
Eucalyptis tereticornis	T	E								+		
Ficus elastica	T	E	+		+							
Ficus hirta	T									+		+
Ficus hispida	T					+			+			
Ficus microcarpa	T		+	+			+	+		+		
Ficus superba	T					+						
Gardenia jasminoides	S									+		
Gossampinus malabaricum	T	E	+							+		+
Gymura bicolor	H											
Hibiscus rosa-sinensis	S	E	+						+			
Hibiscus tiliaceus	T		+									

Species	Habit	Exotic	Site 1	2	3	4	5	6	7	8	9	10
Ilex asprella	S									+		
Ilex rotundus	T											+
Ipomoea cairica	C					+		+		+	+	
Lantana camara	S	E				+						
Leucaena leucocephala	T	E			+					+		
Ligustrum sinense	S								+	+		
Litchi chinensis	T	E										+
Litsea monopetala	T											+
Litsea rotundifolia	S									+		
Lophostemon confertus	T	E								+		
Macaranga tanarius	T			+	+		+	+	+	+		+
Mangifera indica	T	E			+		+					
Manilkana achras	T	E					+					
Melaleuca quinquenervia	T	E			+							
Michelia alba	T	E					+		+			
Mikania micrantha	C	E				+	+	+		+	+	
Miscanthus sinensis	G					+				+		
Morus alba	T	E						+				
Musa paradisiaca	T	E			+		+	+				+
Neyraudia reynaudiana	G									+		
Oxalis corymbosa	H						+			+		
Oxalis corniculatus	H						+					
Paederia scandens	C						+					
Panicum repens	G					+						
Pennisetum purpureum	G					+						
Pinus elliotii	T	E								+		
Pinus massoniana	T									+		
Polygonum chinensis	H									+		
Polygonum sp.	H						+	+				
Psidium guajava	T	E					+					
Rubus parvifolius	C									+		
Rhus succedanea	T									+		
Ricinus communis	S					+						
Smilax china	C									+		
Stephania sp.	C									+		
Syzygium jambos	T				+							+
Urena lobata	C					+						

Habits: T= tree, S=shrub, G = grass, H = herb, C = climber, F = fern, B = bamboo

Sites: 1 = end of Tsun Wen Road, 2 = near Shiu Hong Court, 3 = near Tsuen Tze Wai, 4 = along nullah of Tung Tze Wai, 5= Yick Yuen, 6= Tin Sam Tsuen, 7= North foothill of Ping Shan, 8 = Fung Tei Garden, 9 = Yuen Long Marsh, 10 = Tung Shing Lei

Annex I

Plant Species Recorded in Kam Tin Valley and Tai Lam Country Park for the Route 3 Project, May 1993 - May 1995

Annex I Plant Species Recorded in Kam Tin Valley and Tai Lam Country Park for Route 3 Project between May 1993 and May 1995

Trees

Antidesma ghaesembilla
Aporusa dioica
Aralia dasyphylla
Archidendron lucidum
Artocarpus hypargyreus
*Bamboo**
Bridelia tomentosa
Cinnamomum camphora
Cratoxylum cochinchinense
Ficus hispida
Ficus superba
Ficus variegata chlorocarpa
Homalium cochinchinensis
Ilex rotunda
Leucaena leucocephala
Liquidambar formosana
Litsea glutinosa
Macaranga tanarius
Machilus breviflora
Machilus chinensis
Mallotus apelta
Melia azedarach
Microcos paniculata
Pandanus spp.
Phoenix hanceana
Phyllanthus emblica
Pinus massoniana
Rhus chinensis
Rhus succedanea
Sapium discolor
Sapium sebiferum
Schefflera octophylla
Sterculia lanceolata
Zanthoxylum avicennae

Shrubs

Baeckea frutescens
Breynia fructicosa
Brucea javanica
Clerodendrum fortunatum
Diospyros morrisiana
Eurya japonica
Ficus hirta
Ficus variolosa
Gardenia jasminoides
Glochidion eriocarpum
Glochidion wrightii
Helicteres angustifolia
Ilex asprella
Ilex pubescens

Shrubs (cont.)

Inula cappa
Lantana camara
Litsea rotundifolia
Maesa perlarius
Melastoma candidum
Melastoma dodecandrum
Melastoma sanguineum
Phyllanthus cochinchinensis
Psychotria rubra
Rhaphiolepis indica
Rhododendron simsii
Rhodomyrtus tomentosa
Strophanthus divaricatus
Symplocos chinensis
Syzygium buxifolia
Trema orientalis
Wikstroemia indica

Climbers

Ampelopsis cantoniensis
Artabotrys hexapetalus
Cassytha filiformis
Clematis sp.
Cyclea racemosa
Dalbergia benthamii
Dalbergia hancei
Dendrotrophe frutescens
Dioscorea esculenta
Embelia laeta
Embelia ribes
Gnetum montanum
Gymnema alterniflorus
Hypserpa nitida
Jasminum lanceolatum
Lygodium japonicum
Melothria heterophylla
Mikania guaco
Millettia nitida
Millettia reticulata
Millettia speciosa
Morinda umbellata
Mucuna championi
Mussaenda pubescens
Psychotria serpens
Pueraria lobata
Rapanea neriifolia
Smilax china
Smilax glabra
Stephania hernandifolia
Tetracera asiatica
Vitis flexuosa

Grasses/Herbs/Ferns

Adenosma glutinosum
Adiantum caudatum
Adina pilulifera
Adinandra millettii
Ageratum sp.
Alpinia zerumbet
Arundinella setosa
Asparagus cochinchinensis
Aster sp.
Bidens pilosa
Blechnum orientale
Centella asiatica
Cymbopogon sp.
Desmodium pulchellum
Dianella ensifolia
Dicranopteris linearis
Elephantopus scabra
Emilia sonchifolia
Eremochloa ciliaris
Eriosema chinensis
Eulalia sp.
Fimbristylis sp.
Gahnia tristis
Hedyotis acutangula
Ischaemum sp.
Liriope spicata
Mimosa pudica
Miscanthus floridus
Neyraudia reynaudiana
Osbeckia chinensis
Pteridium sp.
Pteroloma triquetrum
Rhynchospora rubra
Rubus parvifolius
Sageretia theezans
Schizoloma ensifolia
Setaria sp.
Sporobolus sp.
Urena lobata
Uvaria microcarpa
Vernonia cinerea

Source: Freeman Fox and Maunsell 1995

Annex J

Plant Species Recorded in the Study Area for Kam Tin Bypass EIA during January 1996

Annex J Plant Species Recorded in Study Area of Kam Tin Bypass EIA during January 1996

Disturbed Habitat	Disturbed Habitat (cont.)	Marsh	Woodland
Acacia confusa	*Impatiens chinensis*	*Aplunda mutica*	*Acacia confusa*
Acacia mangium	*Imperata cylindrica*	*Carex spp.*	*Alocasia macrorrhiza*
Achyranthes aspera	*Ipomoea cairica*	*Coix lacnryme-jobi*	*Breynia fruticosa*
Ageratum conyzoides	*Lagerstroemia speciosa*	*Commelina nudiflora*	*Bridelia tomentosa*
Aleurites moluccana	*Lantana camara*	*Cuscuta spp.*	*Cansjera rheedii*
Alocasia macrorrhiza	*Leucaena leucocephala*	*Digitaria spp.*	*Celtis philippensis*
Amaranthus spinosa	*Ligustrum sinensis*	*Echinochloa crus-galli*	*Celtis sinensis*
Amaranthus viridus	*Litchi chinensis*	*Eichhornia crassipes*	*Cocculus orbiculatus*
Aplunda mutica	*Litsea glutinosa*	*Eragrostis spp.*	*Cratoxylum*
Arundinella nepalensis	*Macaranga tanarius*	*Hygrophila salicifolia*	*cochinchinensis*
Arundinella setosa	*Malvastrum*	*Ipomoea aquatica*	*Cyclea hypoglauca*
Bauhinia blakeana	*coromandelinum*	*Kyllinga monocephala*	*Delonix regia*
Bidens pilosa	*Melia azedarach*	*Leptochloa chinensis*	*Desmos cochinchinensis*
Blumea laciniata	*Mikania micrantha*	*Ludwigia octovalis*	*Dianella ensifolia*
Bridelia tomentosa	*Mimosa pudica*	*Mikania micrantha*	*Dimocarpus longan*
Carica papaya	*Musa paradisiaca*	*Oenanthe javanica*	*Euonymus chinensis*
Cassia fistula	*Neyraudia reynaudiana*	*Paspalum conjugatum*	*Ficus hispida*
Casuarina equisetifolia	*Oxalis corymbosa*	*Paspalum distichum*	*Ficus hirta*
Celtis philippensis	*Oxalis reticulata*	*Pennisetum alopecuroides*	*Ficus variolosa*
Celtis sinensis	*Panicum maximum*	*Pennisetum purpureum*	*Glochidion eriocarpum*
Chamaesyce hirta	*Paspalum conjugatum*	*Philydrum lanuginosum*	*Gordonia axillaris*
Chloris barbata	*Paspalum spp.*	*Polygonum hydropiper*	*Heterosmilax*
Cinnamomum burmanni	*Passiflora foetida*	*Ranunculus sceleratus*	*gaudichaudiana*
Clausena lansium	*Pennisetum purpureum*	*Rumex maritimus*	*Ipomoea cairica*
Cleome spinosa	*Phyllanthus emblica*	*Sporobolus fertilis*	*Ligustrum sinensis*
Cocculus orbiculatus	*Polygonum chinensis*	*Wedelia trilobata*	*Liriope spicata*
Cratoxylum	*Portulaca oleracea*		*Litchi chinensis*
cochinchinensis	*Psidium guajava*		*Litsea cubeba*
Cyperus difformis	*Pyrostegia ignea*		*Litsea glutinosa*
Cyperus rotundus	*Ricinus communis*		*Litsea rotundifolia*
Delonix regia	*Rubus reflexus*		*Lygodium japonicum*
Desmodium heterocarpon	*Rumex crispus*		*Macaranga tanarius*
Digitaria spp.	*Sapium sebiferum*		*Mallotus paniculatus*
Dimocarpus longan	*Scoparia dulcis*		*Melastoma dodecandrum*
Echinochloa colonum	*Sesbania cochinchinensis*		*Melia azedarach*
Elephantopus tomentosa	*Sida acuta*		*Mussaenda pubescens*
Eleusine indica	*Sida rhombifolia*		*Paederia scandens*
Emilia sonchifolia	*Solanum nigrum*		*Pandanus urophylla*
Erechtites valerianefolia	*Solanum torvum*		*Phyllanthus emblica*
Erigeron floribundus	*Sonchus oleraceus*		*Phyllanthus reticulata*
Eucalyptis robustus	*Sporobulus fertilis*		*Pinus massoniana*
Ficus elastica	*Stachytarpheta*		*Psychotria rubra*
Ficus hirta	*jamaricensis*		*Rhaphiolepis indica*
Ficus hispida	*Sterculia nobilis*		*Sageretia theezans*
Ficus microcarpa	*Synedrella nodiflora*		*Sapium sebiferum*
Ficus pumila	*Trema orientalis*		*Smilax china*
Ficus rumphii	*Triumfetta bartramia*		*Trema orientalis*
Gossampinus malabarica	*Urena lobata*		*Zanthoxylum nitidum*
Hibiscus tiliaceus	*Wedelia triobata*		

Source: Babtie 1996

Annex K

Results of Avian Survey

1. **Avifauna Point Count Survey**

During winter 39 species were recorded during point counts on agricultural habitats in the affected and control zones as defined in *Section 4.10.2.4.2* (*Figure K1*). There were 32 and 30 species in the control and affected zones, respectively, and 23 species were common to both zones. During spring 31 species were recorded. There were 26 and 27 species in the control and affected zones, respectively, and 22 species were common to both zones. During summer 37 species was recorded. There were 31 species in both the control and affected zones and 25 species were common to both zones. During summer 39 species were recorded. The numbers of species were 32 in the control and 28 in the affected zones and 20 species were common to both zones. Overall, 62 species were recorded in agricultural habitats, representing 15% (62/421) of Hong Kong's avifauna and 55% (62/113) of all species recorded in the Kam Tin Valley. Also, because many winter visitors and passage migrants are usually silent, bird species diversity may have been underestimated. These results document the importance of Hong Kong's agricultural habitats to fauna.

The indices of similarity of the two zones were 0.742, 0.830, 0.806 and 0.667 in winter, spring, summer and autumn respectively. There were no large differences in the mean values of *H'* and *J'* for the two zones in the four seasons (*Table 1*). Dominant species were the same at both zones in all four seasons. The dominant species in winter was Crested Myna, in summer it was Barn Swallow, and in spring and autumn it was Spotted Dove.

Totals of 1448 and 1308 birds were recorded in the control and affected zones respectively. There were 51 and 46 species recorded in the control and affected zones respectively. The number of common species was 35, and the overall value of the indices of similarity of the two zones was 0.722. The combined values of *H'* for the control and affected zones were 2.94 and 3.00 respectively. In both cases the diversity indices were high relative to other habitats in Hong Kong. For example, studies in north-central Hong Kong on the Beas-Sutlej River floodplain produced diversity indices similar to those for the Kam Tin Valley. The former area is noted for its unusually high bird community diversity. The combined values of *J'* for the control and affected zones were 0.75 and 0.79 respectively. The commonest species in both zones was the Crested Myna.

The numbers of species and the indices of diversity and evenness for the two zones were similar (both the combined seasonal values and the mean values of each season) (*Table 1*). These, together with the index of similarity, suggest that the bird communities in the control and affected zones were similar. This will facilitate quantification of the effect of the construction works on the bird communities, should comparisons be required during ecological monitoring.

There were 17 confirmed breeders and 12 possible breeders (see *Table 8* of *Annex M*).

Table 1 Shannon's Diversity Index *H'* and Pielou's Index of Evenness *J'* of Each Sampling Point and the Mean Values of Each Zone in February, April, June and September 1997

Index	Season	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Control zone mean	Affected zone mean
H'	winter	2.59	2.77	2.18	2.40	2.43	1.83	2.20	2.53
	spring	2.65	2.79	2.35	2.32	2.32	2.20	2.40	2.44
	summer	2.61	2.49	2.58	2.58	2.76	2.66	2.62	2.58
	autumn	2.68	2.64	2.53	2.42	2.80	2.49	2.57	2.62
J'	winter	0.81	0.87	0.83	0.83	0.88	0.63	0.76	0.86
	spring	0.92	0.89	0.83	0.80	0.79	0.76	0.84	0.83
	summer	0.85	0.86	0.82	0.80	0.87	0.85	0.84	0.84
	autumn	0.74	0.73	0.70	0.67	0.77	0.69	0.71	0.72

Point 1 = operating fields (control), Point 2 = abandoned fields (affected), Point 3 = operating fields (control), Point 4 = operating fields (affected), Point 5 = operating fields (affected), Point 6 = abandoned fields (control)

For location of sampling points, refer to *Figure K1*

Many species were foraged on the paddy at Site 1 (*Table 2*). Flocks of 185 and 289 Crested Mynas were observed at Site 1 on 18 and 20 January 1997 respectively.

Table 2 Species Observed Foraging at Site 1 in January and February 1997

Common names	Scientific name
White-breasted Waterhen	*Amauromis phoenicurus*
Moorhen	*Gallinula striatus*
Spotted Dove	*Streptopelia chinensis*
Greater Coucal	*Centropus sinensis*
Olive-backed Pipit	*Anthus hodgsoni*
Yellow Wagtail	*Motacilla flava*
Grey Wagtail	*Motacilla cinerea*
Pied Wagtail	*Motacilla alba*
Crested Bulbul	*Pycnonotus jocosus*
Siberian Stonechat	*Saxicola maura*
Violet Whistling Thrush	*Myiophoneus caeruleus*
Black-faced Laughing-thrush	*Garrulax perspicillatus*
Rufous-backed Shrike	*Lanius schach*
Magpie	*Pica pica*
Jungle Crow	*Corvus macrorhynchus*
Silky Starling	*Sturnus sericeus*
Black-necked Starling	*Sturnus nigricollis*
Crested Mynah	*Acridotheres cristatellus*

For location of Site 1, refer to *Figure K2*

2. Egretry Monitoring

The three most abundant ardeid species recorded during January, February, April, June and September 1997 were the Chinese Pond Heron, Cattle Egret and Little Egret. There were records of other ardeid species. Grey Herons were observed on 26 February and 7 October 1997. A single Great Egret was seen on 12 June 1997. Night Herons were seen on 22 and 23 April, 18 June and 24 September 1997. However, these species were not seen nesting. The Cattle Egret was numerically dominant in all five surveys. The highest simultaneous counts of each species were 23 in January, 5 in February, 6 in April, 12 in June and 5 in September for the Chinese Pond Heron; 42, 35, 24, 91 and 17 for the Cattle Egret; and 8, 4, 8, 21 and 7 for the Little Egret. Because dense vegetation precluded accurate counts for any species, these figures represented the lower limits of their numbers.

Sites used by ardeids in late winter 1996/7 are shown in *Table 3* and in *Figure K2*. Sites 1-16 were occupied during winter 1994/5 (CES, 1995a). Additional sites occupied in January 1997 were sites 17, 18 and 19. Site 20 was first occupied in February 1997, Sites 21 and 22 in April 1997, Sites 23, 24 and 25 in June 1997, and Site 26 in September 1997. Bird behaviours at these 26 sites were primarily foraging, feeding and roosting. Roosting was concentrated upstream from the egretry at site 5, or at the egretry (site 6). Foraging was more evenly distributed both upstream and downstream from the egretry.

Six of the 26 ardeid sites will be within 100 m of West Rail (sites 4, 7, 10, 13, 23 and 25). These sites represented 8% of all observations of Chinese Pond Herons and Cattle Egrets, 26% of Little Egrets, and 10% of observations of all three species combined. This demonstrates that, although the alignment is some 300 to 500 m distant from the Toll Plaza and Ho Pui egretries, ardeids used the agricultural and riverine habitats within the alignment plan.

The intensity of ardeid use of the sites in Ho Pui valley was different in each study period. Sites were added in each survey but ardeids were not more dispersed in Ho Pui valley over time, because many of the sites used in earlier seasons or years were abandoned (*Table 3*). These seasonal or annual changes may result from birds using ephemeral food resources in different patches. The changes in the uses of foraging habitats during the five study periods could be partly attributable to changes in the habitats (e.g. seasonal vegetation growth in abandoned paddy fields, seasonal draining of ponds, and operation strategy of fields) and the life history of the birds (e.g. birds roosting at Site 6 in summer).

The most important change in the Ho Pui valley was progressive loss of suitable foraging habitats (e.g. fish ponds and abandoned agricultural land).

Table 4 shows that ardeids allocated approximately equal time to roosting and foraging in all study periods, except spring and summer. Roosting and foraging habitats were both located in Ho Pui valley. In April, at the beginning of nesting season, more time was spent gathering nesting materials and building nests. In summer, most of the birds observed roosting were juveniles.

As shown in *Table 5*, all ardeids roosted mostly on trees during the five study periods in 1997, especially in summer (June). Most of the birds observed roosting in summer were juveniles which roosted at the egretry. A metal framework at Site 5 was well used by ardeids, especially Cattle Egrets outside breeding season (April and June), possibly due to the relative absence of disturbance at that location. Chinese Pond Herons and Cattle Egrets frequently roosted on the banks of fish ponds in February. Although paddies and power transmission lines were both used as roosts, neither was as important as trees or pond bunds in terms of relative frequency of use.

Paddies, ponds, pond bunds, flooded fields and streams were all used as foraging habitats by the three species (*Table 6*). Use of foraging habitats differed among the species (*Table 6*). Cattle Egrets fed mainly on abandoned paddy fields during all five study periods. Cattle Egrets also feed terrestrially in other parts of the world (e.g. Belzer and Lombardi, 1989; Maddock and Baxter, 1991). Cattle Egrets used different patches of paddy fields in Ho Pui valley in each study period. This is probably because the birds used ephemeral food resources in each patch.

Little Egrets fed mostly in fish ponds in three of the five study periods (*Table 6*). They foraged more in the flooded paddy fields at Site 23 in summer. There were few ponds in Ho Pui and all were small. In addition, most of them were abandoned and colonised by vegetation. Because Little Egrets are primarily aquatic feeders, these factors may partly explain the low number of Little Egrets observed in the valley.

Feeding site preference was less obvious for Chinese Pond Herons, which fed in both aquatic and terrestrial habitats. There was no obvious seasonal trend in the frequency of use of habitat types (*Table 6*).

The different preference of foraging habitats of each species suggested the importance of a mosaic of fish pond and paddy field habitats to the survival of all species known to nest in Kam Tin valley.

Table 3 Relative Frequency (%) of Ardeid Species Observed at Ho Pui in January, February, April, June, and September 1997.

Site No	CPH					CE					LE					All				
	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept
1	18.5	15.9	2.8	2.0	3.5	33.8	42.6	4.4	0.5	1.1	2.8	1.2	1.4	0.8	0.0	30.5	39.3	3.7	0.6	1.4
2	0.6	0.5	0.0	1.0	21.8	0.6	5.3	0.2	0.3	1.5	2.0	4.8	0.0	0.8	8.5	0.7	5.1	0.1	0.3	6.2
3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
4	1.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0
5	38.6	25.8	4.6	2.0	38.8	27.6	37.7	5.8	0.7	16.7	11.3	6.6	0.7	5.3	9.4	27.8	35.7	4.9	1.0	19.6
6	4.5	0.6	51.4	15.0	0.0	11.9	0.3	73.2	11.4	0.0	44.0	1.8	62.1	37.9	0.0	12.9	0.4	68.7	12.9	0.0
7	0.0	1.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.8	0.6	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0
8	5.7	2.8	0.0	0.0	1.4	3.9	2.2	0.3	0.0	6.1	0.4	0.7	0.0	0.0	0.0	3.0	2.2	0.2	0.0	4.4
9	0.0	3.3	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.8	2.0	0.2	0.0	0.0	0.1
10	0.2	1.1	0.9	0.0	0.0	0.1	0.5	0.3	0.1	0.0	1.6	1.8	4.3	1.5	0.0	0.2	0.6	1.0	0.1	0.0
11	0.2	0.6	0.0	2.0	0.7	0.6	0.5	0.3	0.8	0.0	2.8	3.6	3.6	0.0	0.9	0.7	0.7	0.8	0.8	0.3
12	0.4	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
13	1.7	2.2	9.2	12.0	0.7	1.3	5.6	14.3	0.5	0.2	7.3	39.2	11.4	4.5	2.7	1.7	7.0	13.2	1.1	0.6
14	1.5	8.8	7.3	2.0	3.5	1.0	0.0	0.0	0.0	0.2	0.0	3.6	0.0	0.0	0.8	1.0	0.7	0.9	0.1	0.9
15	0.4	6.0	0.0	2.0	2.1	0.0	0.3	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.4
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0
17	1.7	2.8	11.9	4.0	3.5	0.2	0.0	0.2	0.4	0.2	4.1	0.0	0.0	0.0	6.8	0.5	0.1	1.6	0.5	1.8
18	11.5	9.9	4.6	4.0	2.8	0.2	1.1	0.0	0.3	1.0	13.7	29.5	2.2	2.3	22.2	2.1	2.8	0.9	0.5	4.5
19	13.0	3.3	3.7	0.0	10.6	16.8	1.4	0.0	0.4	0.0	4.4	0.0	0.0	0.0	0.9	15.8	1.4	0.5	0.3	2.1

Site No	CPH					CE					LE					All				
	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept
20	-	14.8	0.0	31.0	7.1	-	2.2	0.0	75.5	42.1	-	3.6	0.0	22.0	2.6	-	2.9	0.0	71.1	29.8
21	-	-	2.7	1.0	0.0	-	-	0.2	0.0	0.0	-	-	10.7	2.3	0.0	-	-	2.2	0.2	0.0
22	-	-	0.9	10.0	0.0	-	-	0.8	0.2	0.0	-	-	2.2	0.8	0.0	-	-	1.1	0.6	0.0
23	-	-	-	5.0	0.0	-	-	-	7.5	0.0	-	-	-	3.8	12.8	-	-	-	7.3	1.9
24	-	-	-	6.0	0.7	-	-	-	1.0	4.8	-	-	-	9.0	5.1	-	-	-	1.6	4.1
25	-	-	-	1.0	2.1	-	-	-	0.1	14.2	-	-	-	9.0	26.5	-	-	-	0.6	13.8
26	-	-	-	-	0.7	-	-	-	-	10.9	-	-	-	-	0.0	-	-	-	-	7.4

CPH = Chinese Pond Heron, CE = Cattle Egret, LE = Little Egret.

Refer Figure K2 for location of sites

Table 4 Relative Frequency of Behaviour of Ardeid Species near Ho Pui in Winter 1996/97, Spring, Summer and Autumn 1997

Behaviour	Month	CPH	CE	LE
Roosting	Jan/97	47.1	41.1	52.4
	Feb/97	57.1	43.5	41.5
	April/97	16.5	7.8	8.7
	June/97	75.0	80.4	67.7
	Sept/97	36.2	57.9	16.7
Foraging	Jan/97	52.9	58.9	47.6
	Feb/97	42.9	56.5	58.5
	April/97	19.3	4.1	14.5
	June/97	25.0	19.6	32.3
	Sept/97	63.8	42.1	83.3
nest building	Jan/97	-	-	-
	Feb/97	-	-	-
	April/97	64.2	88.1	76.8
	June/97	-	-	-
	Sept/97	-	-	-

CPH = Chinese Pond Heron, CE = Cattle Egret and LE = Little Egret

Table 5 Relative Frequency of Use of Different Roost Sites by Ardeid Species at Ho Pui Egretry in Winter 1996/97, Spring, Summer and Autumn 1997

Roost Site	CPH					CE					LE				
	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept
Metal framework at Site 5	16.9	11.2	4.5	0.0	53.2	39.3	26.3	6.7	0.0	22.4	10.3	5.1	3.7	0.0	26.3
Trees	78.6	58.7	95.5	100.0	40.4	59.5	52.7	93.3	100.0	76.6	87.4	92.4	88.9	99.0	68.4
Bank of fish ponds	0.5	20.0	0.0	0.0	6.4	1.2	20.4	0.0	0.0	1.0	1.2	2.5	0.0	1.0	5.3
Paddy	2.0	3.8	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electric wire	2.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	7.4	0.0	0.0

CPH = Chinese Pond Heron, CE = Cattle Egret and LE = Little Egret

Table 6 Relative Frequency of Foraging Habitats Used by Ardeid Species in Winter 1996/97 at Ho Pui Egretry

Roost Site	CPH					CE					LE				
	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept	Jan	Feb	April	June	Sept
Paddy	35.8	31.7	21.1	45.8	15.7	74.2	52.5	87.5	64.5	95.5	7.6	3.6	7.6	2.3	54.7
Fish ponds	28.4	5.0	5.3	12.5	6.0	0.4	3.1	0.0	0.4	0.0	55.7	61.9	46.2	34.1	18.9
Bank of fish ponds	21.1	31.7	63.2	4.2	9.6	8.1	10.5	6.3	4.9	1.8	31.6	32.7	46.2	9.1	18.9
Stream	14.7	31.6	10.4	8.3	68.7	17.3	33.9	6.2	1.1	2.7	5.1	1.8	0.0	4.5	7.5
flooded fields	-	-	0.0	29.2	0.0	-	-	0.0	29.1	0.0	-	-	0.0	50.0	0.0

CPH = Chinese Pond Heron, CE = Cattle Egret and LE = Little Egret

Table 7 Bird Species recorded in the Upper Kam Tin Valley between 1994 and 1997

Common name (Scientific name)	Status	Abundance	Wetland
Little Grebe (*Tachybaptus ruficollis*)	R		W
Yellow Bittern (*Ixobrychus sinensis*)	R	U	W
Night Heron (*Nycticorax nycticorax*)	R		W
Little Green Heron (*Butorides striatus*)	R	U	W
Chinese Pond Heron (*Ardeola bacchus*)	R		W
Cattle Egret (*Bubulcus ibis*)	R		W
Little Egret (*Egretta garzetta*)	R		W
Intermediate Egret (*Mesophoyx intermedia*)	NBV	U	W
Great Egret (*Casmerodius albus*)	R		W
Grey Heron (*Ardea cinerea*)	R		W
Black Baza (*Aviceda leuphotes*)	SV	R	
Black-eared Kite (*Milvus lineatus*)	R		
Crested Serpent Eagle (*Spilornis cheela*	R	R	
Besra (*Accipiter virgatus*)	R	R	
Northern Sparrowhawk (*Accipiter nisus*)	WV	R	
Crested Goshawk (*Accipiter trivirgatus*)	R	R	
Buzzard (*Buteo buteo*)	WV	U	
Bonelli's Eagle (*Hieraaetus fasciatus*)	R	R	
Kestrel (*Falco tinnunculus*)	WV	U	
Peregrine Falcon (*Falco peregrinus*)	R	R	
Chinese Francolin (*Francolinus pintadeanus*)	R		
White-breasted Waterhen (*Amaurornis phoenicurus*)	R		W
Moorhen (*Gallinula chloropus*)	R	U	W
Coot (*Fulica atra*)	R	U	W
Painted Snipe* (*Rostratula benghalensis*)	R	R	W
Little Ringed Plover (*Charadrius dubius*)	R	U	W
Long-billed Plover (*Charadrius placidus*)	WV	R	W
Grey-headed Lapwing (*Vanellus cinereus*)	WV	R	W
Lapwing (*Vanellus vanellus*)	WV	R	W
Temminck's Stint (*Calidris temminckii*)	PM/WV	U	W
Long-toed Stint+ (*Calidris subminuta*)	PM/WV	R	W
Fantail Snipe (*Gallinago gallinago*)	PM/WV	U	W
Pintail Snipe (*Gallinago stenura*)	PM/WV	R	W
Green Sandpiper (*Tringa ochropus*)	PM/WV	U	W
Wood Sandpiper+ (*Tringa glareola*)	PM/WV	U	W
Common Sandpiper (*Actitis hypoleucos*)	PM/WV		W
Red-necked Phalarope (*Phalaropus lobatus*)	PM/WV	U	W
Feral Pigeon (*Columba livia*)	I		

Rufous Turtle Dove (*Streptopelia onentalis*)	PM/WV		
Spotted Dove (*Streptopelia chinensis*)	R		
Rose-ringed Parakeet (*Psittacula kramen*)	R		
Red-winged Crested Cuckoo (*Clamator coromandus*)	SV	U	
Large Hawk-cuckoo (*Cuculus sparverioides*)	SV		
Plaintive Cuckoo (*Cacomantis merulinus*)	SV		
Indian Cuckoo (*Cuculus micropterus*)	SV	U	
Koel (*Eudynamis scolopacea*)	R		
Greater Coucal (*Centropus sinensis*)	R		
Lesser Coucal (*Centropus bengalensis*)	R	U	
Asian Barred Owlet (*Glaucidium brodiei*)	R	R	
Savanna Nightjar (*Caprimulgus affinis*)	R	R	
House Swift (*Apus affinis*)	R/PM		
White-breasted Kingfisher (*Halcyon smyrnensis*)	R		W
Black-capped Kingfisher (*Halcyon pileata*)	R	U	W
Common Kingfisher (*Alcedo atthis*)	R		W
Pied Kingfisher (*Ceryle rudis*)	R	U	W
Hoopoe (*Upupa epops*)	OV	R	
Eurasian Wryneck (*Jynx torquilla*)	WV	R	
Barn Swallow (*Hirundo rustica*)	SV/PM		
Asian House Martin (*Delichon dasypus*)	PM	R	
Richard's Pipit (*Anthus richardi*)	R/M/WV		
Olive-backed Pipit (*Anthus hodgsoni*)	WV		
Red-throated Pipit+ (*Anthus cervinus*)	PM/WV		
Yellow Wagtail+ (*Motacilla flava*)	PM/WV	U	W
Grey Wagtail (*Motacilla cinerea*)	WV		W
White Wagtail (*Motacilla alba*)	WV		
Black-backed Wagtail (*Motacilla lugens*)	WV	U	
Crested Bulbul (*Pycnonotus jocosus*)	R		
Chinese Bulbul (*Pycnonotus sinensis*)	R		
Red-vented Bulbul (*Pycnonotus aurigaster*)	R		
Rufous-tailed Robin (*Luscinia sibilans*)	WV	R	
Siberian Rubythroat (*Luscinia calliope*)	WV	U	
Daurian Redstart (*Phoenicurus auroreus*)	WV	U	
Magpie Robin (*Copsychus saularis*)	R		
Siberian Stonechat (*Saxicola maura*)	WV	U	
Grey Bushchat (*Saxicola ferrea*)	WV	R	
Violet Whistling Thrush (*Myiophoneus caeruleus*)	R		
Blackbird (*Turdus merula*)	WV	U	
Grey-backed Thrush (*Turdus hortulorum*)	WV	U	
Fantail Warbler (*Cisticola juncidis*)	R/WV	U	W

Bright-capped Cisticola (*Cisticola exilis*)	WV	U	
Plain Prinia (*Prinia inornata*)	R	U	
Yellow-bellied Prinia (*Prinia flaviventris*)	R		
Common Tailorbird (*Orthotomus sutorius*)	R		
Arctic Warbler (*Phylloscopus borealis*)	PM	U	
Yellow-browed Warbler (*Phylloscopus inornatus*)	WV		
Dusky Warbler (*Phylloscopus fuscatus*)	WV	U	
Red-throated Flycatcher+ (*Ficedula parva*)	WV	R	
Black-faced Laughing-thrush (*Garrulax perspicillatus*)	R		
Red-headed Tit (*Aegithalos concinnus*)	R	R	
Great Tit (*Parus major*)	R		
Yellow-cheeked Tit (*Parus spilonotus*)	R	R	
Fork-tailed Sunbird (*Aethopyga christinae*)	R	U	
Scarlet-backed flowerpecker (*Dicaeum cruentatum*)	R	R	
Japanese White-eye (*Zosterops japonica*)	R		
Black-naped Oriole (*Oriolus chinensis*)	SV	U	
Rufous-backed Shrike (*Lanius schach*)	R		
Black Drongo (*Dicrurus macrocercus*)	SV		
Hair-crested Drongo (*Dicrurus hottentottus*)	SV	U	
Magpie (*Pica pica*)	R		
Jungle Crow (*Corvus macrorhynchus*)	R		
Collared crow (*Corvus torquatus*)	R		
Silky Starling (*Sturnus sericeus*)	WV	U	W
Chinese Starling (*Sturnus sinensis*)	WV	U	
Common Starling (*Sturnus vulgaris*)	WV	R	
White-cheeked Starling (*Sturnus cineraceus*)	WV	R	
Black-necked Starling (*Sturnus nigricollis*)	R		
Common Myna (*Acridotheres tristis*)	I		
Crested Mynah (*Acridotheres cristatellus*)	R		
Tree Sparrow (*Passer montanus*)	R		
White-backed Munia (*Lonchura striata*)	R		
Spotted Munia (*Lonchura punctulata*)	R		
Masked Bunting (*Emberiza spodocephala*)	WV		
Little Bunting (*Emberiza pusilla*)	PM/WV		

Key to symbols: I = introduced, R = resident, SV = summer visitor, PM = passage migrant, WV= winter visitor, R = rare, U = uncommon, W = wetland dependent

+predominantly a summer visitor/passage migrant; may also be recorded in winter

*predominantly passage migrant/winter visitor; may also be seen during summer

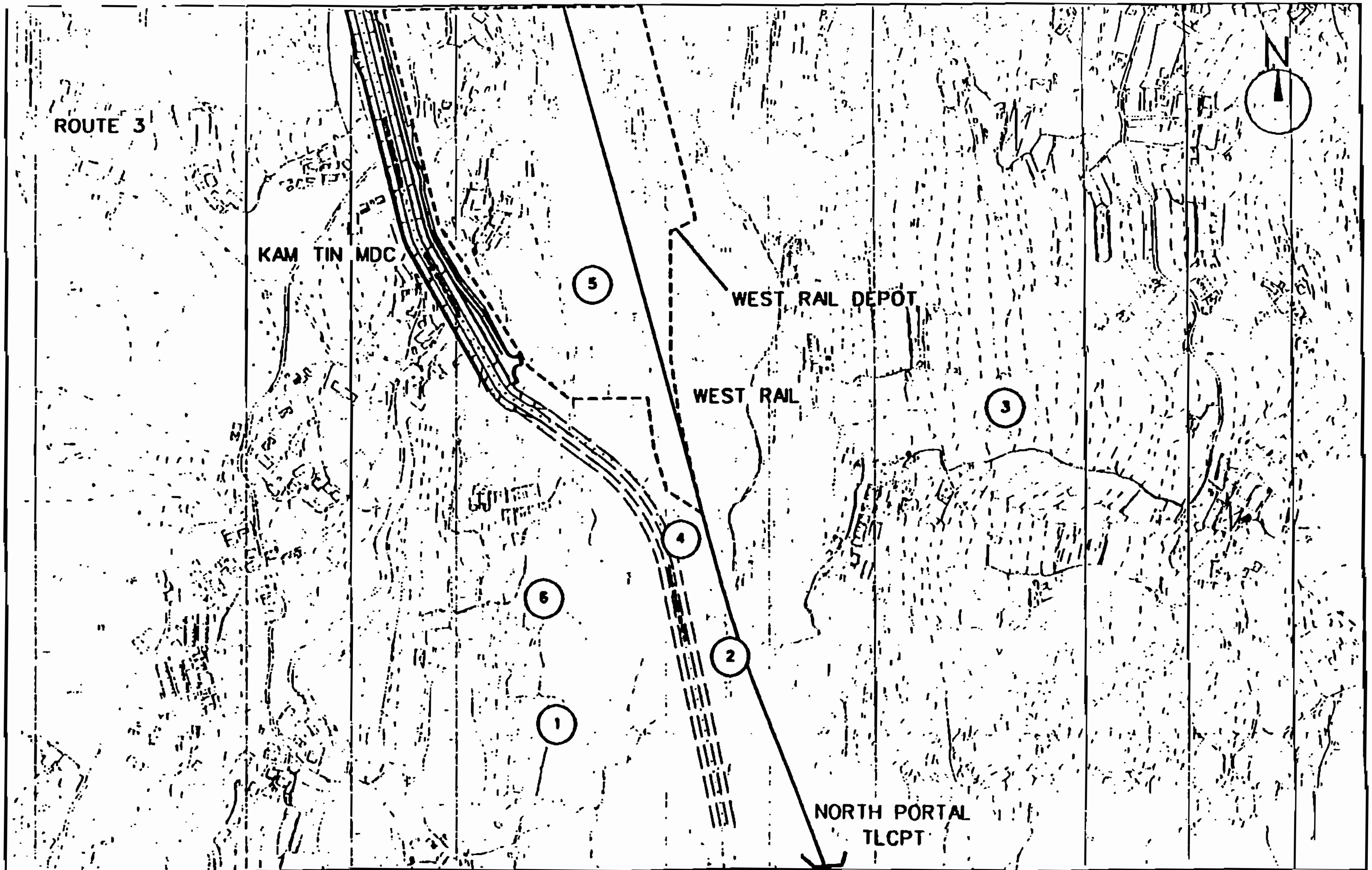
Species not designated as rare or uncommon are common

Data Source: Includes Diskin and Pearse (1996), D Lau (unpubl.data) and current study. Taxonomy follows Viney et al 1994

Table 8-Bird Species observed breeding on/near West Rail - Spring, Summer and Autumn 1997

Species	Grade*/Behaviour	Spring	Summer	Autumn
Chinese Pond Heron	D/Nests found	✓	✓	
Cattle Egret	D/Nests found	✓	✓	
	D/Carrying food for juveniles		✓	
Little Egret	D/Nests found	✓	✓	
Greater Coucal	D/Carrying food for juveniles		✓	
	C/Calling for territories	✓	✓	
Lesser Coucal	D/Recent fledged juveniles		✓	
	C/Calling for territories		✓	
Asian Barred Owlet	D/Recent fledged juveniles		✓	
	C/Calling for territories	✓	✓	
Common Kingfisher	D/Recent fledged juveniles			✓
	C/Chasing intruders out of territories		✓	
Barn Swallow	D/Nests found	✓	✓	
Crested Bulbul	D/Recent fledged juveniles			✓
	C/Singing for territories	✓	✓	
Chinese Bulbul	D/Recent fledged juveniles			✓
	C/Singing for territories	✓	✓	
Magpie Robin	D/Recent fledged juveniles			✓
	C/Singing for territories	✓		
	C/Chasing intruders out of territories	✓		
Black-faced Laughing-thrush	D/Carrying food for juveniles	✓		
Red-headed Tit	D/Recent fledged juveniles		✓	
Great Tit	D/Recent fledged juveniles	✓		
	C/Calling for territories	✓		
Crested Myna	D/Carrying food for juveniles	✓	✓	
Black-necked Starling	D/Recent fledged juveniles			✓
	C/Carrying nesting materials	✓		
Tree Sparrow	D/Recent fledged juveniles		✓	
Night Heron	C/Pair of birds observed in potential breeding habitat	✓	✓	
White-breasted Waterhen	C/Calling for territories	✓	✓	
Black Baza	C/Pair of birds observed in potential breeding habitat		✓	
Spotted Dove	C/Calling for territories	✓	✓	
	C/Display	✓	✓	
Plaintive Cuckoo	C/Calling for territories	✓	✓	
Koel	C/Calling for territories		✓	
Plain Prinia	C/Singing for territories	✓	✓	
Yellow-bellied Prinia	C/Singing for territories	✓	✓	
Common Tailorbird	C/Calling for territories	✓	✓	
Rufous-backed Shrike	C/Calling for territories	✓	✓	
Magpie	C/Calling for territories	✓		
White-rumped Munia	C/Carrying nesting materials		✓	

*See *Table 4.10a* for descriptions of criteria used to distinguish grades of breeding behaviour.



AVIFAUNA POINT COUNT SITES AT KAM TIN VALLEY

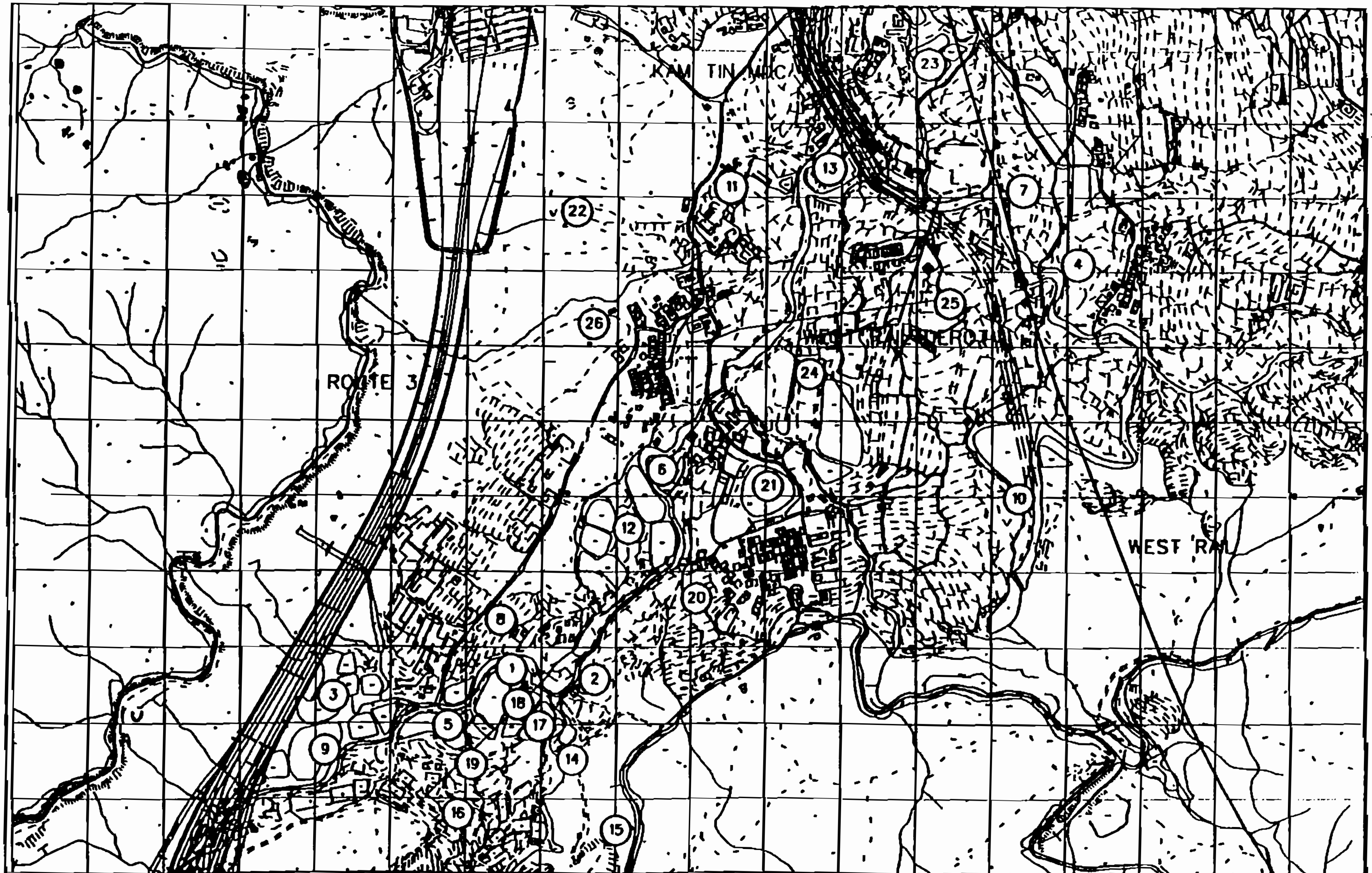
SCALE: 1/5,000

FIGURE K1

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



SITES USED BY ARDEIDS IN HO PUI, 1994-97

FIGURE K2

SCALE: 1/7000

BRM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

Annex L

Ecology of the Painted Snipe

The Painted Snipe *Rostratula benghalensis* breeds in Africa, Egypt, the Middle East, and Asia east to Japan, including southern China, the Philippines and Indonesia. In China it is resident in South China from Sichuan and Yunnan eastwards to Taiwan, and it is a summer visitor from Shaanxi to the southern part of Liaoning province (Cheng, 1987). The Chinese populations are unique in that they are the only ones known to undertake regular migrations; the movements of all other populations are considered nomadic (Hayman *et al*, 1986). In Hong Kong the Painted Snipe was considered a passage migrant and winter visitor with no breeding records up to 1985 (Chalmers, 1986).

The first confirmed breeding record of Painted Snipe in Hong Kong was in 1988 (HKBWS). All breeding records in Hong Kong are listed below. The term "Long Valley" refers to the floodplain between the Rivers Beas and Indus near Tsung Pak Long in the northcentral New Territories.

- 1988: A male with three juveniles at Lok Ma Chau on 4 July;
- 1992: A pair with three juveniles at Tin Shui Wai on 9-23 August;
- 1993: A male with four juveniles at Long Valley on 8 July;
- 1996: A nest with four eggs found at Kam Tin on 10 October; and
- 1997: A male at Kam Tin with four large juveniles on 2 April (D. Diskin, pers comm) and a different male there with four very young chicks on 7 April.

The species is very secretive during the breeding season and can be difficult to detect (Cramp and Simmons, 1983). It is likely that breeding occurs annually in Hong Kong. The 1992 wetland breeding site at Tin Shui Wai has now dried up and is unsuitable for future nesting. Kam Tin is the only site in Hong Kong where regular breeding is confirmed.

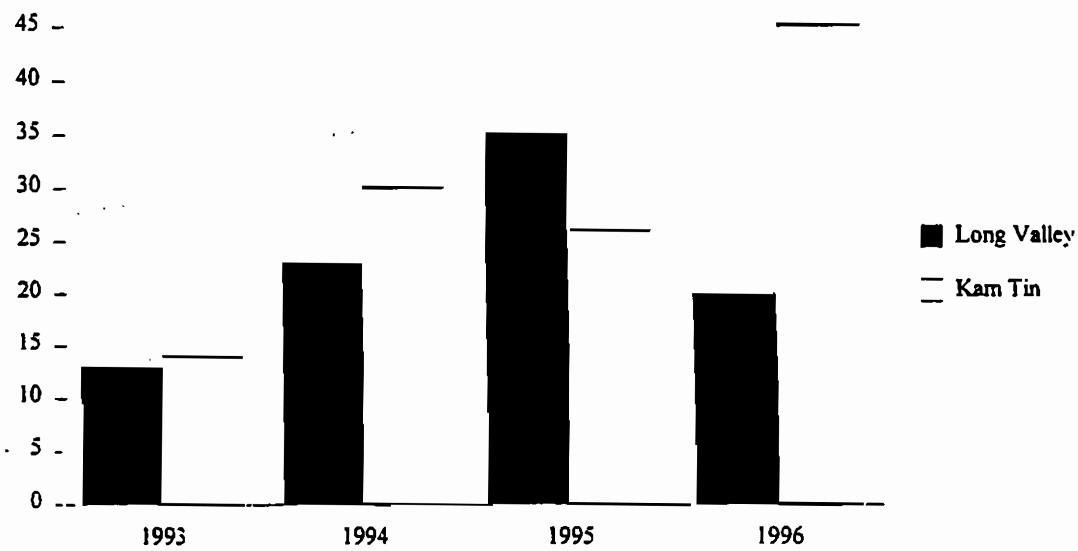
Painted Snipe inhabit rice fields, freshwater lakes with grassy islets for nesting, overgrown mudflats, reservoirs, and damp agricultural land. The species lives and feeds primarily in swamps and marshes interspersed with pools 30 to 50 cm deep, soft muddy areas, and dense shrubbery and reed-beds (del Hoyo *et al*, 1996). In Hong Kong, Painted Snipe are confined to wet agricultural land with associated overgrown marshy areas. Not surprisingly, given the scarcity of this habitat, it is a very localised breeding species in Hong Kong.

Painted Snipe may breed in habitats which are suitable only on a temporary basis (Marchant and Higgins, 1993). In 1992 Painted Snipe nested at Tin Shui Wai in a fish pond which had been filled with earth, but had developed extensive low vegetation and retained shallow water.

Since 1993 Painted Snipe have been recorded regularly at both Kam Tin and Long Valley. Prior to this the species was considered to be declining. In three of the four years for which count data are available (1993-96) the Kam Tin valley count exceeded that for Long Valley. The locations of the marsh and riverine habitats occupied by Painted Snipe in Kam Tin valley are shown in *Figure L1*. The northermost two sites are known nesting sites, and the southernmost site (nearest Kam Tin Road) is a preferred roosting site, with two confirmed records of nesting.

The counts at Long Valley and Kam Tin during the period 1993 to 1996 include the highest counts ever recorded in Hong Kong (see *Figure L2*). No other Hong Kong site has held more than 9 Painted Snipe since 1993. From 1993 to 1996 the only records away from these two sites were of single birds at three other sites on four dates. It is reasonable to conclude that in Hong Kong the species is almost entirely dependent on Long Valley and Kam Tin Valley.

Figure L2 Peak Annual Counts of Painted Snipe at Long Valley and Kam Tin, 1993-1996



Freshwater Wetland and Painted Snipe

One of the largest populations of Painted Snipe (*Rostratula benghalensis*) in Hong Kong and throughout the region occupies the mosaic of freshwater wetlands, including agricultural land, marshland and stream habitat immediately southwest of Kat Hing Wai (see *Section 7.9.2.1.1*). Painted Snipe are occupants of freshwater wetlands, including marshes and agricultural areas. Their number is declining in Hong Kong due to losses of wetland habitat (Viney *et al*, 1994).

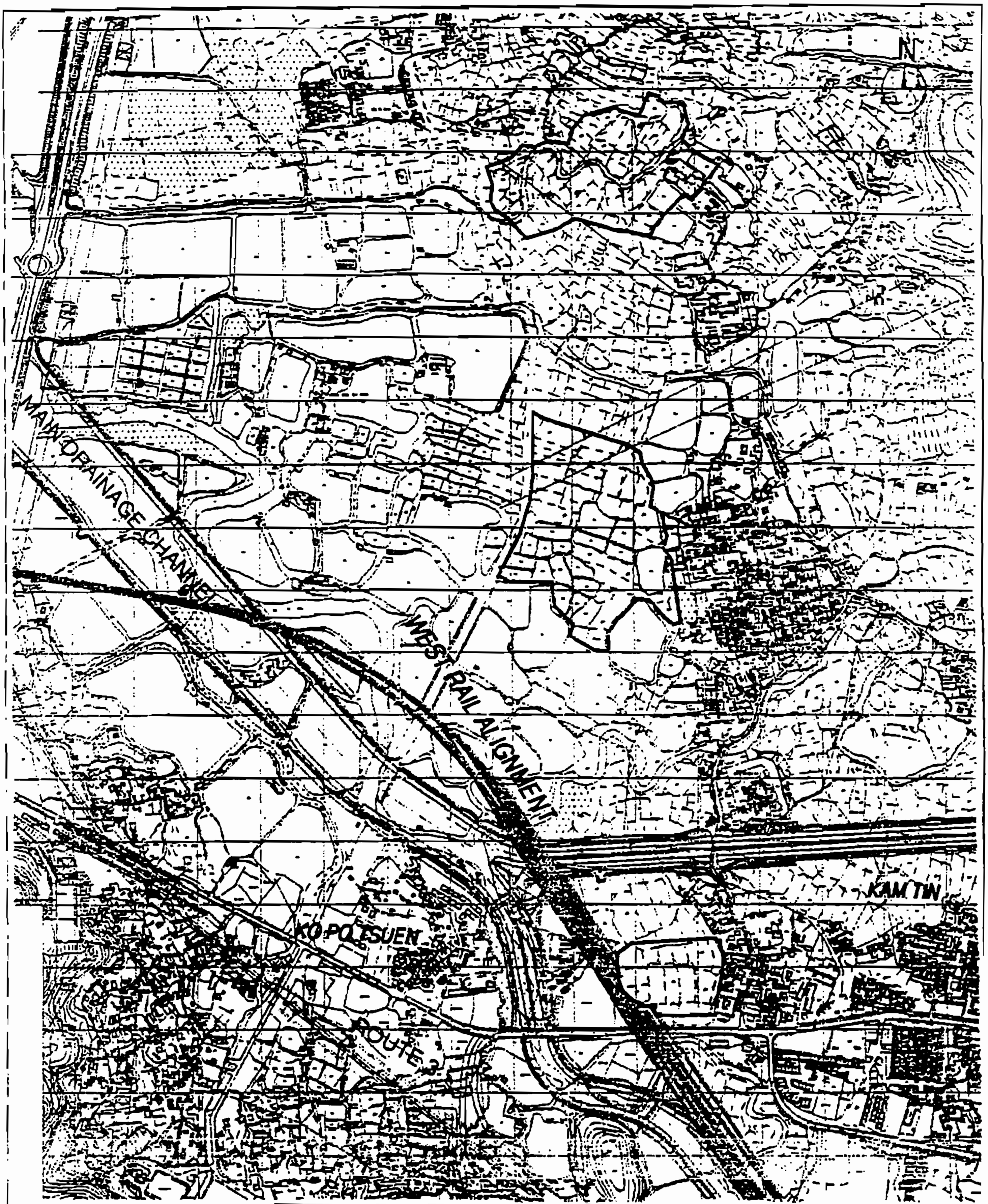


FIGURE L1

BREEDING AND ROOSTING SITES OF PAINTED SNIPE AT KAM TIN VALLEY

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

Annex M

Results of the Ecological Survey for West Rail and Literature Review

Table M1 Butterflies recorded in the Upper Kam Tin River Valley

Family	Species	HK status**
Nymphalidae		
Danainae	***Danaus chrysippus***	**uncommon**
	Danaus genutia	very common
	Euploea core	very common
	Euploea midamus	very common
	Ideopsis similis	very common
	Tirumala limniace	common
Satyrinae	*Elymnias hypermnestra*	common
	Lethe confusa	common
	Lethe rohria	**uncommon**
	Melanitis leda	common
	Melanitis phedima	**uncommon**
	Mycalesis mineus	very common
	Mycalesis panthaka	common
	Ypthima baldus	common
Amathusiinae	***Discophora sondaica***	**uncommon**
	Faunis eumeus	common
Charaxinae	*Charaxes bernardus*	common
Nymphalinae	*Ariadne ariadne*	common
	Athyma nefte	common
	Athyma perius	common
	Athyma selenophora	common
	Cupha erymanthis	very common
	Euthalia phemius	**uncommon**
	Hestina assimilis	common
	Hypolimnas bolina	common
	Hypolimnas misippus	**rare**
	Junonia atlites	common
	Junonia orithya	**uncommon**
	Kaniska canace	common
	Limenitis sulpitia	common
	Neptis hylas	very common
	Pantoporia hordonia	common
	Parasarpa dudu	**uncommon**

Family	Species	HK status**
	Phaedyma columella	common
	Phalanta phalantha	**uncommon**
	Symbrenthia lilaea	common
	Vanessa indica	**uncommon**
Lycaenidae		
Riodininae	*Abisara echerius*	very common
	Zemeros flegyas	common
Theclinae	***Rapala manea***	**uncommon**
Lycaeninae	***Heliophorus epicles***	**uncommon**
Polyommatinae	*Acytolepis puspa*	common
	Chilades lajus	very common
	Euchrysops cnejus	common
	Everes lacturnus	common
	Famegana alsulus	common
	Neopithecops zalmora	**uncommon**
	Zizeeria maha	common
	Zizina otis	**uncommon**
Pieridae		
Pierinae	*Artogeia canidia*	common
	Delias pasithoe	common
	Hebomoia glaucippe	common
	Catopsilia pomona	common
	Catopsilia pyranthe	common
Coliadinae	***Eurema blanda***	**rare**
	Eurema hecabe	very common
Papilionidae	*Chilasa clytia*	common
	Graphium agamemnon	very common
	Graphium sarpedon	very common
	Papilio bianor	common
	Papilio demoleus	common
	Papilio helenus	very common
	Papilio memnon	very common
	Papilio paris	very common
	Papilio polytes	very common
	Papilio protenor	common
	Papilio xuthus	**uncommon**

Family	Species	HK status**
Hesperiidae		
Pyrginae	*Tagiades litigiosus*	common
Hesperiinae	***Ampittia dioscorides***	**uncommon**
	Borbo cinnara	**uncommon**
	Astictopterus jama	common
	Erionota torus	**uncommon**
	Matapa aria	**uncommon**
	Pamara guttatus	common
	Pamara ganga	**rare**
	Pelopidas agna	common
	Pelopidas mathias	**rare**
	Polytremis lubricans	common
	Potanthus confucius	common
	Suastus gremius	**uncommon**
	Udaspes folus	**rare**

** Derived from Walthew, G. (1997). The status and flight periods of Hong Kong butterflies. *Porcupine!* 16: 34-37.

Rare and uncommon species are shown in bold

Table M2 Butterfly species recorded in the Kam Tin Valley in Spring through Autumn 1997

Family	Species	HK status**
Nymphalidae		
Danainae	***Danaus chrysippus***	**uncommon**
	Danaus genutia	very common
	Euploea core	very common
	Euploea midamus	very common
	Ideopsis similis	very common
	Tirumala limniace	common
Satyrinae	*Elymnias hypermnestra*	common
	Lethe confusa	common
	Lethe rohria	**uncommon**
	Melanitis leda	common
	Melanitis phedima	**uncommon**
	Mycalesis mineus	very common
	Mycalesis panthaka	common
	Ypthima baldus	common

Family	Species	HK status**
Amathusiinae	***Discophora sondaica***	**uncommon**
	Faunis eumeus	common
Charaxinae	*Charaxes bernardus*	common
Nymphalinae	*Ariadne ariadne*	common
	Athyma nefte	common
	Athyma selenophora	common
	Cupha erymanthis	very common
	Hestina assimilis	common
	Hypolimnas bolina	common
	Hypolimnas misippus	**rare**
	Junonia atlites	common
	Kaniska canace	common
	Limenitis sulpitia	common
	Phaedyma columella	common
	Neptis hylas	very common
	Pantoporia hordonia	common
	Symbrenthia lilaea	common
Lycaenidae		
Riodininae	*Abisara echerius*	very common
	Zemeros flegyas	common
Theclinae	***Rapala manea***	**uncommon**
Lycaeninae	***Heliophorus epicles***	**uncommon**
Polyommatinae	*Acytolepis puspa*	common
	Chilades lajus	very common
	Euchrysops cnejus	common
	Everes lacturnus	common
	Famegana alsulus	common
	Parasarpa dudu	**uncommon**
	Neopithecops zalmora	**uncommon**
	Zizeeria maha	common
	Zizina otis	**uncommon**
Pieridae		
Pierinae	*Artogeia canidia*	common
	Delias pasithoe	common
	Hebomoia glaucippe	common
Coliadinae	*Catopsilia pomona*	common

Family	Species	HK status**
	Catopsilia pyranthe	common
	Eurema blanda	**rare**
	Eurema hecabe	very common
Papilionidae	*Graphium agamemnon*	very common
	Graphium sarpedon	very common
	Papilio bianor	common
	Papilio demoleus	common
	Papilio helenus	very common
	Papilio memnon	very common
	Papilio paris	very common
	Papilio polytes	very common
	Papilio protenor	common
	Papilio xuthus	**uncommon**
Hesperiidae		
Coeliadinae	*Tagiades litigiosus*	
Hesperiinae	*Astictopterus jama*	common
	Erionota torus	**uncommon**
	Matapa aria	**uncommon**
	Parnara guttatus	common
	Parnara ganga	**rare**
	Pelopidas agna	common
	Pelopidas mathias	**rare**
	Polytremis lubricans	common
	Potanthus confucius	common
	Suastus gremius	**uncommon**
	Udaspes folus	**rare**

** Derived from Walthew, G. (1997). The status and flight periods of Hong Kong butterflies. Porcupine! 16: 34-37.

Rare and uncommon species are shown in bold.

Table M3 Butterfly species recorded near Ho Pui from 1975-1979

Papilionidae		
Graphium doson	**Common Jay**	**uncommon**
Pathysa antiphates	Fivebar Swordtail	common
Pieridae		
Delias hyparete	**Painted Jezebel**	**rare**
Lycaenidae		
Spindasis syama	**Long-banded Silverline**	**uncommon**
Remelana jangala	**Chocolate Royal**	**uncommon**
Nacaduba kurava	Rounded Six-line Blue	common
Jamides bochus	Dark Caerulean	common
Catochrysops strabo	**Forget-me-not**	**rare**
Lampides boeticus	Pea Blue	common
Castalius rosimon	**Straight Pierrot**	**very rare**
Zizeeria karsandra	**Pale Grass Blue**	**rare**
Nymphalidae		
Junonia almana	Peacock Pansy	common

Data from Bascombe (1993). Very rare, rare and uncommon species are shown in bold.

Table M4 Dragonflies and Damselflies recorded in the Upper Kam Tin Valley in Spring, Summer and Autumn 1997

Scientific name	Status*
Odonata	
Zygoptera	
Calopterygidae	
Neurobasis chinensis	**NC, r**
Coenagrionidae	
Agriocnemis femina	FC, W
Ceriagrion auranticum	C, W
Ischnura senegalensis	C, W
Chlorocyphidae	
Rhinocypha perforata	C, W
Anisoptera	
Gomphidae	
Sinictogomphus clavatus	**NC**
Aeshnidae	
Anax guttatus	C; W
Libellulidae	
Orthetrum chrysis	FC, W
Orthetrum luzonicum	W
Orthetrum pruinosum	C, W
Rhyothemis variegata	C, W
Pantala flavescens	C, W
Brachytemis contaminata	C, W
Crocothemis sevilia	C, W

* R = rare, C = common, r = restricted, W = widespread, NC = not common, FC = fairly common

Taxonomy and Status follow Wilson (1995)

Species considered to be rare, not common, or restricted in distribution are shown in bold.

Table M5 Dragonfly and Damselfly species recorded in general area of Kam Tin Valley on 28 October, 1997

Scientific names	Status*
Zygoptera	
Coenagrionidae	
Agriocnemis femina	FC W
Ceriagrion auranticum	C W
Ischnura senegalensis	C W
Platycnemididae	
Copera ciliata	C W
Anisoptera	
Libellulidae	
Brachydiplax chalybea	C W
Brachythemis contaminata	C W
Crocothemis servilia	C W
Tholymis tillarga	C W
Orthetrum glaucum	C W
Orthetrum pruinosum	C W
Orthetrum sabina	C W
Pantala flavescens	C W
Rhyothemis variegata	C W
Neurothemis tullia	C W
Neurothemis fulvia	C W
Trithemis aurora	C W

*C = common; W = widespread; FC = fairly common

Table M6 Reptiles and Amphibians Reported in the General Area of Kam Tin valley

Common name	Species	Hong Kong Status	Habitat	Recorded in this study
Asian Common Toad	*Bufo melanostictus*	common	F,W,G,Sh	✓
Paddy Frog	*Rana limnocharis**	common	F	✓
Chinese Bullfrog	*Rana rugulosa**	common	F	
Gunther's Frog	*Rana guentheri**	common	F,M,P,St	✓
Brown Tree Frog	*Polypedates leucomystax**	common	F,M,P	✓
Narrow-mouthed Frog	*Kalophrynus pleurostigma**	rare	M	✓
Asiatic Painted Frog	*Kaloula pulchra**	common	M	✓
Butler's Pigmy Frog	*Microhyla butleri**	uncommon	P	✓

Common name	Species	Hong Kong Status	Habitat	Recorded in this study
Ornate Pigmy Frog	*Microhyla ornata**	common	F,M	
Marbled Pigmy Frog	*Microhyla pulchra**	common	F	
Bowring's Gecko	*Hemidactylus bowringi*	common	V	
Chinese Gecko	*Gekko chinensis*	common	V	
Changeable Lizard	*Calotes versicolor*	common	Sh	✓
Reeves' Smooth Skink	*Scincella reevesii*	common	P	
Red-eared Terrapin	*Trachemys scripta elegans*	common	M	
Greater Green Snake	***Cyclophiops major***	**uncommon**	**Sh**	
Chinese Water Snake	*Enhydra chinensis*	common	St, M	
Plumbeous Water Snake	*Enhydra plumbea*	not available	F, St, P	✓
Chinese Cobra	*Naja naja*	common	F, M, W, G, St	
Indo-chinese Rat Snake	*Ptyas korros*	common	W	✓

Abbreviations: P=pond, Sh=shrubland, W=woodland, G=grassland, V=village, F=field, M=marsh, St=stream, *=breeding

Rare and uncommon species are shown in bold.

Table M7 Mammals recorded on or near the study area since 1993

Common Name	Binomial	Location	Source of data	Status
Great Roundleaf Bat	***Hipposideros armiger***	**Kam Tin valley**	**G. Ades (pers. comm.)**	**uncommon**
Lesser Bent-winged Bat	***Miniopterus pusillus***	**North Portal**	**G. Ades (pers. comm.)**	**rare**
Large Mouse-eared Bat	***Myotis chinensis***	**North Portal**	**G. Ades (pers. comm.)**	**rare**
Eastern Daubenton's Bat	***Myotis daubentonii***	**North Portal**	**G. Ades (pers. comm.)**	**rare**
Rickett's Big-footed Bat	*Myotis ricketti*	North Portal	G. Ades (pers. comm.)	common
Noctule Bat	***Nyctalus noctula***	**Kam Tin village**	**Babtie (1996)**	**rare**
Japanese Pipistrelle	*Pipistrellus abramus*	Route 3	FFM, 1993a	common
Rufous Horseshoe Bat	*Rhinolophus rouxi*	North Portal	G. Ades (pers. comm.)	common
Leschenault's Rousette Bat	***Rousettus leschenaulti***	**Route 3**	**FFM, 1993a**	**rare**
Javan Mongoose	*Herpestes javanicus*	West Rail, Route 3	this study, and FFM, 1993a	common
Small Indian Civet	*Viverricula indica*	West Rail, Route 3	this study, and FFM, 1993a	common
Wild Boar	*Sus scrofa*	Route 3	FFM, 1993a	common
Barking Deer	*Muntiacus reevesi*	West Rail, Route 3	this study, and FFM, 1993a	common
Pangolin	***Manis pentadactyla***	**Route 3**	**FFM, 1993a**	**rare**
Styan's Squirrel	*Callosciurus erythraeus*	West Rail	this study	introduced

Rare and uncommon species are shown in bold.

Annex N

Earthwork Schedules for the West Rail Development

Annex O

Focused EIA on the Reprovisioned Pond Fish Wholesale Market in Yuen Long

CONTENTS:

1 INTRODUCTION

This report presents the findings of a Focused Environmental Impact Assessment(EIA) for the construction and operation of a reprovisioned Pond Fish Wholesale Market in Yuen Long East Extension. The study was carried out by ERM Hong Kong on behalf of the Kowloon-Canton Railway Corporation (KCRC) as part of the West Rail Environmental Impact Assessment Study.

The EIA assesses the feasibility of the construction and operation of the project from an environmental standpoint, identifies any likely environmental issues and details mitigation measures as may be required.

1.1 PROJECT DESCRIPTION

The proposed development is for the reprovisioning of the Pond Fish Wholesale Market currently situated adjacent to Wang Yip Street South and at the south western corner of Tung Tau Industrial Area in Yuen Long Town, as this land is to be resumed for the West Rail Project. The market is to be reprovisioned as a duel-storey covered fish trading market on a reserved site of approximately 6000m^2 in Area 12 of the Yuen Long Town East Extension, as shown in *Figures 1.1a* and *1.1b*. It is proposed that the market will be occupied during 1999.

A Drainage Services Department (DSD) drainage channel which currently runs from east to west in the middle of the site will require relocating to the northern boundary of the site. This has been agreed with DSD and the design of the new channel will meet DSD specifications.

The proposed development will provide the following facilities :

- Covered trading area of buyers' walk-in single-storey simple sheds with elegant economic structural forms;
- Loading and unloading bays; and
- Trade offices, public toilets, refuse collection points;

1.2 STRUCTURE OF THE REPORT

The remainder of this report is structured as follows:

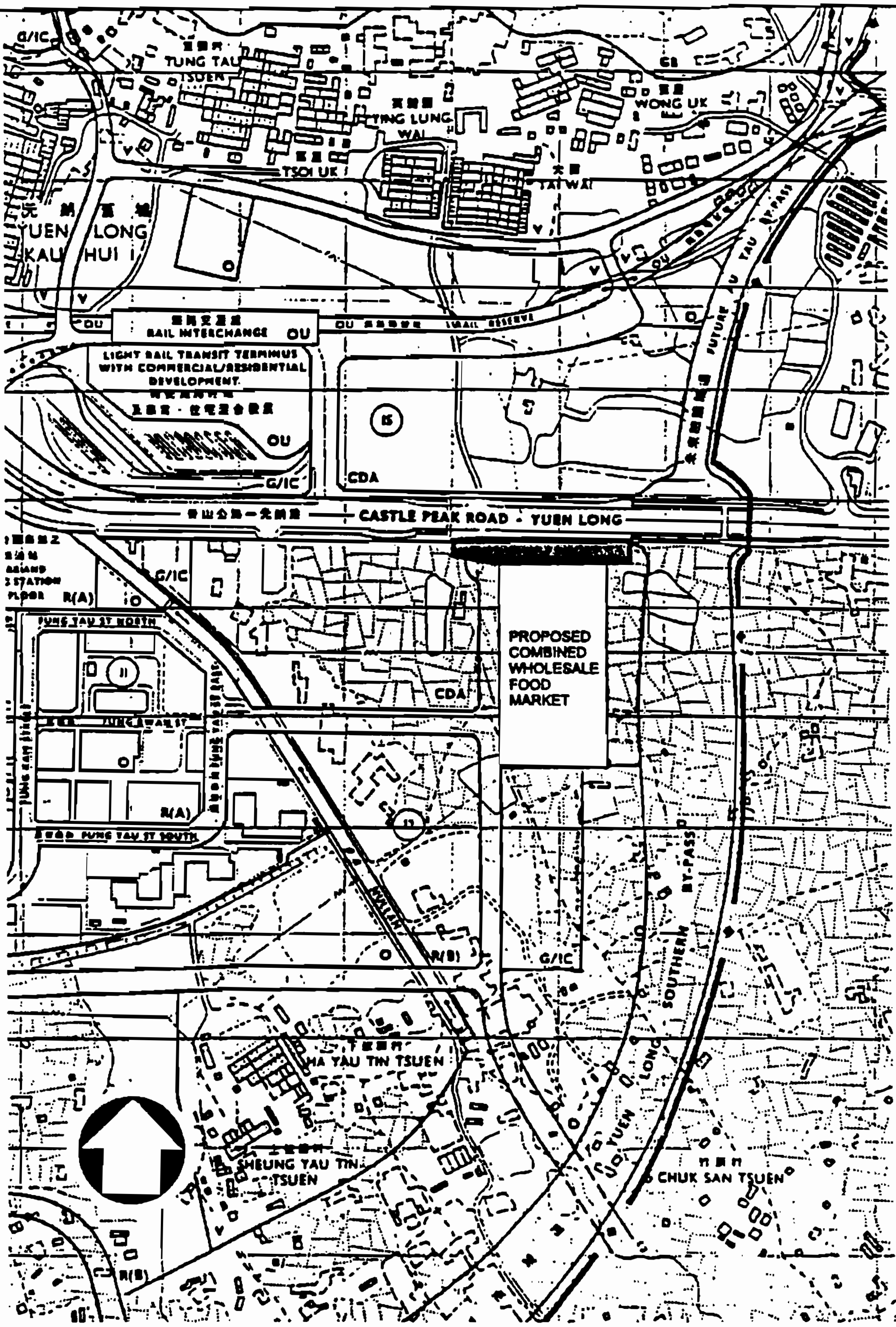
- *Section* 2 provides information on the environment surrounding the proposed site;
- *Section* 3 identifies potential environmental impacts associated with the reprovisioning of the Pond Fish Wholesale Market ;
- *Section 4* presents the noise impact assessment of the reprovisioned market;
- *Section 5* presents the air quality impact assessment of the reprovisioned market;

- *Section 6* presents the water quality impact assessment of the reprovisioned market;

- *Section 7* presents the waste management implication of the reprovisioned market;

- *Section 8* provides recommendation on environmental consideration and mitigation measures to be undertaken during the construction and operation of the reprovisioned market;

- *Section 9* presents the conclusions of the focused EIA of the reprovisioning of the Pond Fish Wholesale Market



KEY

PROPOSED POND FISH WHOLESALE MARKET SITE

NOT TO SCALE

LOCATION PLAN OF THE REPROVISIONED YUEN LONG POND FISH WHOLESALE MARKET

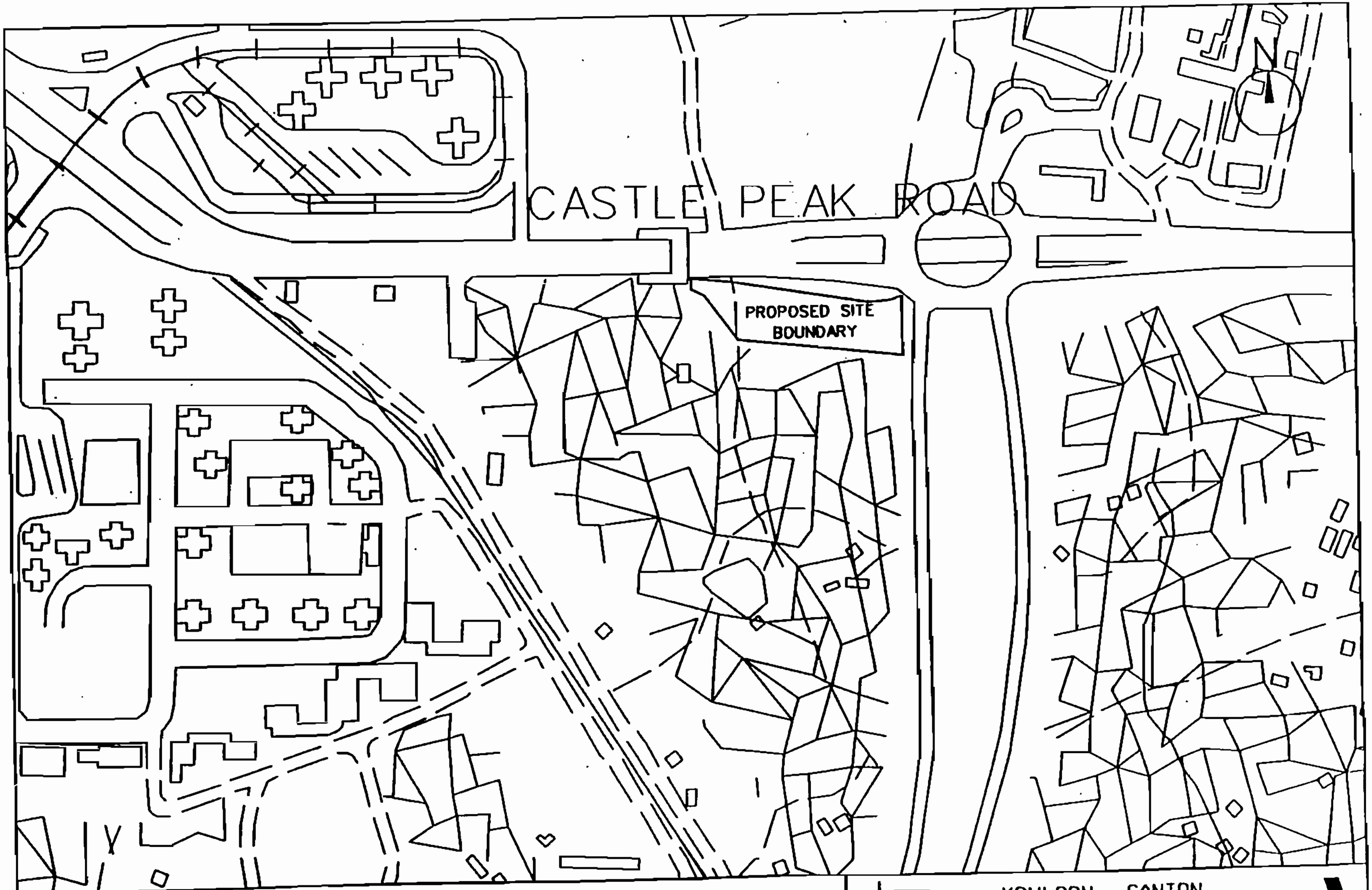
FIGURE 1.1a

Contract/C1566/C1566_69

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



LOCATION PLAN OF THE REPROVISIONED YUEN LONG POND FISH WHOLESALE MARKET

SCALE: 1/4,000

FIGURE 1.1b

BRM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

2 SURROUNDING ENVIRONMENT

2.1 THE PROPOSED SITE

This section describes the surrounding environment and prevailing ambient conditions of the proposed site.

The proposed Yuen Long Pond Fish Wholesale Market is to be located on a reserved site in Area 12 of the Yuen Long Town East Extension (as shown in *Figures 1.1a* and *1.1b*). The site currently comprises roadside vegetation and a Drainage Services Department (DSD) drainage reserve channel and access road.

The site is bounded to the south by private farmland on which the reprovisioned Yuen Long Temporary Combined Wholesale Food Market is due to be sited, and to the west by zoned Comprehensive Development Area (CDA) where a residential development is proposed. To the northern and eastern sides of the site are major distributor roads with private farmland, small villages and residential uses, light rail system and CDA area beyond.

2.2 CURRENT AMBIENT CONDITIONS

The current major sources of environmental impacts in the vicinity of the site are traffic noise and traffic emissions from Yuen Long Southern By-pass to the east and Castle Peak Road to the north. The annual averaged daily traffic on Castle Peak Road in 1994 was 66600 vehicles. Since it is a rural trunk road with high traffic loading, high noise levels at the proposed development are expected.

It is considered that the future use of the CDA sites to the north and west, will not affect the proposed market site.

Background noise levels close to the site boundary were measured during several noise monitoring sessions carried out on 15 January 1998 at mid-day and on 19 January 1998 at 0700. The measurement location was approximately 10 m from the Pok Oi Interchange which connects Castle Peak Road with Yuen Long Southern By-pass. Another background noise sample was also taken between 0645 and 0700 at the northwest corner of the site, adjacent to the CDA. A sample time of 15 minutes was used for all background noise samples. The results are shown in *Table 2.2a* below.

Traffic from the two roads was the dominant noise source, producing a very high ambient noise level during all sessions. Various other construction projects were noted in the vicinity, but no activities were ongoing during the background measurement. Noise levels would have been considerably higher had works been active at the time.

Table 2.2a *Noise Survey Results (in dB(A))*

Location	Date/Time	L_{max}	L_{min}	L_{10}	L_{90}	L_{eq}
Northeast site boundary (approximately 10 m from roads)	15/1/98 (1200-1215)	97	76	88	81	85
Northeast site boundary (approximately 10 m from roads)	19/1/98 (0700-0715)	94	73	86	78	83
Northwest site boundary (approximately 10m from Castle Peak Road)	19/1/98 (0645-0700)	98	75	88	80	85

The closest sensitive receivers, at present, are located to the west of the site and comprise residential buildings along Fung Yau Street East (approximately 275 m from the site boundary), Kei Yuen College (approximately 190 m from the site boundary) which is next to the existing nullah and Sun Yuen Long Centre (approximately 200 m from the site boundary).

3 POTENTIAL ENVIRONMENTAL IMPACTS

This section identifies potential environmental issues associated with the construction and operation of the Yuen Long Pond Fish Wholesale Market.

3.1 SCOPING OF LIKELY ISSUES

Table 3.1a is a checklist prepared with reference to observations during site visits, site map drawings and survey maps. The checklist helps to identify potential sources of environmental impacts during the construction and operation of the proposed development.

Table 3.1a *Potential Environmental Issues*

Type of potential impact	Construction Phase	Operation Phase
Gaseous emissions	✗	✓
Dust	✓	✗
Odour	✗	✓
Noisy operation	✓	✓
Night-time operation	✗	✓ (1)
Traffic generation	✓	✓
Liquid effluent, discharges, or contaminated run-off	✓	✓
Generation of waste or by-products	✓	✓
Storage, handling, transport, or disposal of hazardous materials or wastes	✗	✗
Risk of accidents which would result in pollution or hazard	✗	✗
Disposal of spoil material including potentially contaminated soils and material	✗	✗
Disruption of water movement	✗	✗
Ecological disruption	✗	✗
Historic/cultural impacts	✗	✗
Unsightly visual appearance	✓	✗

✓ possible ✗ not expected (1) Early morning deliveries between 0600 and 0700 will fall within night-time noise criteria

Conflict of land use between the proposed site and the adjoining surrounding regions was also reviewed and is not expected to be an issue.

3.2 CONSTRUCTION PHASE

Impacts due to dust, noise, run-off and waste may result during the construction phase of the development, leading to adverse environmental impacts on the occupants of residential buildings and educational establishments in the vicinity. Due to the uncertainty of construction phasing for the planned land uses in the surrounding area, cumulative impacts during the construction phase cannot be predicted at this stage of study. It is, however, expected that there would be some level of cumulative impact if construction at the adjacent CDA area is concurrent with the Pond Fish Market works.

The severity of any noise impacts is related to the adopted construction methods, the type of powered mechanical equipment used and the duration of any noisy activities such as excavation and piling. Nearby Sensitive Receivers may also be affected by construction dust. Dust impacts will depend on the prevailing weather conditions and also the mode of construction. Sensitive Receivers to the western side of the proposed site are most susceptible to impacts from construction dust and noise. Typical construction activities are expected and, with suitable mitigation measures, these should not cause any impact.

As there are no existing buildings or large infrastructure on the proposed site, impacts from demolition waste will be minimal. A small amount of waste may result from the relocation of the DSD drainage channel from the centre of the site to the northern boundary but this will not cause any significant impact.

Construction of the market will generate construction waste, and small amounts of excavated materials arising primarily from the construction of the foundations are anticipated. The environmental impacts arising from construction wastes are expected to be minimal and will not be a key issue.

Any hazardous materials used during construction, including paints, glues, diesel fuel, pressurised gas cylinders may need to be specially stored, handled, transported and disposed of depending on the quantity utilized, as specified in *Dangerous Goods (General Regulations).*

Other minor issues that might arise from the construction of the proposed development include silty run-off from the site and increased vehicle emissions from construction equipment and haultrucks. Traffic resulting from construction of the proposed development is expected to be low, and should not pose extra traffic loading on the existing roadways or other environmental issues. With proper management of site activities and with best practical measures, these impacts can be controlled to within acceptable levels. Unsightly views of the site during construction may exist temporarily and could be ameliorated with tidy site hoardings.

Assessments of noise and air quality issues during the construction phase have been carried out and are discussed in *Sections 4* and *5* respectively.

3.3 *OPERATION PHASE*

The likely impacts associated with the operation of the proposed development have been evaluated with reference to the *Hong Kong Planning Standards and Guidelines* (HKPSG), which provides guidance on environmental considerations for land use planning and new development. Guidelines applicable to this project have been extracted from the HKPSG and are presented in *Table 3.3a*.

The Pond Fish Wholesale Market is likely to be a source of environmental impacts on the surroundings. According to the HKPSG, the development has potential to cause the generation of gaseous emissions, noise emission during the night-time as well as daytime, liquid effluent, generation of waste and odour.

Table 3.3a *Relevant HKPSG's Environmental Guidelines*

General environmental guidelines (air aspect) for governmental, institutional, community (GIC) uses	• For sensitive GIC uses such as schools and hospitals etc. avoid locating developments in existing pollution black spots or sites that are subject to direct impingement of air discharge plumes. • For potentially polluting GIC uses such as markets and refuse collection points etc. provide adequate buffering against sensitive uses and ensure that the site layout does not restrict local air circulation.
General environmental guidelines (noise aspect) for GIC uses	• For noise generating activities, ensure that there is no direct line-of-sight to noise sources from noise sensitive uses and that adequate buffering and screening are provided. • Make full use of noise tolerant GIC uses such as multi-storey car parks and markets etc. as screening structures.
General environmental guidelines (water and waste aspects) for GIC uses	• Ensure adequate provision of suitable land and vehicular access for refuse transfer stations, barge loading areas and refuse collection points. • For GIC uses with special requirements for waste disposal, ensure adequate provision of suitable land and access for collection, treatment and transportation of liquid and solid wastes and provide adequate buffer zone to minimise nuisance.
Guidelines for Community Facilities with Special Requirements for Waste Disposal (Markets and Cooked Food Stalls)	• Wastes produces by these facilities are highly putrescible and adequate refuse storage area should be provided and located so as to minimise potential nuisance to the public and people living and working nearby.
Road traffic noise criteria $L_{10, 1hour}$	• Offices : 70 dB(A) at 1 metre away from noise sensitive receiver's façade.

Traffic impacts generated by the proposed development on the surrounding highways may be a potential problem and a separate assessment is recommended to evaluate this from a highway standpoint. Both light and heavy goods vehicles are likely to be used for transportation and delivery, and could cause noise nuisance at sensitive receivers. Noise from market activities during normal trading hours could also cause impacts on the Nearby Sensitive Receivers, though this is expected to be minimal in view of the distance between the development and sensitive receivers.

Air and odour impacts are not envisaged to be a problem if the mitigation measures recommended in *Section 5* are effectively implemented.

The potential sources of waste impact will comprise mostly of fish waste parts and general refuse though the amount will be minimal. Control measures should be in compliance with the Hong Kong Government Waste Disposal

Ordinance. Poor waste control techniques are likely to result in severe odorous emissions due to the rapid putrescibility of fish material in warm weather, and therefore waste control should be well managed.

Assessments of noise, air quality, water and waste are detailed in *Sections 4, 5, 6* and *7* of this document.

4 NOISE IMPACT ASSESSMENT

4.1 INTRODUCTION

This section discusses the potential noise impacts associated with the proposed development during the construction and operation phases.

Construction noise impacts may be generated by powered mechanical plant employed on site and from traffic generated by the construction activities.

In the operational phase, noise from on site market activities during normal trading hours could impose noise impacts on nearby sensitive uses, particularly as the market will open prior to 0700 and as such will be considered to be governed by nighttime noise criteria established in the *Noise Control Ordinance(NCO)*. Traffic noise generated from Castle Peak Road and Yuen Long Southern By-pass could also create noise impacts on any offices proposed within the market. The impacts from each of these noise sources have been assessed at the façades of the nearest noise sensitive receivers (NSRs); where necessary, environmental considerations and mitigation measures are recommended in *Section 8*.

4.2 ENVIRONMENTAL LEGISLATION AND GUIDELINES

Construction Noise

It is anticipated that the construction works will be undertaken between 0700 - 1900. There are currently no legislative standards in Hong Kong for the control of construction activities during normal working hours. Hence, a limit of $L_{Aeq, 30min}$ 75 dB(A) is proposed in accordance with the *"Practice Note for Professional Persons, PN2/93"* issued by the Professional Persons Environmental Consultative Committee (ProPECC) in June 1993 for sensitive receivers at residential uses. For schools and educational institutions, a limit of $L_{Aeq, 30min}$ 70 dB(A) and 65 dB(A) are proposed during normal school hours and examination period respectively.

These limits have been applied on a wide range construction projects, and are now generally accepted in Hong Kong. Therefore, they will be adopted in this study in order to protect NSRs to an appropriate extent.

Traffic Noise

According to the HKPSG, the traffic noise ($L_{10\ 1\ hour}$) should be limited to 70 dB(A) at the sensitive façades of nearby receivers and any offices within the market.

Market Noise

Noise generated from the premises of the fish market, affecting off-site NSRs, can be considered as a fixed noise source since the noise is emanating from a fixed position within the site boundary. According to HKPSG, noise assessments on fixed noise sources will normally be conducted with reference to the *Technical Memorandum* (TM) *For The Assessment of Noise From Places Other Than Domestic Premises, Public Places Or Construction Sites*, published under the *Noise Control Ordinance* (NCO).

All fixed noise sources should be located so that the level of intruding noise at the façade of the nearest sensitive uses should be at least 5 dB(A) lower than the appropriate Acceptable Noise Level (ANL) stated in the TM. In cases where the background noise level is more than 5 dB(A) lower than the ANL, the noise level at NSRs should not be higher than the background. The surrounding area can be characterised as urban fringe and is to a reasonable extent directly affected by Influencing Factors (Castle Peak Road and Yuen Long Southern By-pass), giving an Area Sensitivity Rating (ASR) for the individual NSRs of B or C according to the TM.

Thus, the ANL in daytime and evening periods (0700 - 2300) is 65 or 70 dB(A), for ASR 'B' or 'C' respectively and in the night-time period (2300 - 0700) is 55 or 60 dB(A). Therefore, the noise levels at the façade location of NSRs during daytime and evening should be limited to 60/65 dB(A) and 50/55 dB(A) at night. Early morning operation of the market is envisaged and, therefore, the night-time criterion will apply.

4.3 CONSTRUCTION NOISE

Since there is no detailed information concerning the construction activities at this stage of the study, a simple assessment has been carried out to back-calculate the recommended total sound power level (SWL) for the construction plant on the proposed site given the distance from noise source to NSR and the recommended daytime construction noise limits.

Sun Yuen Long Centre and Kei Yuen College will potentially be impacted by construction noise from the site. It was predicted that the recommended total SWL should not exceed 120 dB(A) due to the proximity to the NSRs, especially during normal school hours. In examination period, the total SWL should be restricted to 115 dB(A).

Powered mechanical equipment with a total SWL higher than 120 dB(A) should be avoided. Plant with a total SWL higher than 115 dB(A) should not be used during examination periods. Certain mitigation measures which can also be employed to further reduce the noise impacts, are detailed in *Section 8*.

4.4 OPERATIONAL NOISE

4.4.1 *Traffic Noise*

During the operational phase, traffic accessing proposed development has the potential to cause an impact alongside the highways network. The traffic flow on the planned Road 6/L6 would also share loading with traffic to the Yuen Long Temporary Wholesale Market and therefore would increase traffic loading on the planned road network, particularly during the early morning period when new stock will be delivered to both the markets.

In view of the high background noise levels at the proposed site it is expected that the dominant noise source in the area will continue to be from traffic on Castle Peak Road and Yuen Long Southern By-pass.

Since any noise generated off site is not controllable under the *Noise Control Ordinance* or could be assessed by the HKPSG, quantification of this source has not been undertaken. With regard to noise impacts from Yuen Long Southern By-pass and Castle Peak Road it is recommended that office windows in the market do not face these highways, or noise insulation is provided to meet the HKPSG requirements.

4.4.2 *Market Noise*

A market noise survey was conducted in January 1996 as part of the study undertaken for the reprovisioning of the Yuen Long Temporary Wholesale Market and investigated the noise issues arising from trading activities. Existing wholesale market activities in Yuen Long district are mostly concentrated along Kin Tak Street and Hop Choi Street and a 30 minute noise measurement at this market site was taken (5 m away and 1.5 m above ground). *Table 4.4a* presents the survey results during the normal trading period.

Table 4.4a *Market Noise Survey Results (dB(A))*

Location	L_{max}	L_{min}	L_{10}	L_{90}	L_{eq}	Remark
5 m from Hop Choi Street measured at 1.5 m above ground level	87	66	75	69	73	noise from market activities and trading are dominant

It is expected the market activities in the proposed development would be slightly larger in scale than the existing situation. However, as market activities are confined within a duel-storey covered trading area, noise will be screened by the envelope of the building. No unacceptable noise levels with regard to NCO or HKPSG criteria are therefore expected at NSRs.

4.4.3 *Loading and Unloading Activities*

A vehicle delivery noise survey was conducted at the current Yuen Long Pond Fish Wholesale Market between 0605 and 0635 on 19 January 1998, the time when highest vehicle numbers visit the market. The measurement location was situated approximately 5m from the main unloading bay of the market. Results are shown below in *Table 4.4b.*

Table 4.4b *Noise Levels at Market Loading/Unloading Bay*

Location	L_{max}	L_{min}	L_{10}	L_{90}	L_{eq}
5m from unloading bay at current Yuen Long Pond Fish Wholesale Market	104	74	87	77	84

During the 30 minute monitoring period, 11 medium and 2 small size trucks delivered to the market, while 7 medium size trucks departed from the market. The dominant noise sources were the vehicular activities and the generators mounted on the trucks for aeration of the fish tanks on board. The generators were left running continually while fish were being unloaded.

A preliminary evaluation of the maximum likely noise impact has been carried out based on noise measurements of vehicular activities within the loading and unloading bay of the current Pond Fish Wholesale Market in Yuen Long.

It is assumed that the activities within the loading/unloading bay of the proposed market will be similar to those within the existing market, therefore the noise generated by these activities can also be expected to be similar.

The noise levels generated by vehicular activities have been estimated to be approximately 84dB(A) Leq at the boundary of the CDA site which is at its closest at the northeasternmost region the proposed market; this is representative of the nearest possible planned NSR.

The market will be in operation from 0600 and it is anticipated that the majority of vehicular unloading will take place between 0600 and 0700. During this period noise levels are likely to exceed night-time NCO based criterion noise level by up to 35dB, therefore mitigation measures are unlikely to be effective in attenuating this level to within NCO guidelines save full enclosure of the unloading area.

A site survey was conducted on 19 January 1998 during which the existing noise levels at the CDA site were monitored. The results are presented in *Table 4.4c* and indicate that the site is currently exposed to road traffic noise levels which alone, exceed the recommended HKPSG criterion of 70 dB L_{A10} by up to 14 dB(A). Therefore any residential development within this site is likely to require mitigation measures in order to prevent traffic noise impacts.

Table 4.4c *Existing Road Traffic Noise (dB(A)) - 0645-0700*

Location	L_{max}	L_{min}	L_{10}	L_{90}	L_{eq}	Remark
5m from boundary of proposed site, adjacent to CDA.	98	75	88	80	85	traffic noise from Castle Peak Road dominant.

The setback necessary to ensure compliance with the HKPSG criterion has been calculated assuming a 90° angle of view and a maximum barrier attenuation at higher level properties of 10 dB(A) and is approximately 140m (from the centre of the road) [(1)]. Alternatively, screening measures and noise insulation may be proposed by the developer.

At a set back distance of 140m, noise levels from the Pond Fish Market would be approximately $L_{eq(30\ minutes)}$ 59dB(A) and in exceedance of the night-time criteria. In order to achieve a reduction of 9dB to ensure compliance with the night-time NCO criteria, the unloading area could be located to the east side of the site, thus increasing the distance to any NSR in the CDA by approximately 100 metres and reducing noise levels from vehicles accessing the market to below night-time NCO criteria, at the facade of any NSR.

Alternatively, assuming no noise mitigation or set back at the CDA site the unloading bay area could remain at the west of the market site if its design incorporates a fully enclosed area, within which vehicles can carry out loading and unloading operations. The market building shall be a complete structure with either no openings or insulated openings along the western side. An insertion loss of 35dB(A) will be required for the building envelope containing the unloading area and is achievable with concrete, masonry or insulated lightweight cladding materials. No residual impacts are expected with such an

(1) In line with the HKPSG broad guidelines of separations Required between Various Types of Roads and Residential Developments.

enclosure.

Any recommended enclosure structure or other mitigation measures will need to take into account the design specification of the reprovisioned DSD drainage channel.

There shall be sufficient on-site road space and loading/unloading bay area provided to accommodate the peak throughput of delivery vehicles to and from the market (this has been taken to be approximately 40 vehicles per hour, as extrapolated from the vehicle count conducted at the existing Pond Fish Wholesale Market on 19 January 1998). Additionally, this area shall be screened or fully enclosed to ensure noise from the vehicles, including compressors for the aeration units, and other activities will not exceed the NCO criteria at nearby Noise Sensitive Receivers.

In order to minimise any potential off-site noise impact, the possibility of an alternative route providing access from the south, adjacent to Yuen Long Southern By-pass, connecting to a loading/unloading bay area at the east of the site should be explored. This proposal, if adopted, would further reduce any traffic noise, as this will increase the distance to any NSR in the CDA by approximately 100m.

However, this access does not form part of the current proposal and relies upon land being made available outside of the eastern boundary of the Combined Wholesale Food Market, adjacent to Yuen Long Southern By-pass. The Agricultural and Fisheries Department shall be consulted regarding the use of this alternative access road by Pond Fish Wholesale Market traffic, if this were to compromise the operation of the Combined Wholesale Food Market.

5 AIR QUALITY IMPACT ASSESSMENT

5.1 INTRODUCTION

This section discusses the air quality impacts associated with the proposed development during construction and operational phases. Air quality impacts can be categorised into the following :

- Dust impact during the construction period at nearby residential buildings and schools;
- Vehicular emissions from the nearby roadways creating air quality impacts on air sensitive receivers(ASR) ; and
- Vehicular emissions from lorries and vans in the loading and unloading bays of the market and any associated delivery vehicle queues which may form during the early morning peak.

Air quality impacts from each of these are assessed at the nearest ASRs and mitigation measures are recommended where required.

5.2 ENVIRONMENTAL LEGISLATION AND GUIDELINES

The principal legislation for the management of air quality is the *Air Pollution Control Ordinance* (APCO) (Cap 311). The whole of the Hong Kong SAR is covered by the *Hong Kong Air Quality Objectives* (HKAQOs) which stipulate the statutory limits of some typical air pollutants and the maximum allowable numbers of exceedance over specific periods. The HKAQOs are shown in *Table 5.2a* below.

Table 5.2a ***Hong Kong Air Quality Objectives***

Pollutant	Concentration in micrograms per cubic metre (i) Averaging Time			
	1 Hour (ii)	8 Hours (iii)	24 Hours (iii)	1 Year (iv)
Total Suspended Particulates (TSP)			260	80
Respirable Suspended Particulates (v) (RSP)			180	55
Sulphur Dioxide (SO2)	800		350	80
Nitrogen Dioxide (NO_2)	300		150	80
Carbon Monoxide (CO)	30,000	10,000		

Note:
(i) Measured at 298°K (25°C) and 101.325 kPa (one atmosphere).
(ii) Not to be exceeded more than three times per year.
(iii) Not to be exceeded more than once per year.
(iv) Arithmetic means.
(v) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 micrometres and smaller.

In addition, the EPD recommends a maximum level of hourly TSP of 500 $\mu g\ m^{-3}$ at the boundary of any construction site.

5.3 *CONSTRUCTION PHASE*

Dust impacts on the nearby ASRs could be a major concern during the construction period. The likely air quality impacts arising from the construction of the development is related to fugitive dust emission and gaseous emissions from construction plant and vehicles. Construction dust is generated from excavation and earthworks, material handling and transfer, stockpiling and also vehicular movement on unpaved haul roads.

As details of the construction programme and activities are not available at this time, quantitative assessment is not possible. Judging from the scale of construction and the proximity to the ASRs, it is expected that the ASRs close to the site such as Sun Yuen Long Centre and Kei Yuen College will receive the highest dust impacts. By assuming that typical operations will be employed for the construction, it is considered that the dust impact on the nearby receivers will be minimal, if sufficient mitigation measures are implemented.

SO_2 and NO_2 will be emitted from the diesel-powered equipment used. Since the number of plant required will be small, gaseous emissions will be limited. It is therefore not expected to cause any exceedance of the HKAQOs.

Mitigation measures required to protect the closest ASRs are recommended in *Section 8*. The Contractor should ensure the environmental performance of the construction for the proposed development is within acceptable limits.

5.4 *OPERATIONAL PHASE*

Vehicular emissions from Castle Peak Road and Yuen Long Southern By-pass could potentially cause cumulative air quality impacts in the region of the proposed development. As they are rural trunk roads with heavy daily traffic, they are likely to be the dominant sources of vehicular emissions. The buffer distance between the site and both Castle Peak Road and Yuen Long Southern By-pass is less than five metres. It would be advised that the northern and eastern sides of the fish market are sealed to reduce traffic fume entry and accumulation inside the development.

It is recommended that all vehicles during loading and unloading operations should have their engines turned off, under suitable supervision and management of the market. In addition, adequate numbers of mechanical ventilation fans should be installed to improve local air movement in the market and dilute any accumulating pollutants.

With the provision of sufficient on-site road space and loading/unloading bay area within the market, no off-site queueing is anticipated. However, it is advised that idling vehicles turn their engines off so as not cause any unacceptable increases in pollutants.

The refuse collection point and storage area within the fish market is likely to be significant source of odour. It is recommended that the refuse collection point in the development should be located as far away as possible from the nearest odour sensitive receptors. The interior of the development should be equipped with ventilation fans to enhance air movement to avoid the accumulation of odour. The emission of odour that could cause an impact at Sensitive Receivers will be effectively mitigated through the implementation control measures proposed in *Section 8.2.1* and *8.2.5*.

In addition, it is suggested that air intakes for any air-conditioning systems be located on the western side of the site to avoid taking in vehicular exhaust fumes from Castle Peak Road and Yuen Long Southern By-pass area.

6 WATER QUALITY IMPACT ASSESSMENT

6.1 INTRODUCTION

This section discusses the potential noise impacts associated with the proposed development during the construction and operation phases.

6.2 CONSTRUCTION PHASE

During construction it is not anticipated that any significant quantity of water will be utilized, therefore no water quality impacts are expected.

6.3 OPERATIONAL PHASE

Wastewater will be generated during the market operation from three main sources, water that fish is transported/housed in, cleaning activities and toilet facilities. It is expected that wastewater will be discharged into the foul sewer network. The Yuen Long and Kam Tin Sewerage Masterplan Study (YL & KT SMP) indicates that the nearest existing public sewer is located to the immediate north of the proposed site along Castle Peak Road - Yuen Long with a capacity of 127 l s^{-1}.

The YL & KM SMP predicts the ultimate flow, based on available information on maximum development potential, in that section of the sewer to be 48 l s^{-1} approximately 38% of the capacity of the sewer. The volume of effluent discharged from the fish market is not expected to compromise the sewer capacity. The actual volume of effluent discharge from the proposed development will be governed by a discharge licence issued under the *Water Pollution Control Ordinance* (WPCO) which will prevent overloading of the public sewer.

The *Technical Memorandum - Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (TM), issued under the WPCO should be complied with for any effluent discharge. *Table 6.1a* shows the relevant standards stated in the TM for effluent discharged into foul sewers leading into Government sewage treatment plants. If these criteria cannot be achieved, on-site treatment facilities will need to be provided prior to discharge to control effluent to the TM standards. Options for on-site treatment are addressed in *Section 8*.

Table 6.1a ***Relevant Effluent Discharge Standards***

Parameter	Discharge Rate (≤10 m^3/day)	Discharge Rate (10 - 100 m^3/day)
pH	6-10	6-10
Suspended Solids	1200	1000
Biochemical Oxygen Demand	1200	1000
Chemical Oxygen Demand	3000	2500
Oil & Grease	100	100
Total Toxic Metals	10	10
Cyanide	2	2
Phenols	1	1
Total Phosphorus	200	200
Total Nitrogen	50	50

Note : All figures are the upper limit and in mg l^{-1}

The design of the drainage system should also take account of the *Practice Note for Professional Persons - Drainage Plans Subject to Comment by the Environmental Protection Department* (ProPECC PN 5/93).

7 WASTE MANAGEMENT IMPLICATIONS

7.1 GENERAL

This section identifies the nature of waste arisings at the proposed reprovisioned Pond Fish Wholesale Market and provides details of the recommended waste management control measures that should be employed at the site.

7.2 WASTE ARISINGS

The following wastes will be generated by activities at the wholesale market:

- Minimal amounts of fish waste; and
- General refuse.

As the market will predominantly be selling live fish, accumulated wastes may comprise a very small quantity of waste fish material, the waste water that fish have been transported and housed in and possibly a limited amount of packaging and wrapping materials.

Ancillary facilities which may include a food kiosk, management block and toilets will generate additional small amounts of waste including food waste, general office waste, and sewage waste.

The estimated volume of waste arisings will be a function of the number of individual stalls that are to be accommodated in the reprovisioned Pond Fish Wholesale Market. The relatively limited scale of waste arisings are such that, subject to the implementation and maintenance of waste management measures as recommended in *Section 8*, no unacceptable waste impacts will occur.

8.1 CONSTRUCTION PHASE

8.1.1 *Air Quality Impacts*

The civil engineering contractors should take effective measures to minimize the environmental impacts arising from the construction activities. Dust impact could be alleviated by good site practices. The following dust control measures should be incorporated in the Contract Specifications and implemented to minimise dust nuisance to acceptable levels.

- Dropping heights for excavated materials should be controlled to a practical height to minimize the fugitive dust arising from loading and unloading;
- During transportation by truck, materials should not be loaded to a level higher than the side and tail boards, and should be dampened or covered before transport off-site;
- Wheel washing facilities should be provided at the exit of work sites;
- All stockpiles of aggregate or spoil should be enclosed or covered with regular watering in dry or windy conditions; and
- Effective and regular watering should be implemented on the site at potential emission sources.

8.1.2 *Noise Impacts*

Construction noise can be minimized by the use of quiet construction methods and equipment. The contractor should meet the noise criteria at the nearest NSRs during 0700 - 1900, Monday to Saturday.

If construction work is necessary at other time periods, the Contractor will be required to meet the noise limits as stipulated in the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* in order to obtain a Construction Noise Permit. However, night-time construction activities are not recommended.

Good site practice and noise management should reduce the impact from the construction on nearby NSRs to acceptable levels. The following measures should be followed during each phase of construction :

- Only well-maintained plant should be operated on-site and plant should be serviced regularly according to the construction programme;
- Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction, should, where possible, be orientated so that the noise is directed away from nearby NSRs;

- Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction period;
- Mobile plant should be sited as far away from NSRs as possible; and
- Mobile noise barriers should be positioned within a few metres of noisy plant items such as breakers and excavators.

It should be noted that barriers may need to be used on more than one side of plant items. If so, the barriers should be lined with acoustic absorptive materials in order to reduce noise reflections from the opposite barriers.

Site hoardings, as recommended to ameliorate unsightly visual appearances, will also provide screening of works from low level NSRs.

8.2 OPERATIONAL PHASE

8.2.1 *Air Quality Impacts*

In order that odour problems are avoided, it is recommended that regular collection from the refuse collection point is undertaken, supported by high standards of general house-keeping within the market. Cleaning-up of the market should be implemented by the traders, under supervision, on a daily basis. Sufficient mechanical ventilation should be provided inside the development to provide effective air movement, ensure the dilution of odour and prevent the accumulation of vehicle exhaust fumes from the nearby roads.

Delivery vehicles should turn off their engines when loading or unloading or if queueing for access to loading/unloading bays.

The air intake of any air-conditioning system should be located at the western side of the site and exhaust to the eastern side in order to avoid taking in excessive fumes from vehicular exhaust.

8.2.2 *Noise Impacts*

Noise mitigation measures should be incorporated in the design of the proposed market in order to minimize any likely impacts. Sufficient on-site road space and loading/unloading bay area shall be provided to accomodate the peak throughput of delivery vehicles such that off-site queueing of vehicles can be eliminated.

The market structure should be designed with either no openings or insulated openings along the western façade to avoid noise impacts at the proposed CDA. Siting of the loading/unloading bay would be most environmentally acceptable at the east side of the site, in concert with an access road from the south.

It is recommended that the design of the cover and any boundary wall requirements be refined during the detailed design stage of the project. Additionally, the design of the market buildings should be optimised to ensure that levels of breakout noise do not exceed the criterion level. It would be the responsibility of the KCRC to ensure that the design will enable the criterion noise levels in respect of the NCO and the HKPSG be achieved.

It is expected that the traffic noise generated from the facilities will be small compared with the noise from Castle Peak Road and Yuen Long Southern By-pass and impose limited impacts on the nearby sensitive uses. In addition, noise from market activities would be screened out by the covering structure of the proposed development and to a certain extent by the Yuen Long Wholesale Market structure.

8.2.3 *Water Impacts*

It is important that appropriate measures are implemented to control run-off to thereby prevent high loading of Suspended Solids from entering the nearby reserve drainage system and other drainage systems in the vicinity. Proper site management can minimise surface run-off, soil erosion and sewage effluents so that all discharge complies with the WPCO. Also see *Site Drainage* in *Section 8.2.4*.

8.2.4 *Waste Impacts*

Site Cleaning

Daily supervised clean-up will be carried out by each of the stall holders. The public areas of the market and the lorry parking areas should be cleaned daily by a private cleaning contractor upon closing of the market. Any waste collected should be transferred to the refuse collection area.

Waste Handling, Storage, Collection and Disposal

Containers should be strategically located around the market to facilitate the collection of wastes. Stall holders should undertake the cleaning of waste from their stalls upon the close of the market by placing waste in these containers.

The containers should then be taken by the stall holders to the proposed refuse collection area. These larger containers of waste should be emptied daily by a Urban Services refuse collection vehicle and transported to a solid waste transfer station or landfill for disposal at the close of each market day.

The refuse collection area should be fully enclosed and comprise of a shed constructed with brick walls and a roof.

Site Drainage

Waste management measures should be taken to ensure that the site's waste is properly managed and that disposal of any solid materials, litter or wastes will not enter the drainage system untreated. The drainage design should incorporate the following recommended measures to prevent market debris from being washed into the drainage system:

- Interceptors should be installed as necessary to floor drains;
- Grating should be provided over the surface channels of an appropriate grate size;
- Installation of vertical grates, removable for easy cleaning, in the surface channels at a frequency of one grate for every six market stalls;

- Widening of the width of the surface channel at the point where the surface channel meets the outlet point;

- Fitting of a pyramid type grating above the outlet point with a hinged lid on it, together with vertical grates on either side of the pyramid trap;

- Installation of a removable sump bucket, under the pyramid grating, with drain holes; and

- The development of a simple independent drainage system design.

The drainage system should be cleaned at a regular frequency using gully suckers or other appropriate equipment to ensure that the performance of the system is effective in removing solid materials.

8.2.5 *Control Measures Checklist*

A control measures checklist has been produced to facilitate the Fish Wholesale Market Association's enforcement of reasonable mitigation measures during market operation.

Air quality/Odour

- Check that ventilation fans are well maintained and running efficiently to aid dispersion of any accumulated odours or traffic fumes within the market building.

Noise

- Ensure that delivery vehicle engines are turned off if queueing for access to the unloading bay; and

- Ensure that unloading takes place behind any barriers necessary for noise attenuation.

Water

- Visually check that waste effluent does not look contaminated or contain excessive amounts of solid. Note: Effluent discharges from the market shall follow the WPCO and TM criteria.

Waste

- Ensure that stored waste (general and fish material) does not create offence by either dust, leachate and odour emission or by unsightliness;

- Provide all market stalls with plastic bins for waste which have tight fitting lids and are vermin-proof;

- Ensure storage containers are readily manoeuvrable from the waste storage area to the collection vehicle;

- Any spillage of waste must be dealt with immediately;

- Check that market stalls are kept in a generally clean state and that they are cleaned down every night;

- Check that licensed waste hauliers are used for the collection of waste ;
- Ensure that waste is removed in a timely manner and that waste storage areas are cleaned regularly;
- Make sure that necessary waste disposal permits are obtained;
- Develop procedures, such as a ticketing system, to aid the tracking of loads, and ensure illegal disposal does not occur; and
- Maintain records of the quantities of wastes generated and disposed.

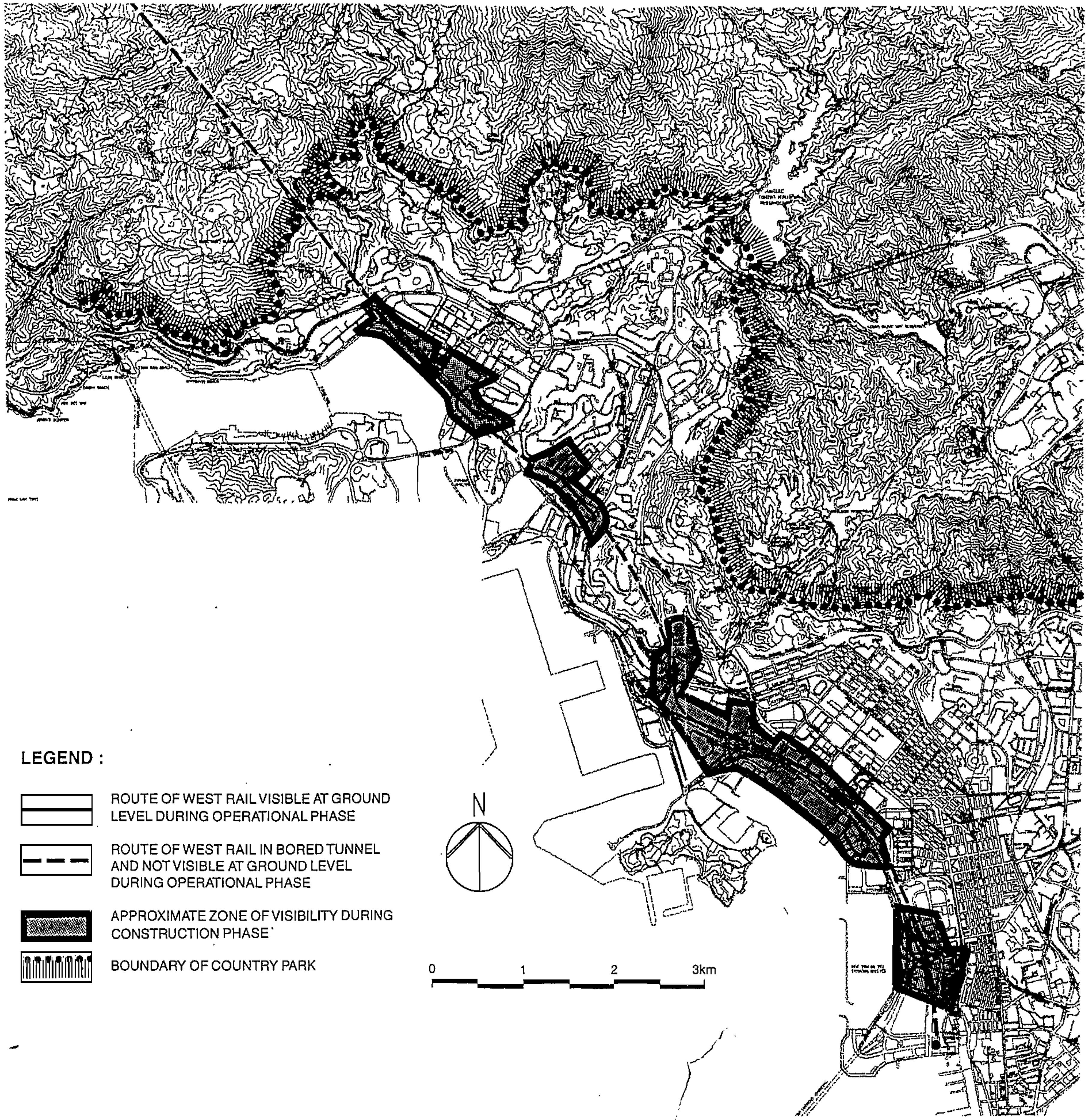


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FIGURE 5.6a
CENTRAL SECTION & SOUTHERN SECTION - ZONE OF VISIBILITY

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

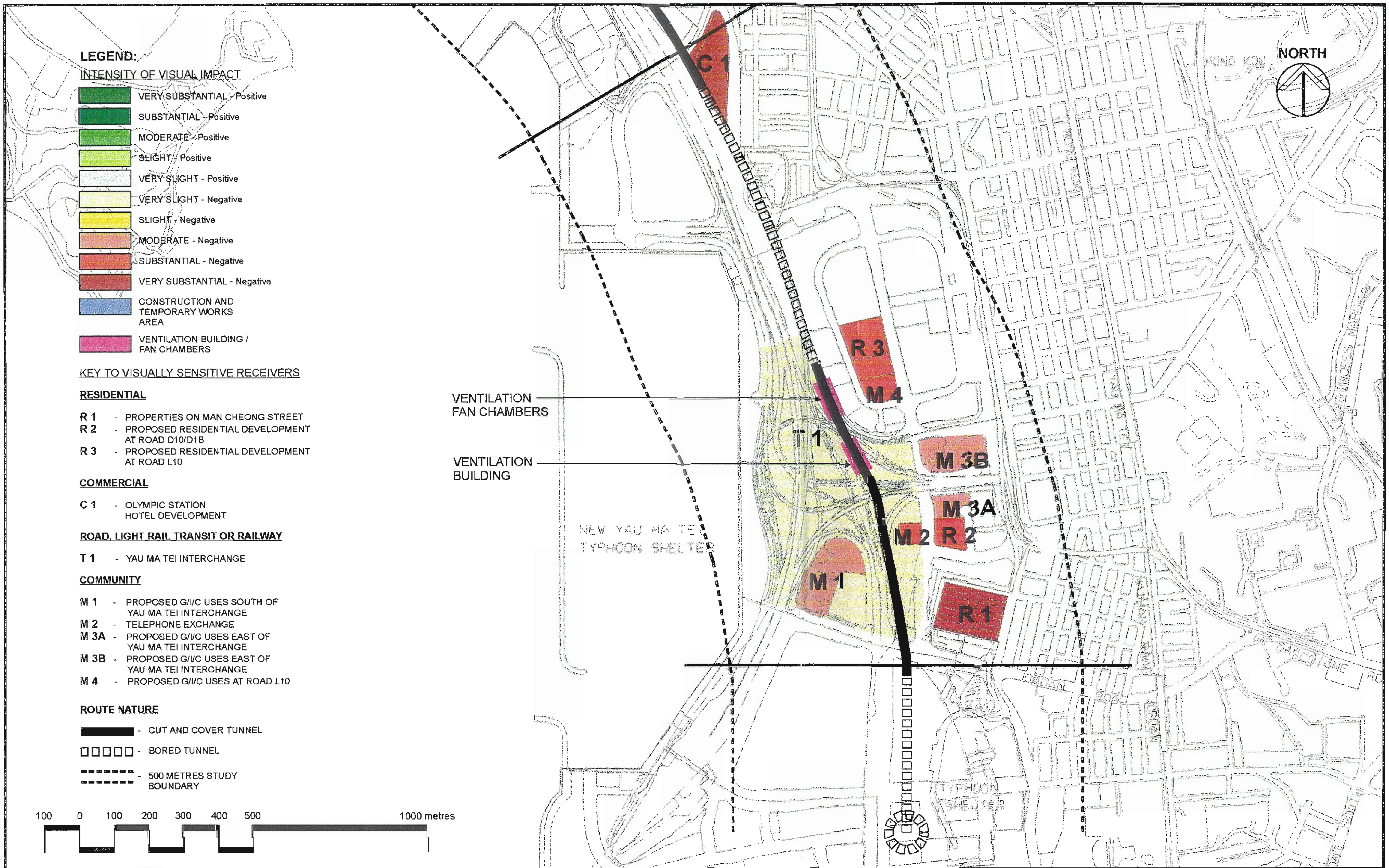

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FIGURE 5.6b
SOUTHERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 1 OF 2
WEST KOWLOON STATION TO TAI KOK TSUI

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

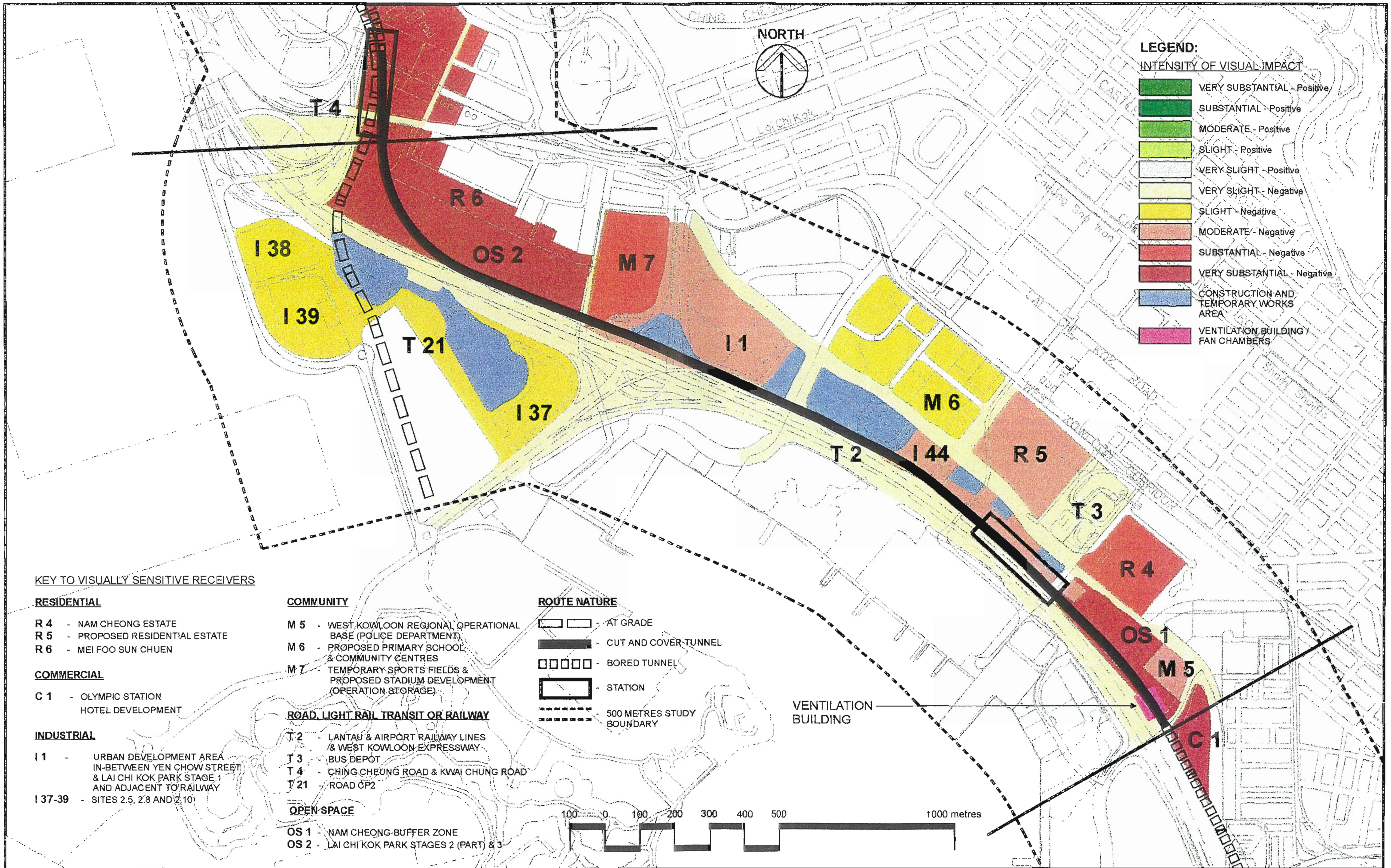

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FIGURE 5.6c
SOUTHERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 2 OF 2
TAI KOK TSUI TO MEI FOO STATION

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

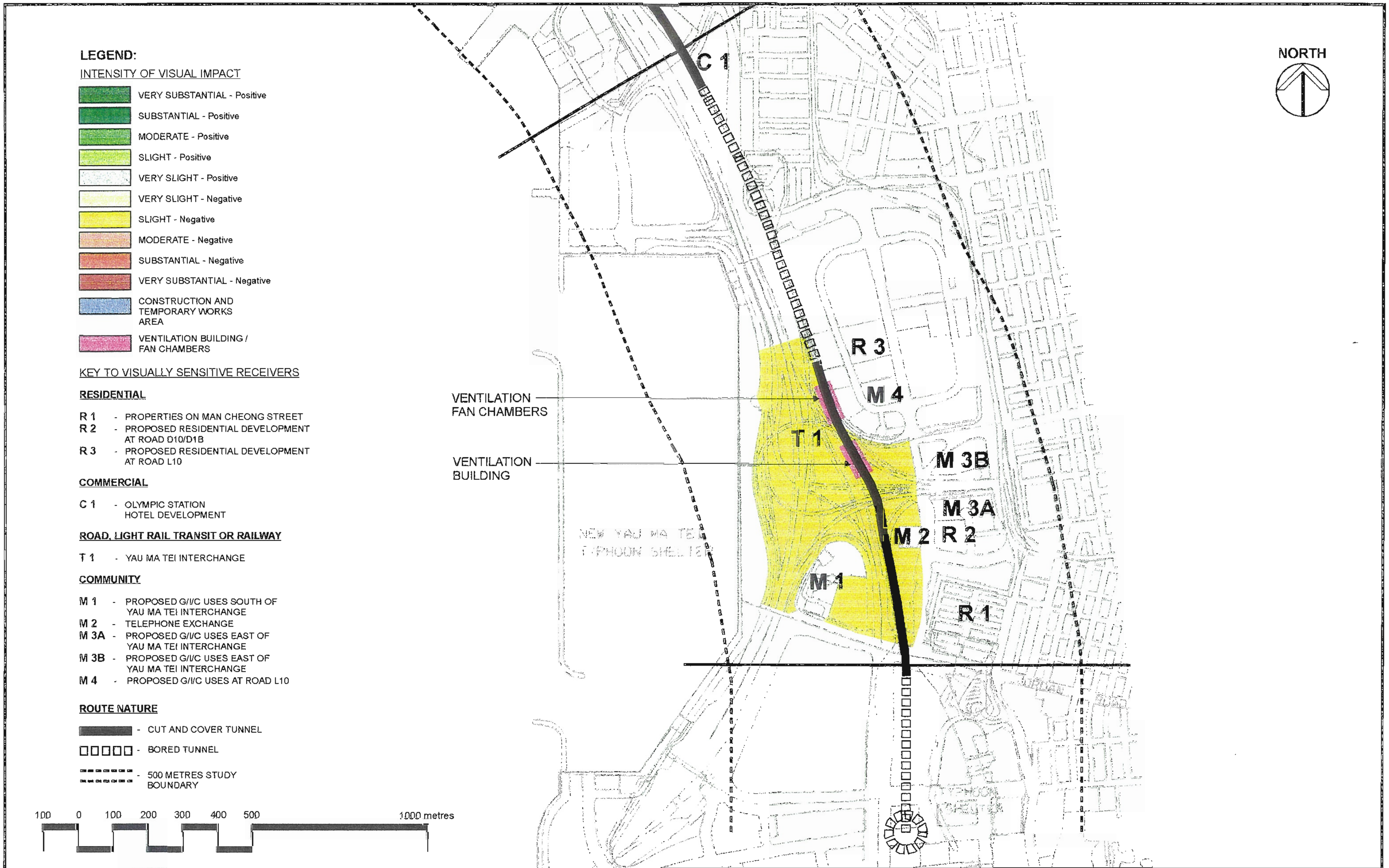

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FIGURE 5.6d

SOUTHERN SECTION

VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 1 OF 2

WEST KOWLOON STATION TO TAI KOK TSUI

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

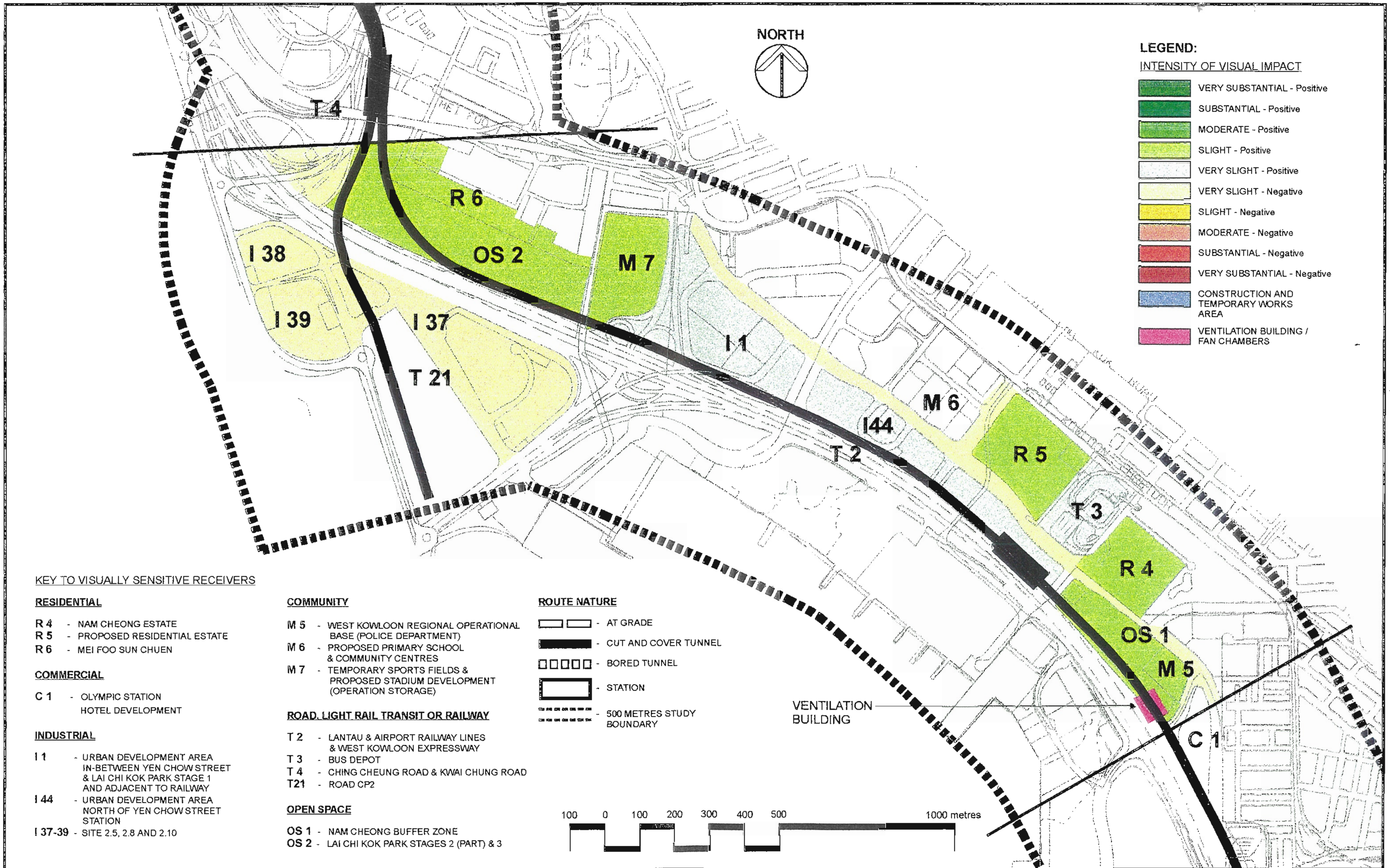

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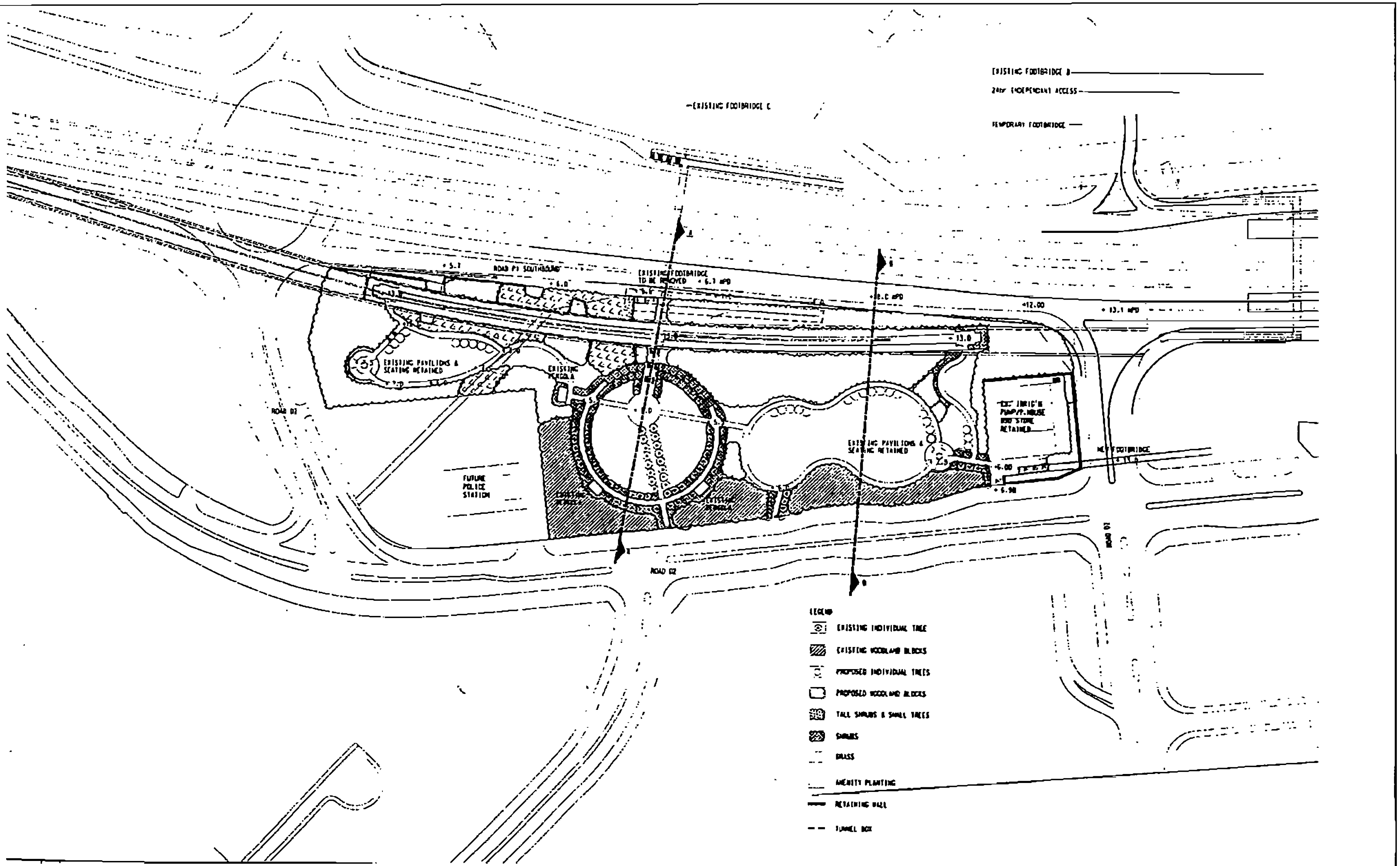
FIGURE 5.6e
SOUTHERN SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 2 OF 2
TAI KOK TSUI TO MEI FOO STATION

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY



PRELIMINARY NAM CHEONG BUFFER ZONE LANDSCAPE LAYOUT

FIGURE 5.6f

Contract/C1588/C1588Z36

ERM

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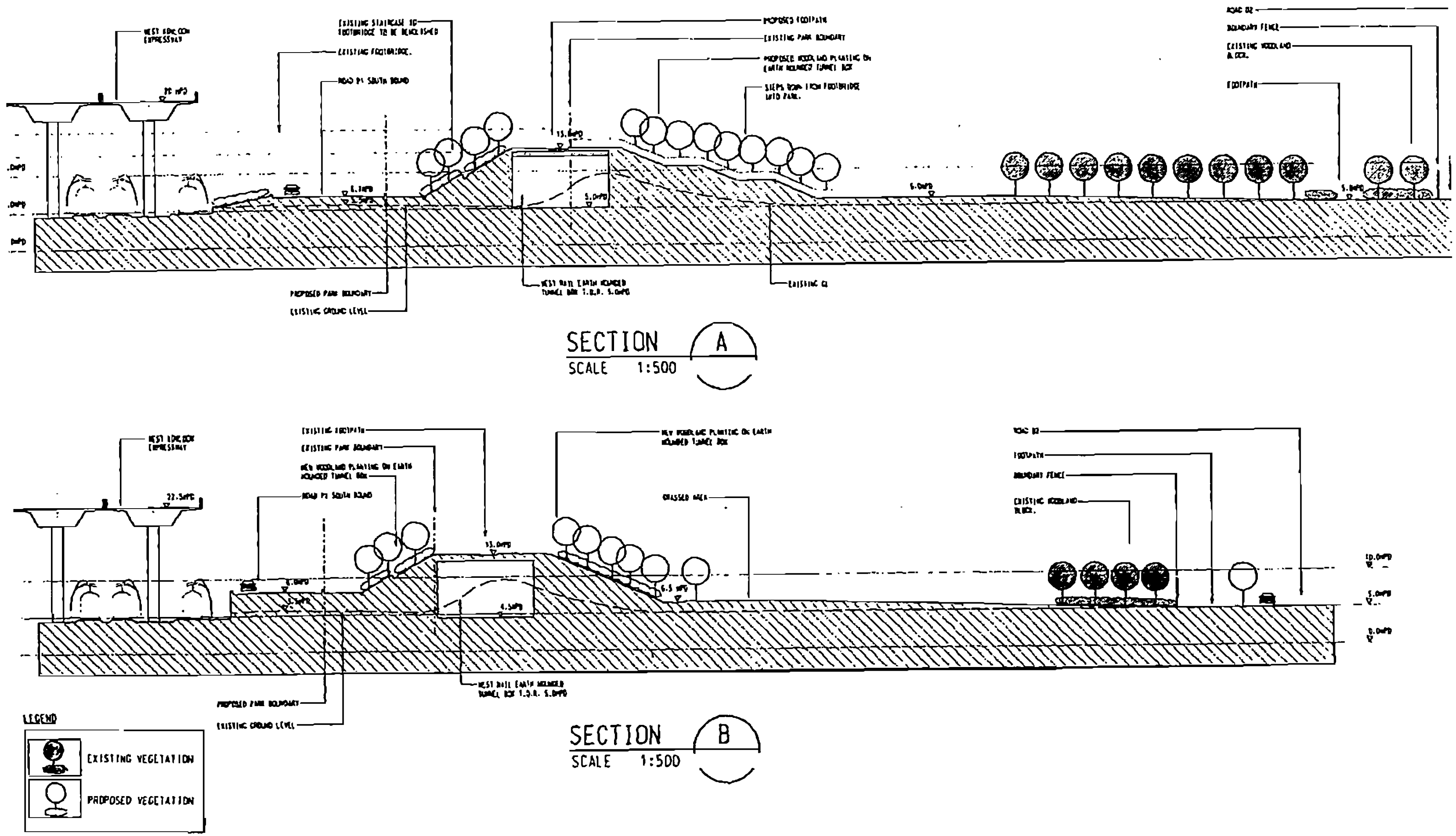
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

NAM CHEONG BUFFER ZONE LANDSCAPE SECTION

FIGURE 5.6g

Contract/C1588/C1588Z37

ERM

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WEST RAIL: TS900 EIA STUDY

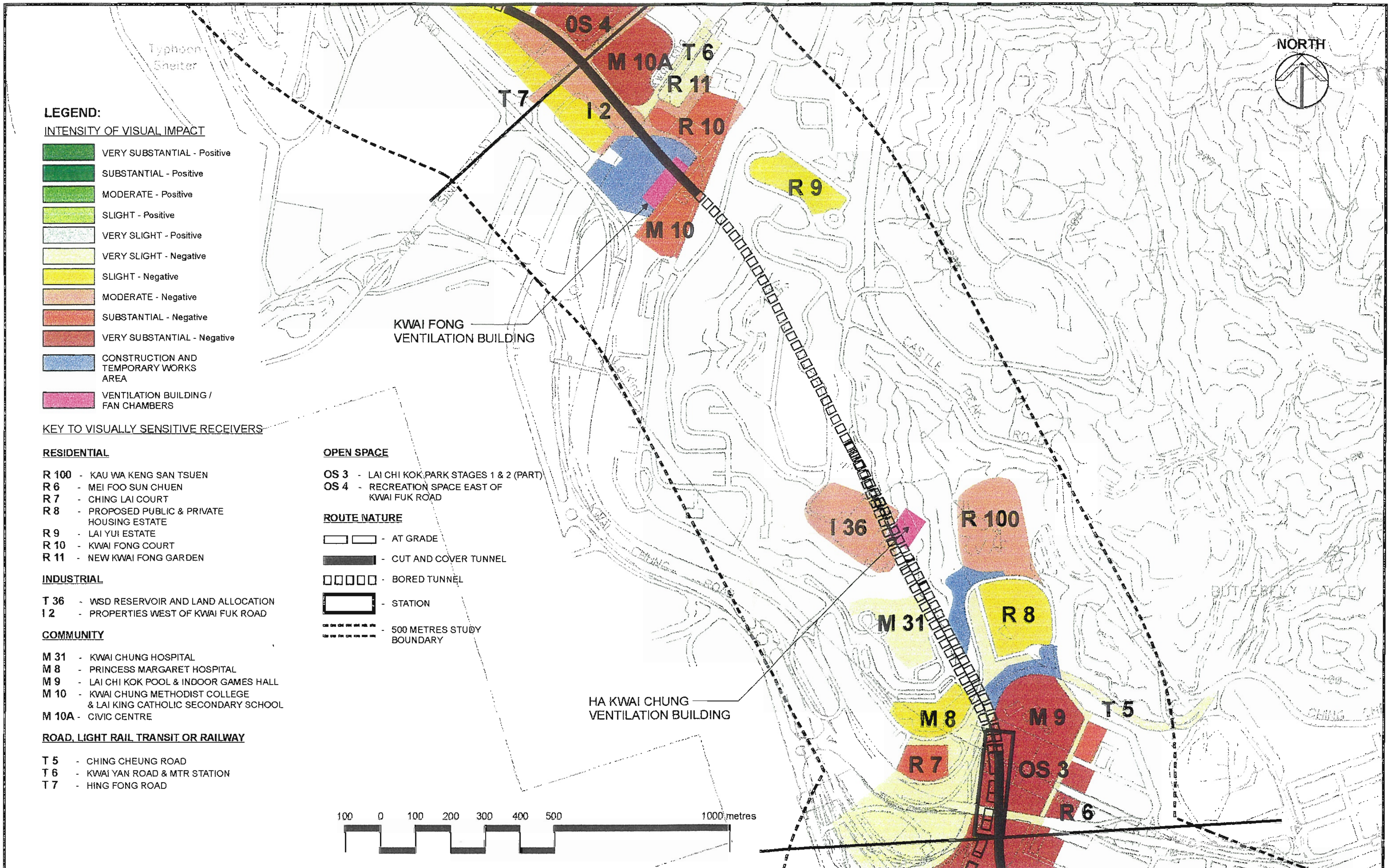

FIGURE 6.6a
CENTRAL SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 1 OF 2
MEI FOO STATION TO HING FONG ROAD

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

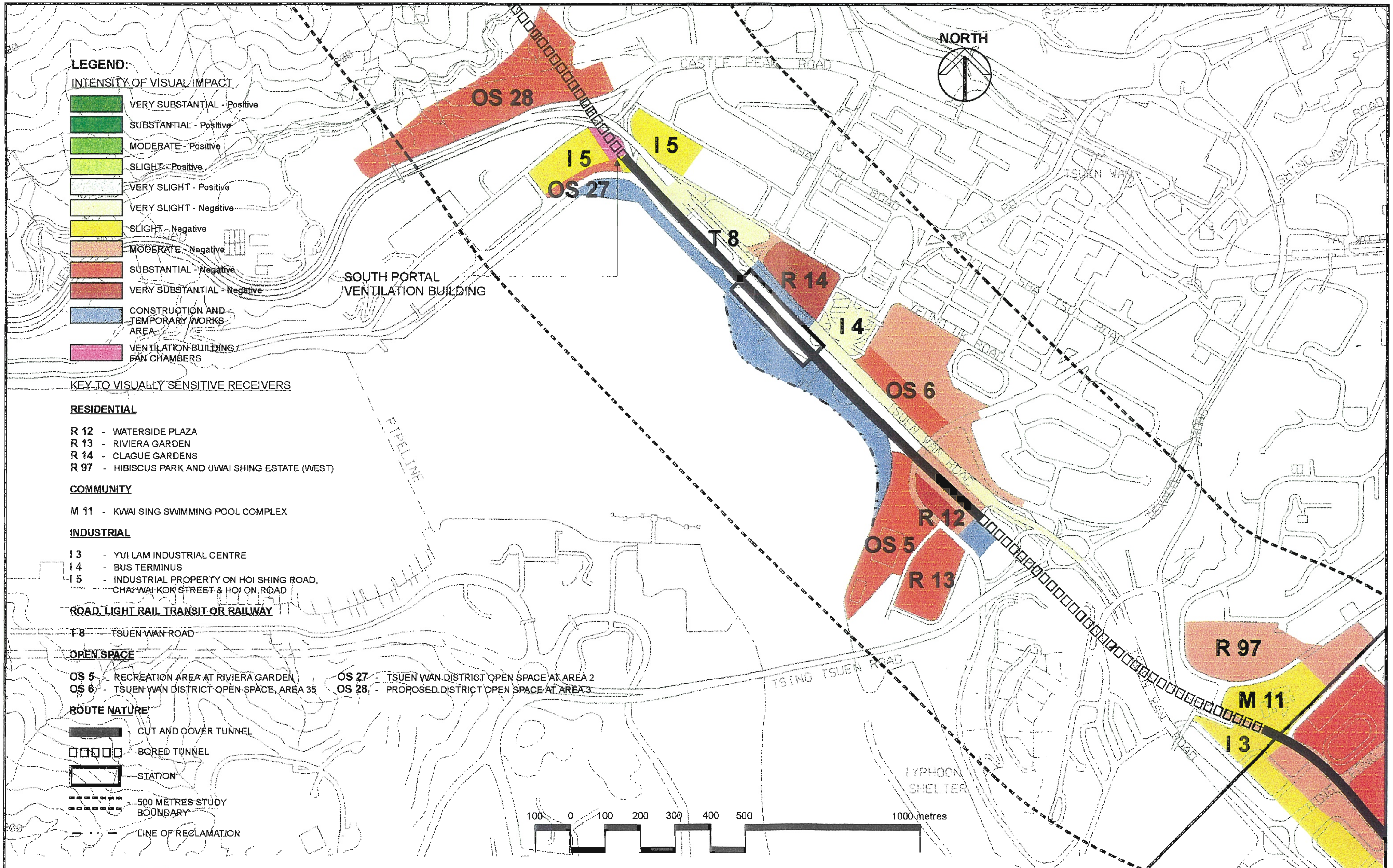

FIGURE 6.6b
CENTRAL SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 2 OF 2
HING FONG ROAD TO TAI LAM SOUTH PORTAL

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

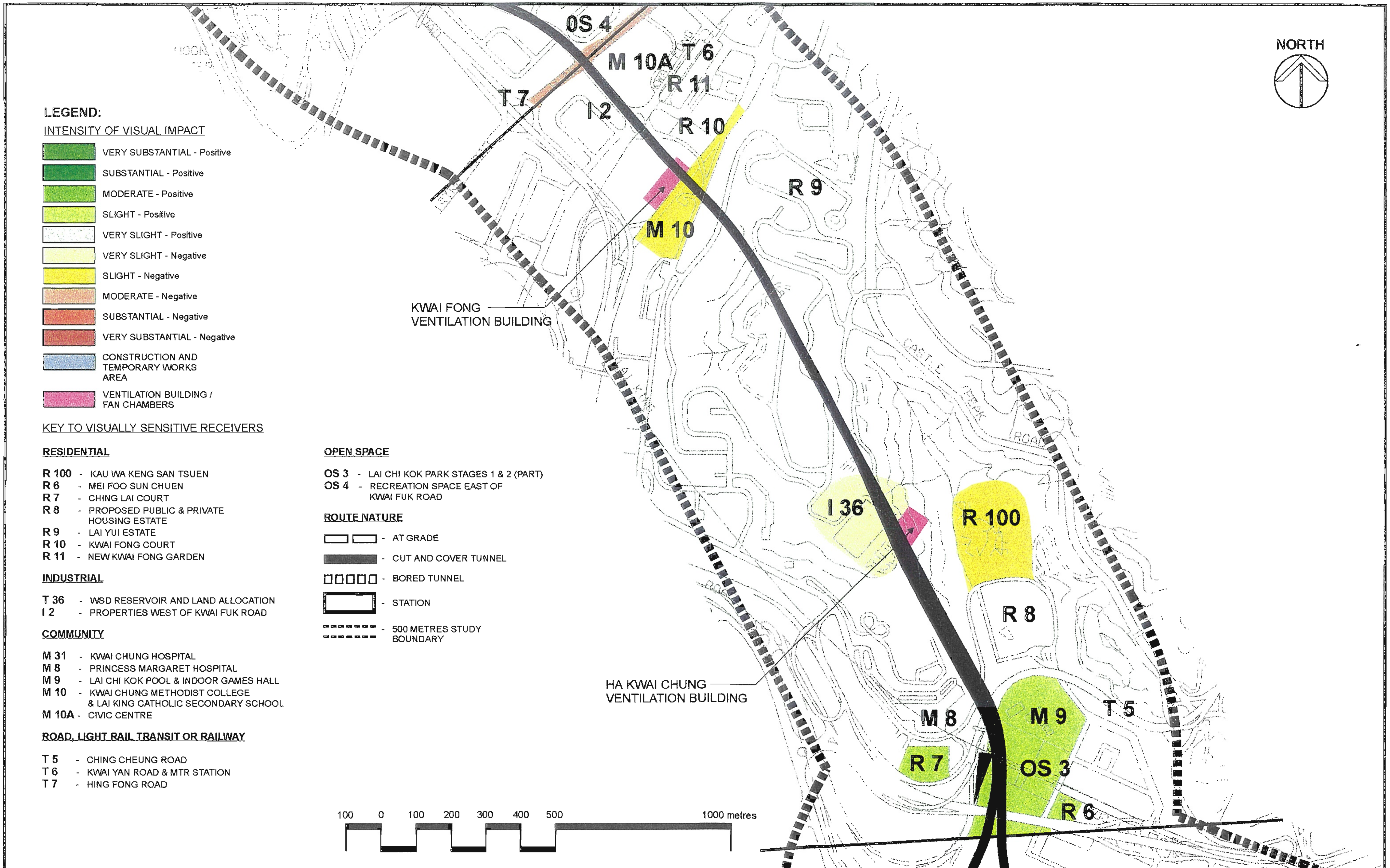

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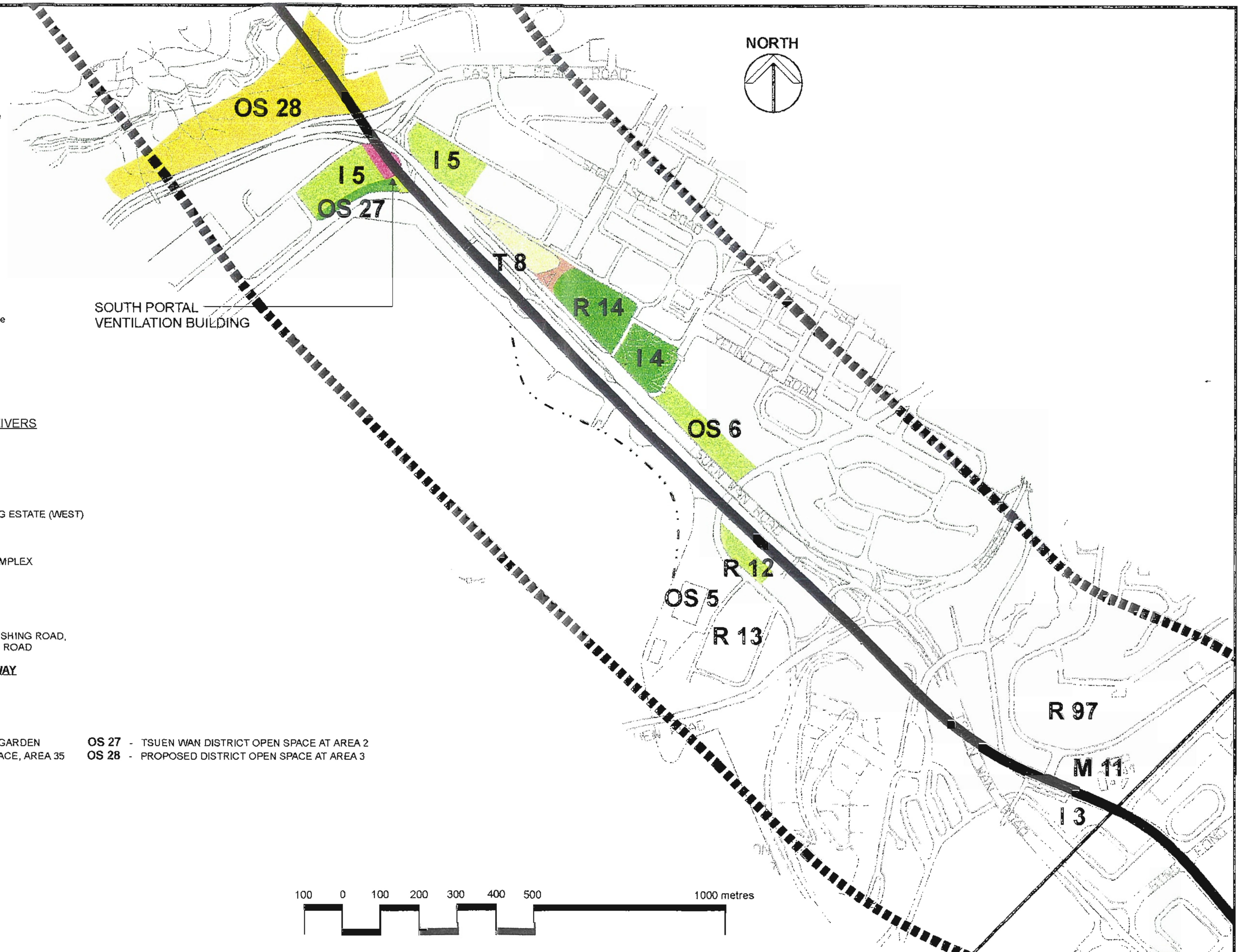
FIGURE 6.6c
CENTRAL SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 1 OF 2
MEI FOO STATION TO HING FONG ROAD

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY



LEGEND:

INTENSITY OF VISUAL IMPACT

- VERY SUBSTANTIAL - Positive
- SUBSTANTIAL - Positive
- MODERATE - Positive
- SLIGHT - Positive
- VERY SLIGHT - Positive
- VERY SLIGHT - Negative
- SLIGHT - Negative
- MODERATE - Negative
- SUBSTANTIAL - Negative
- VERY SUBSTANTIAL - Negative
- CONSTRUCTION AND TEMPORARY WORKS AREA
- VENTILATION BUILDING / FAN CHAMBERS

KEY TO VISUALLY SENSITIVE RECEIVERS

RESIDENTIAL

R 12 - WATERSIDE PLAZA
R 13 - RIVIERA GARDEN
R 14 - CLAGUE GARDENS
R 97 - HIBISCUS PARK AND UWAI SHING ESTATE (WEST)

COMMUNITY

M 11 - KWAI SING SWIMMING POOL COMPLEX

INDUSTRIAL

I 3 - YUI LAM INDUSTRIAL CENTRE
I 4 - BUS TERMINUS
I 5 - INDUSTRIAL PROPERTY ON HOI SHING ROAD, CHAI WAI KOK STREET & HOI ON ROAD

ROAD, LIGHT RAIL TRANSIT OR RAILWAY

T 8 - TSUEN WAN ROAD

OPEN SPACE

OS 5 - RECREATION AREA AT RIVIERA GARDEN
OS 6 - TSUEN WAN DISTRICT OPEN SPACE, AREA 35
OS 27 - TSUEN WAN DISTRICT OPEN SPACE AT AREA 2
OS 28 - PROPOSED DISTRICT OPEN SPACE AT AREA 3

ROUTE NATURE

- CUT AND COVER TUNNEL
- BORED TUNNEL
- STATION
- 500 METRES STUDY BOUNDARY
- LINE OF RECLAMATION

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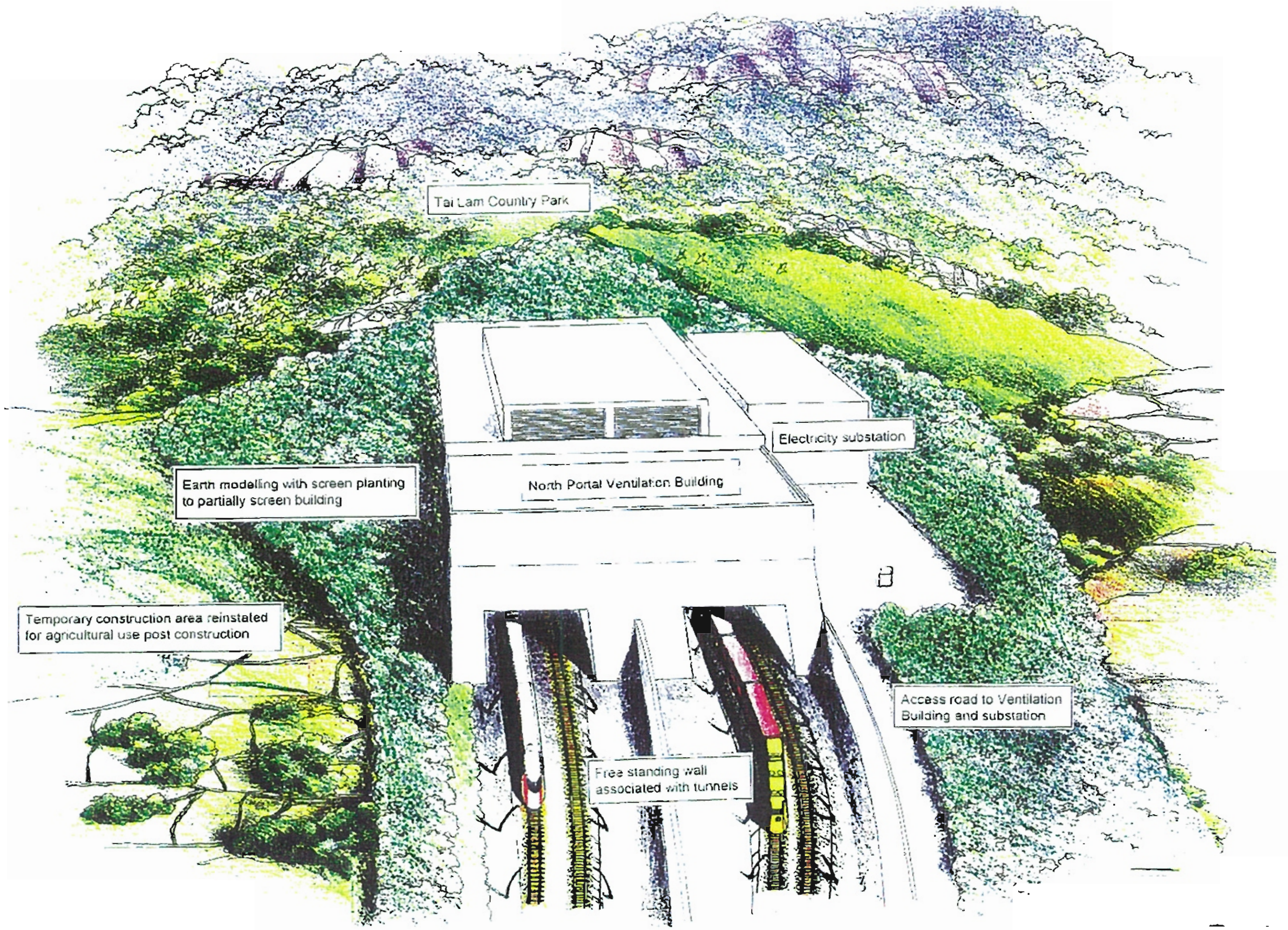
FIGURE 6.6d
CENTRAL SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 2 OF 2
HING FONG ROAD TO TAI LAM SOUTH PORTAL

ERM

KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

ARTIST'S IMPRESSION OF THE TAI LAM TUNNEL NORTH PORTAL AREA

FIGURE 6.6e

Contract/C1588/C1588Z38

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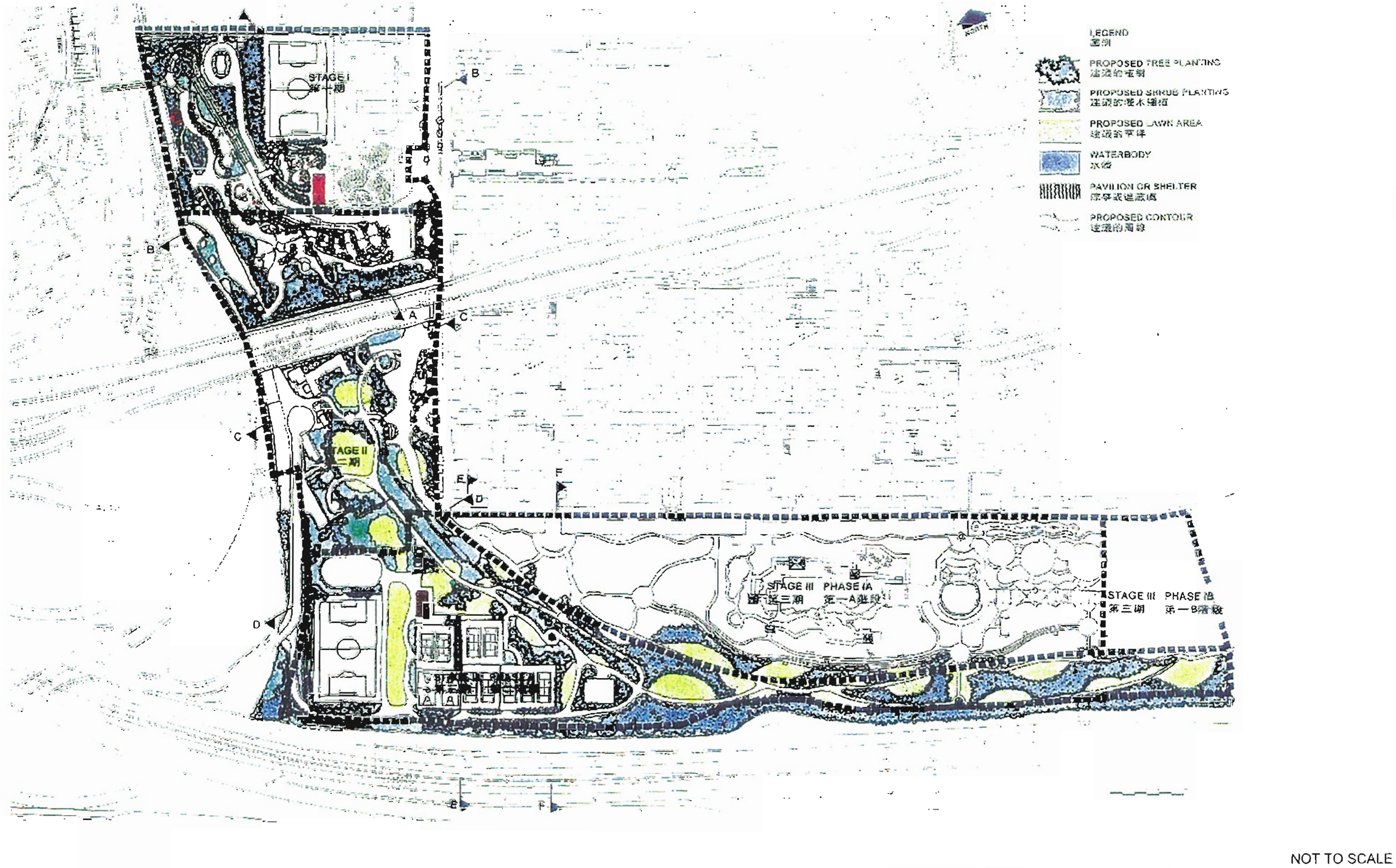
WEST RAIL: TS900 EIA STUDY



PRELIMINARY LANDSCAPE MASTER PLAN

FIGURE 6.6f

Contract/C1588/C1588Z39

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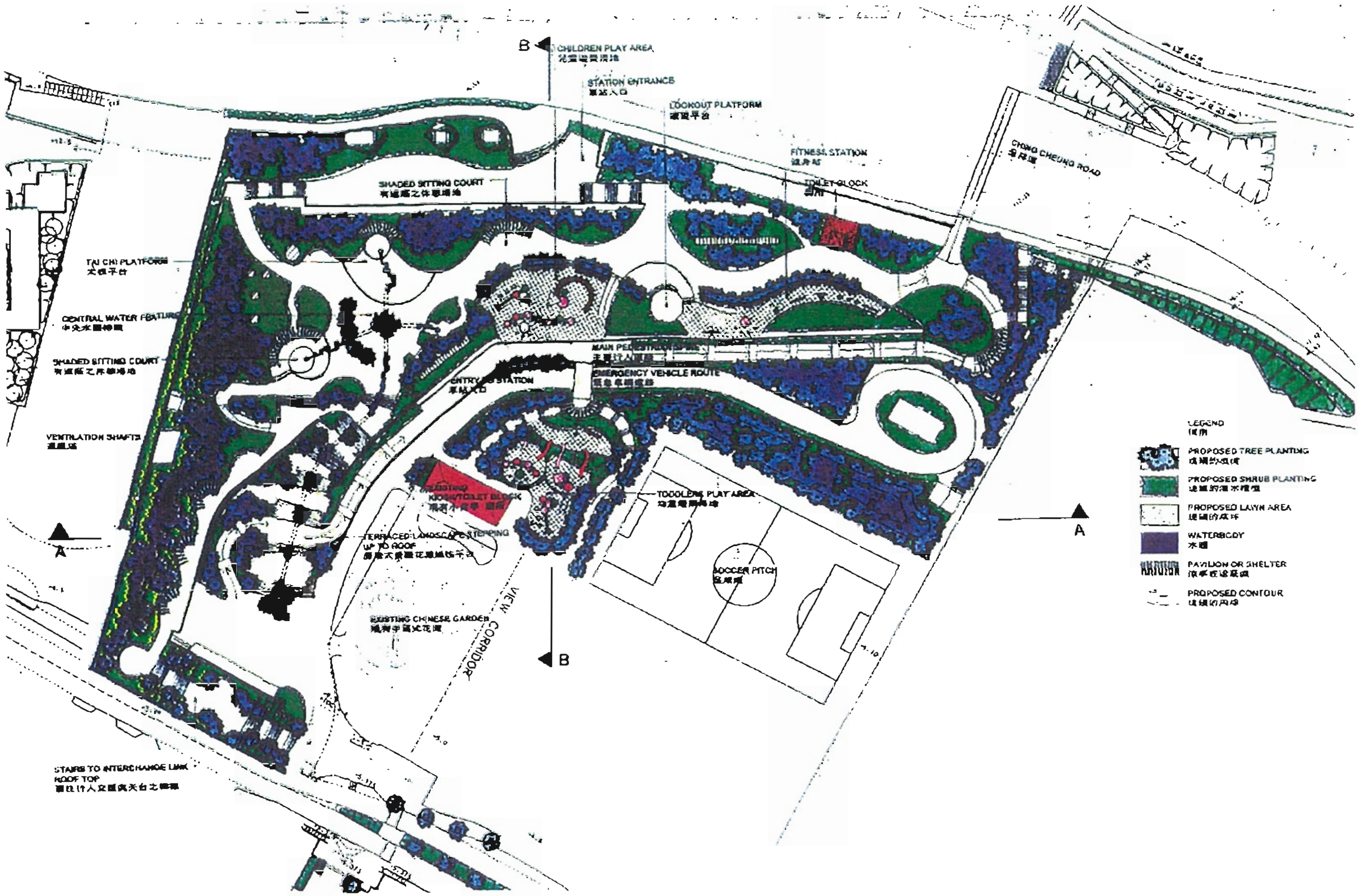
WEST RAIL: TS900 EIA STUDY



NOT TO SCALE

STAGE I & II - NORTHERN STATION ROOF AREA
FLAT ROOF TERRACED OPTION

FIGURE 6.6g

Contract/C1588/C1588Z40

ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

NOT TO SCALE

STAGE II & III - SOUTHERN STATION ROOF AREA

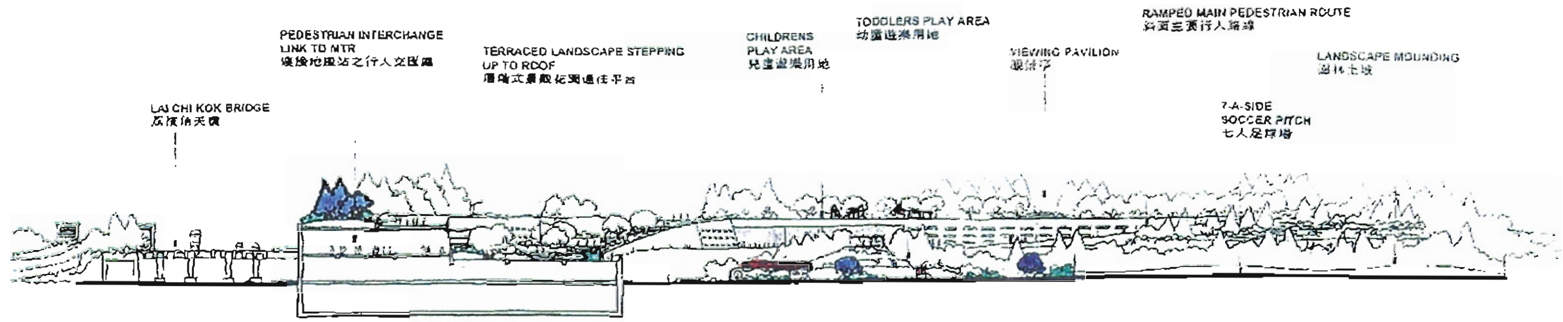
FIGURE 6.6h

Contract/C1588/C1588Z41

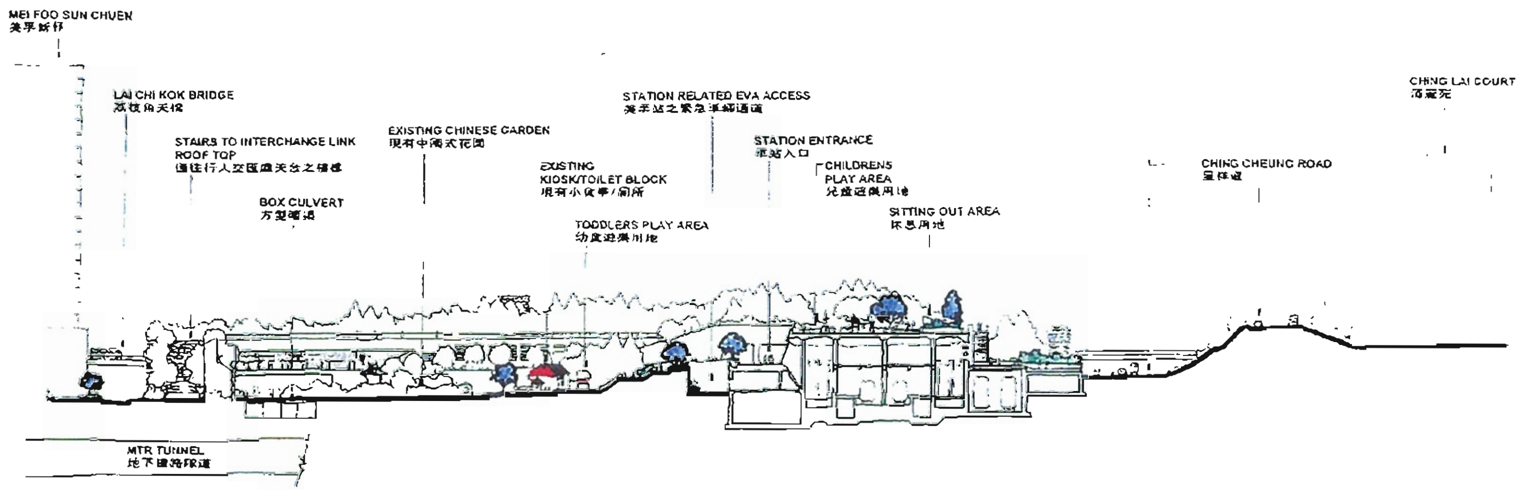
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



SECTION A



SECTION B

NOT TO SCALE

TYPICAL SECTIONS STAGE I & II

FIGURE 6.6i

Contract/C1588/C1588Z42

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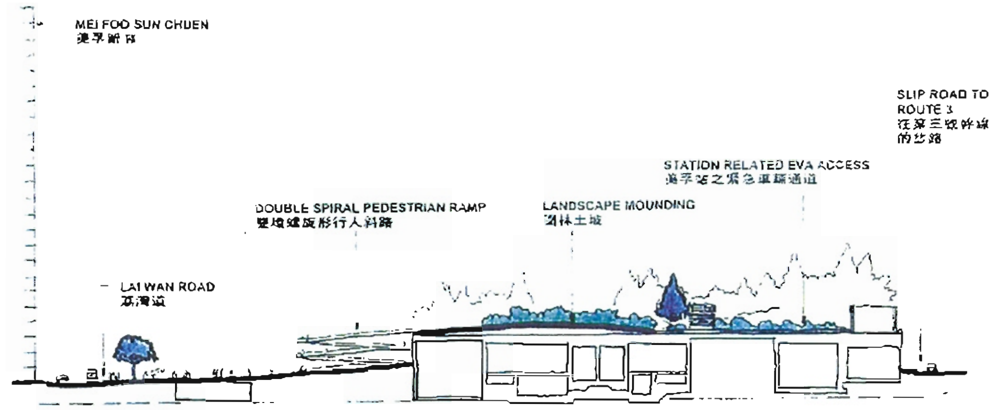
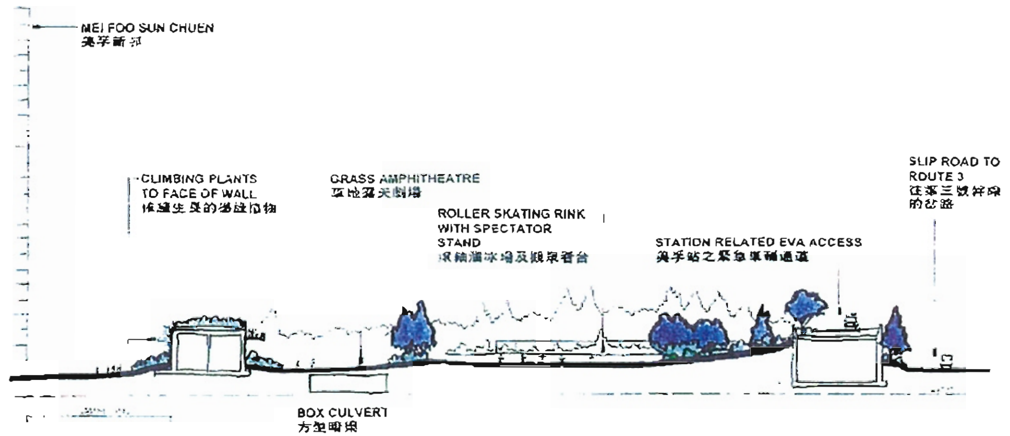
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



SECTION C



SECTION D

NOT TO SCALE

TYPICAL SECTIONS STAGE II & III

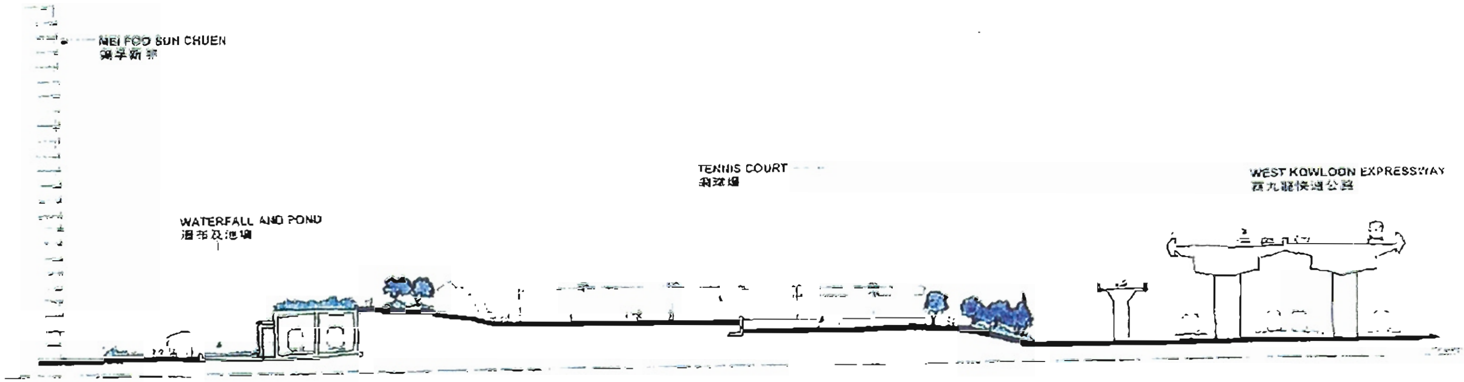
FIGURE 6.6j

Contract/C1588/C1588Z43

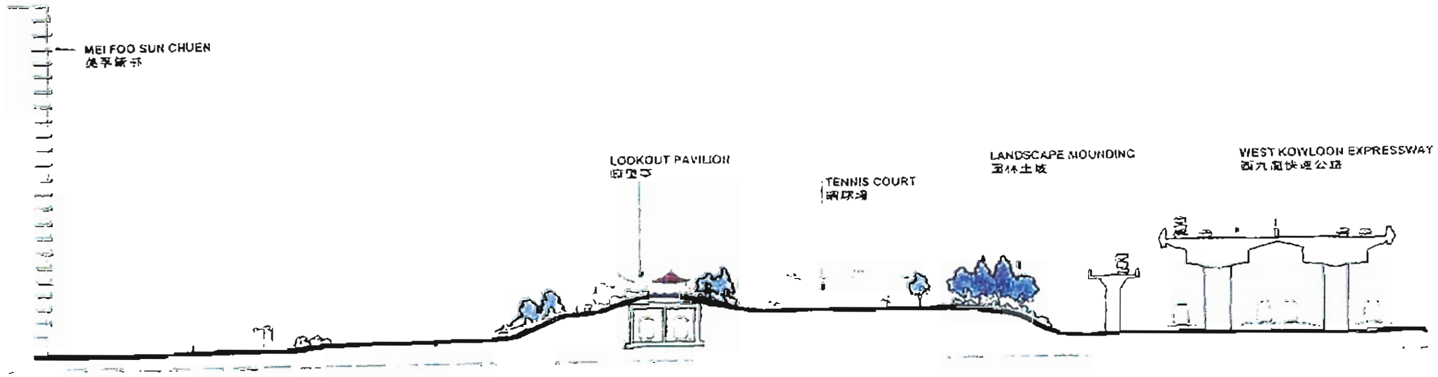
ERM

KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



SECTION E



SECTION F

NOT TO SCALE

TYPICAL SECTIONS STAGE III

FIGURE 6.6k

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WEST RAIL: TS900 EIA STUDY

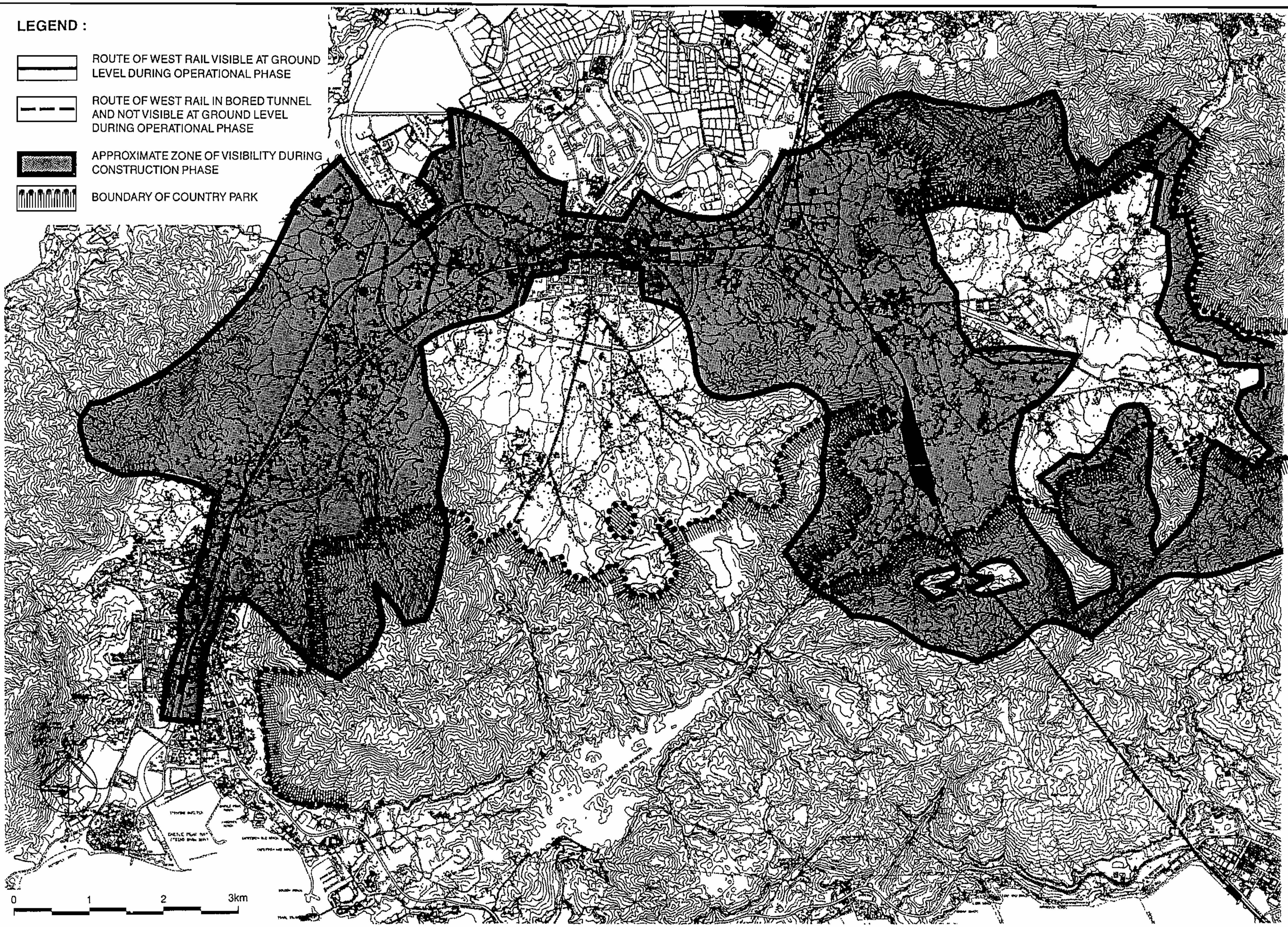

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FIGURE 7.6a
WESTERN SECTION, NORTHERN SECTION & DEPOT - ZONE OF VISIBILITY

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WEST RAIL: TS900 EIA STUDY

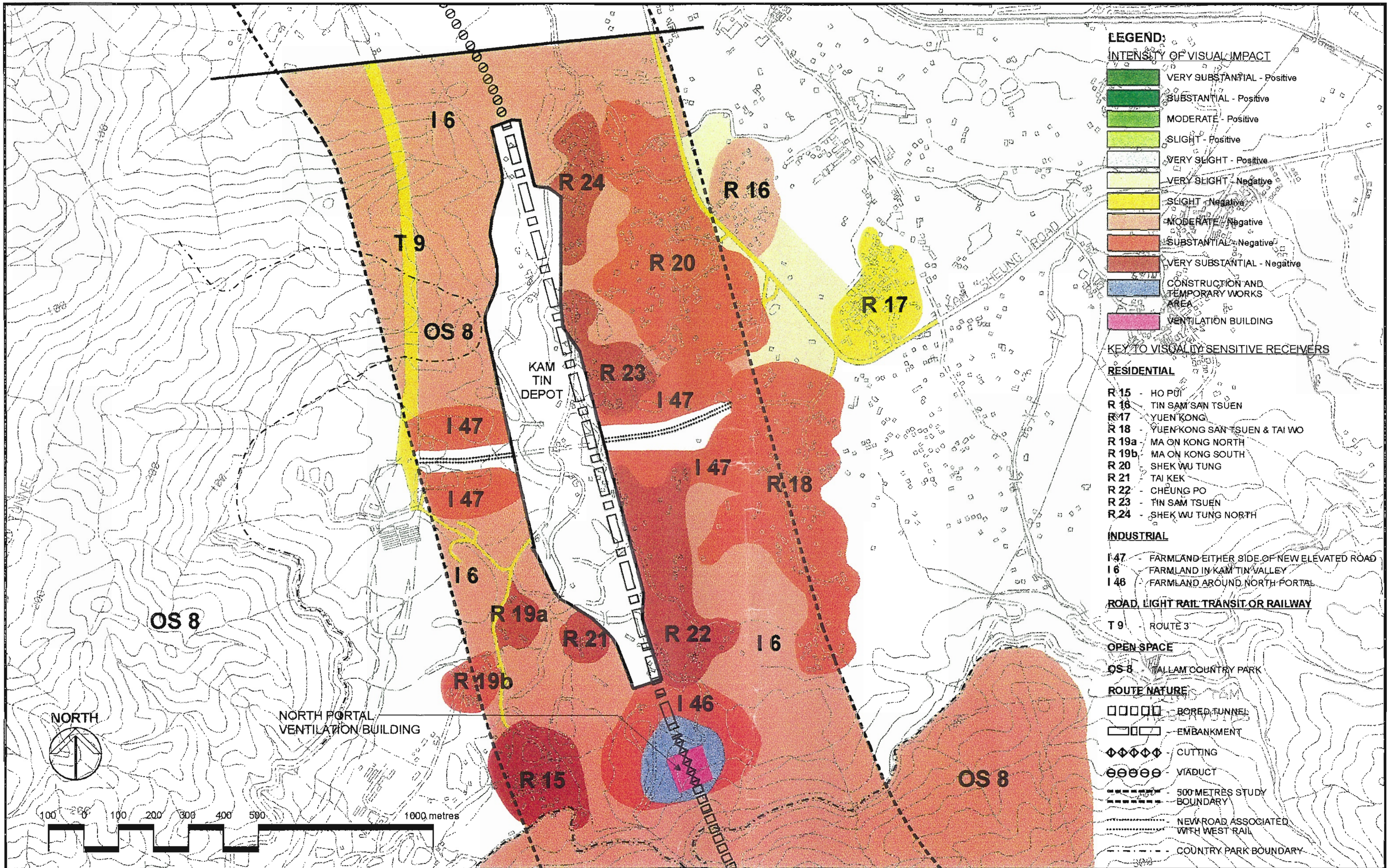

FIGURE 7.6b
NORTHERN SECTION AND DEPOT
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 1 OF 2
TAI LAM NORTH PORTAL TO KAM TIN STATION

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

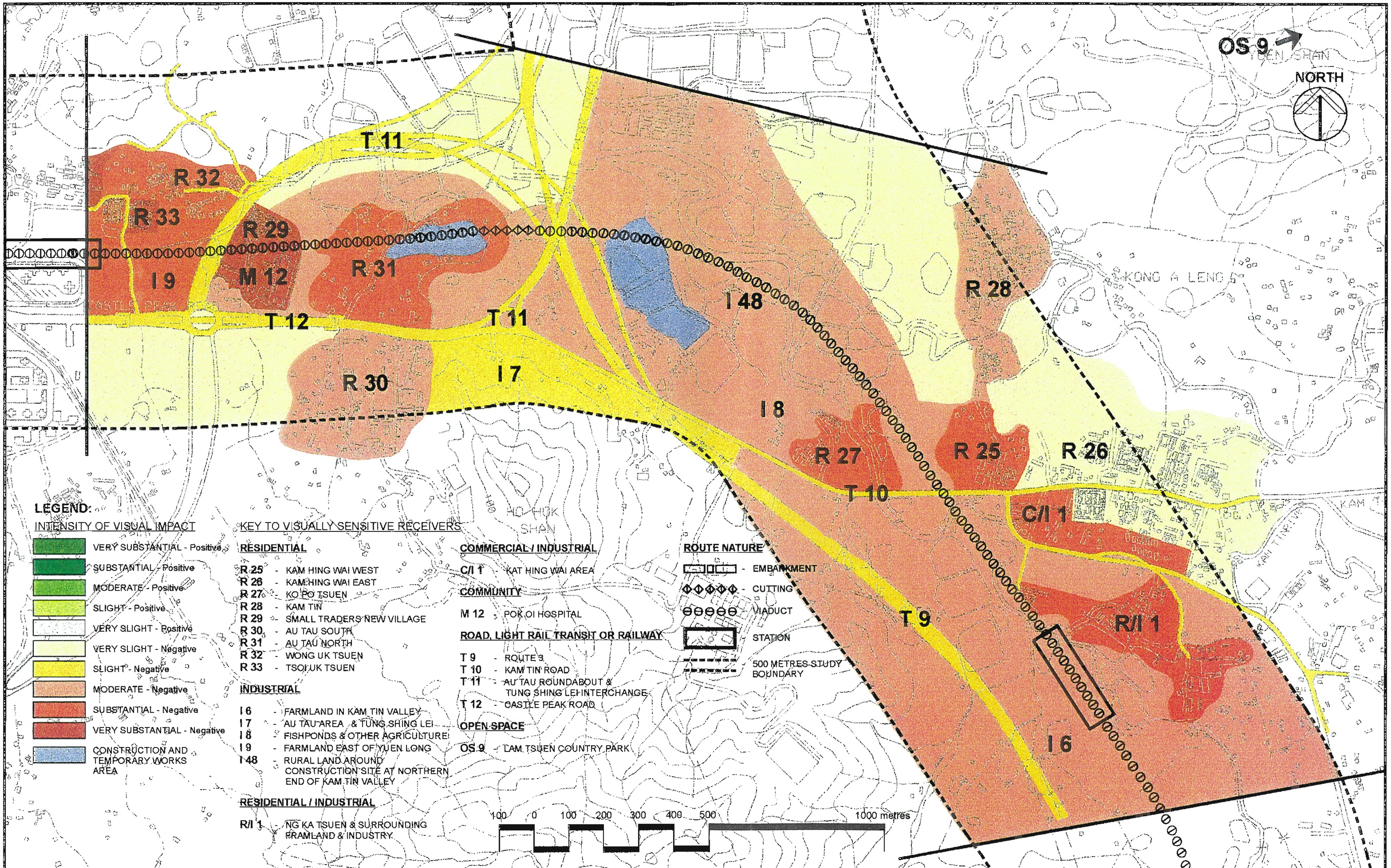

FIGURE 7.6c

NORTHERN SECTION AND DEPOT
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 2 OF 2
KAM TIN STATION TO LONG PING STATION

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

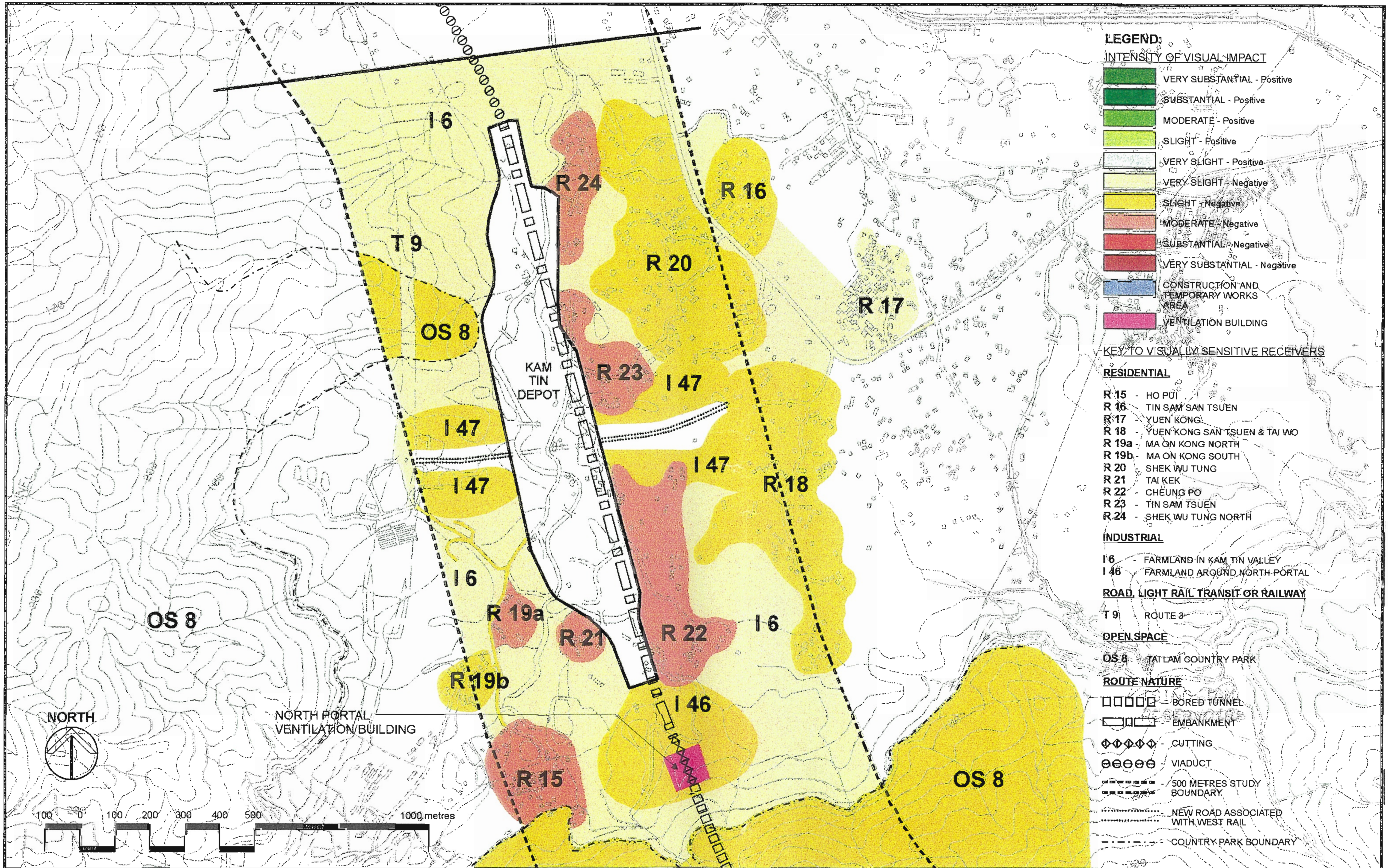

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FIGURE 7.6d
NORTHERN SECTION AND DEPOT
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 1 OF 2
TAI LAM NORTH PORTAL TO KAM TIN STATION

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

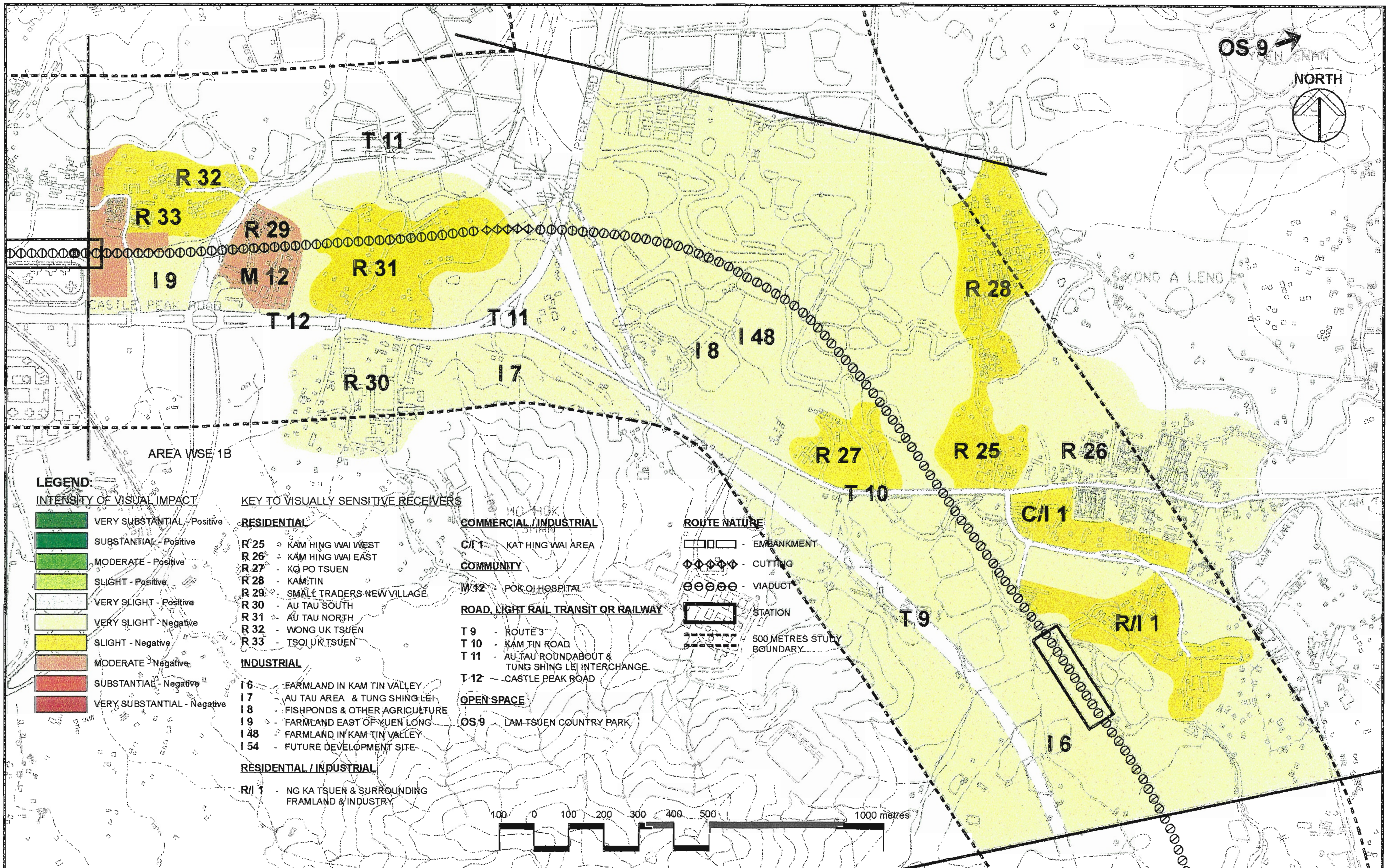

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FIGURE 7.6e
NORTHERN SECTION AND DEPOT
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 2 OF 2
KAM TIN STATION TO LONG PING STATION

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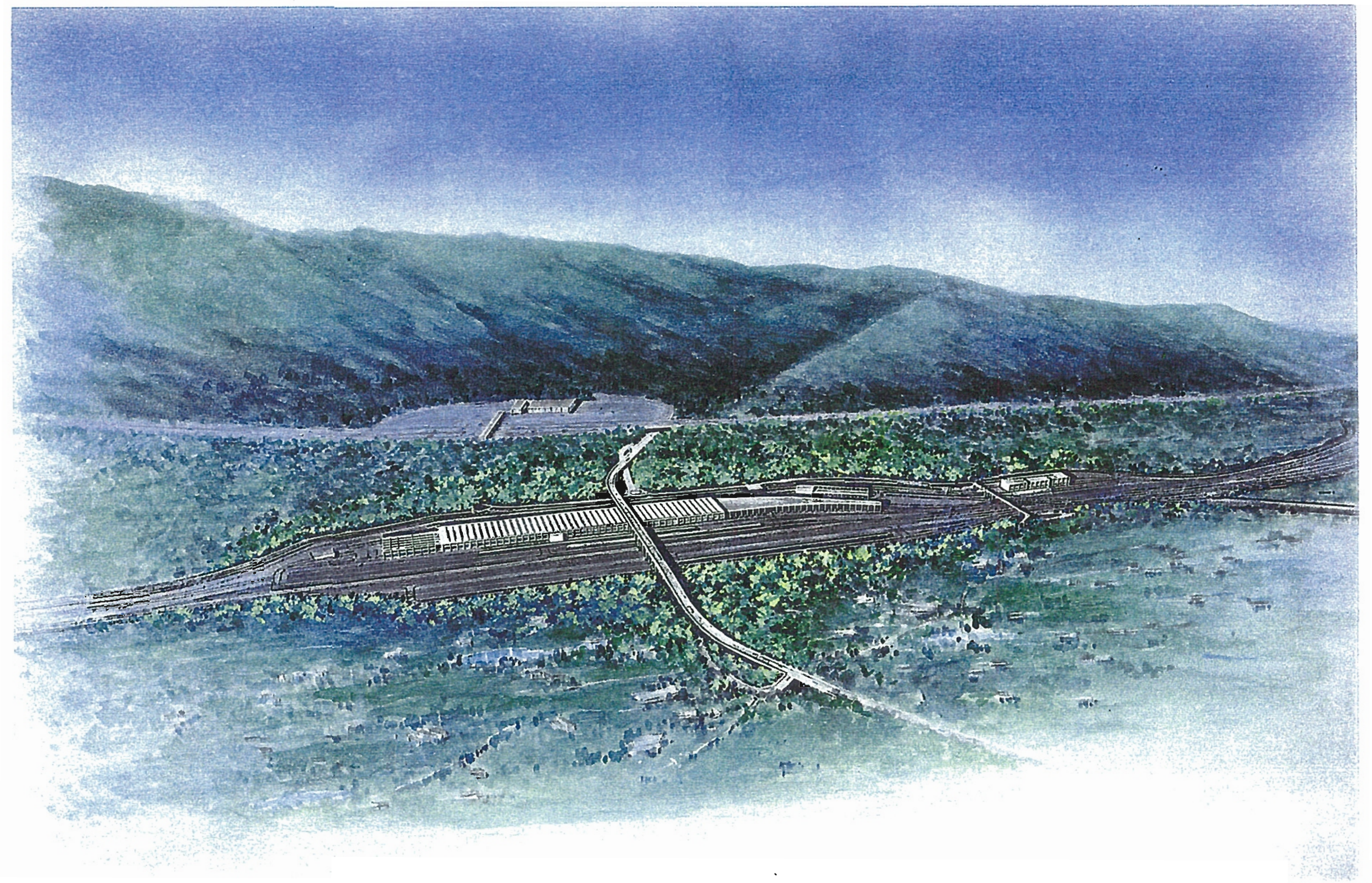
KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY



AN ARTIST'S IMPRESSION OF THE DEPOT

FIGURE 7.6f

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

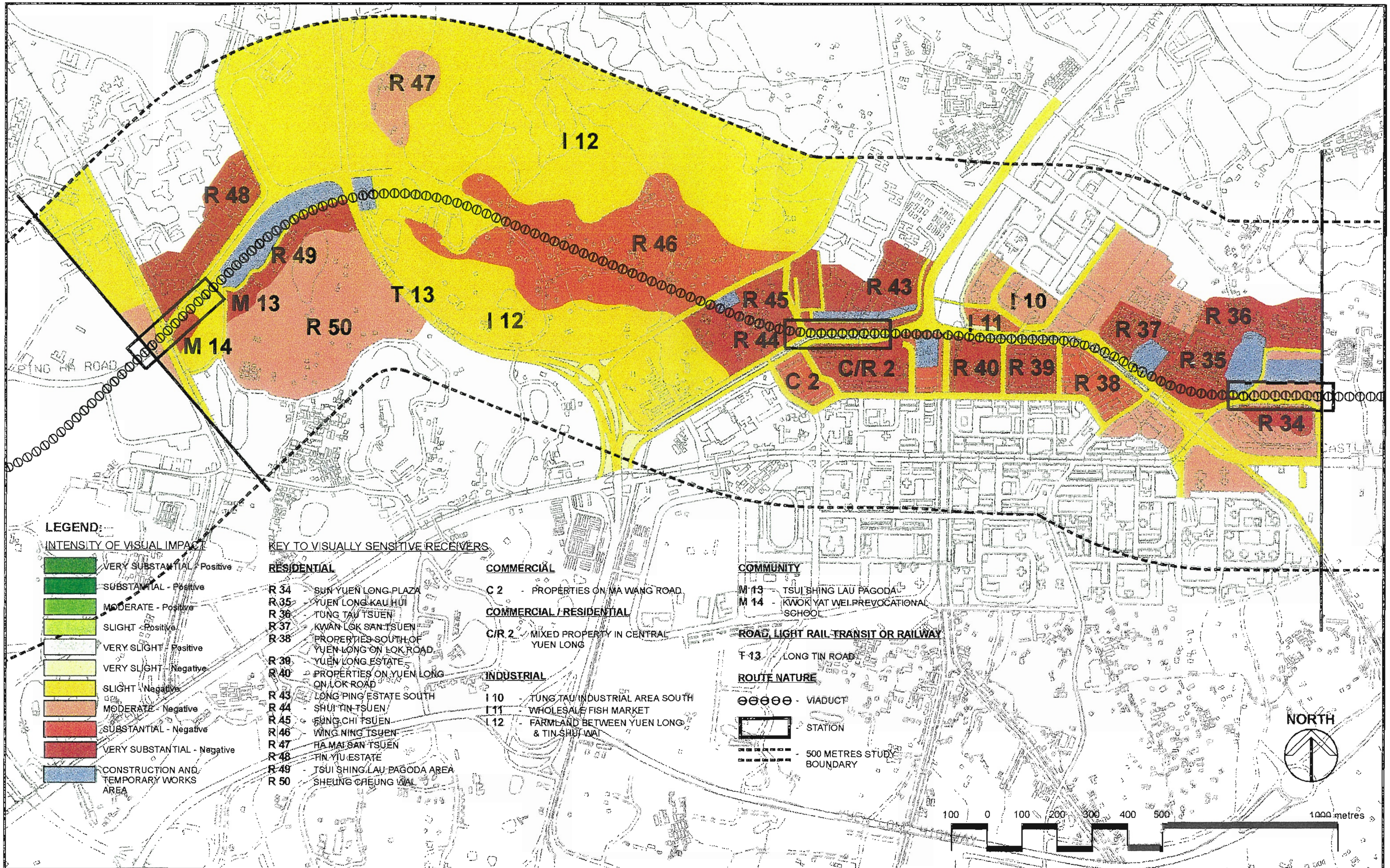

FIGURE 8.6a
WESTERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 1 OF 4
LONG PING STATION TO TIN SHUI WAI STATION

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

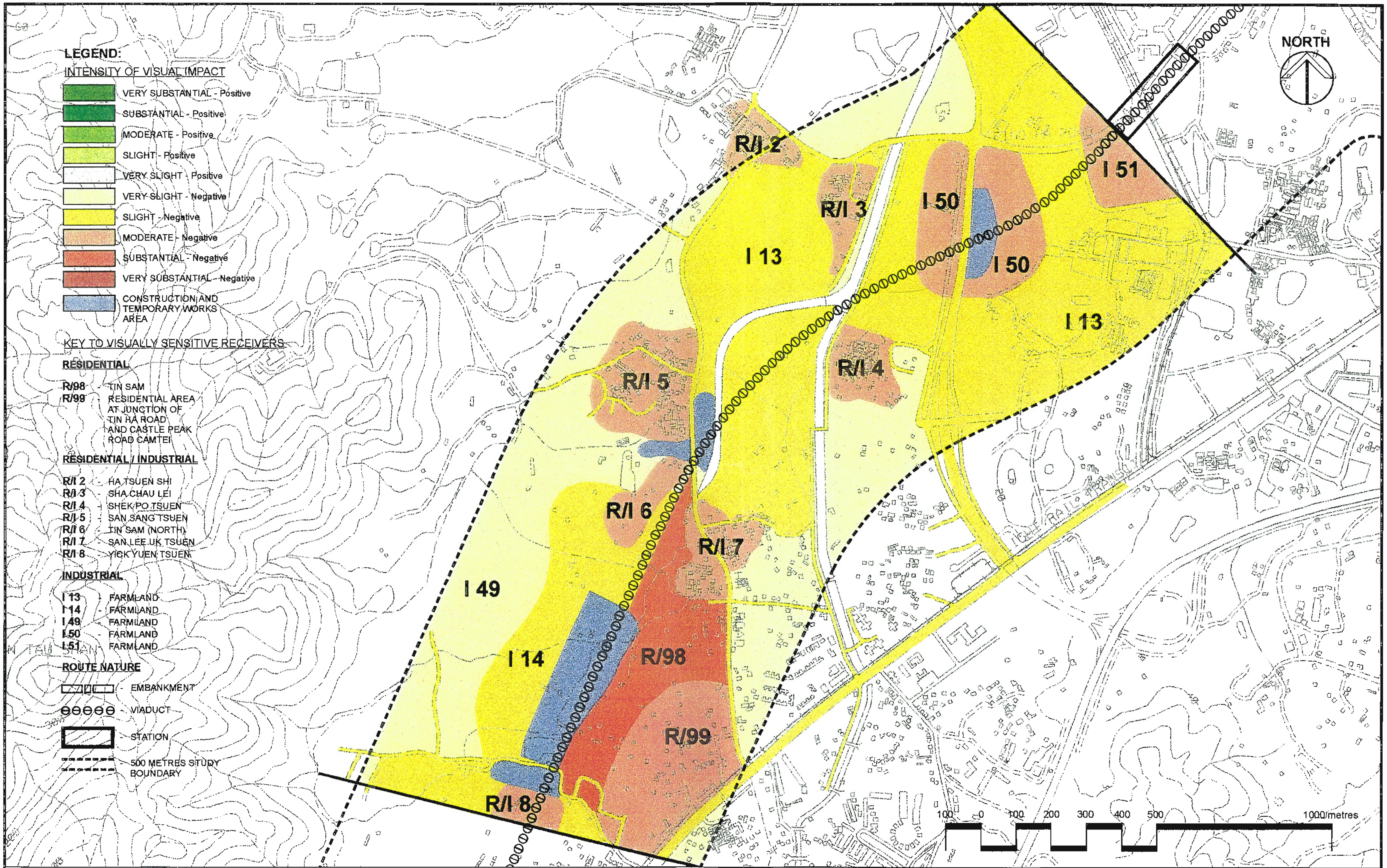

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FIGURE 8.6b
WESTERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 2 OF 4
TIN SHUI WAI STATION TO YICK YUEN TSUEN

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

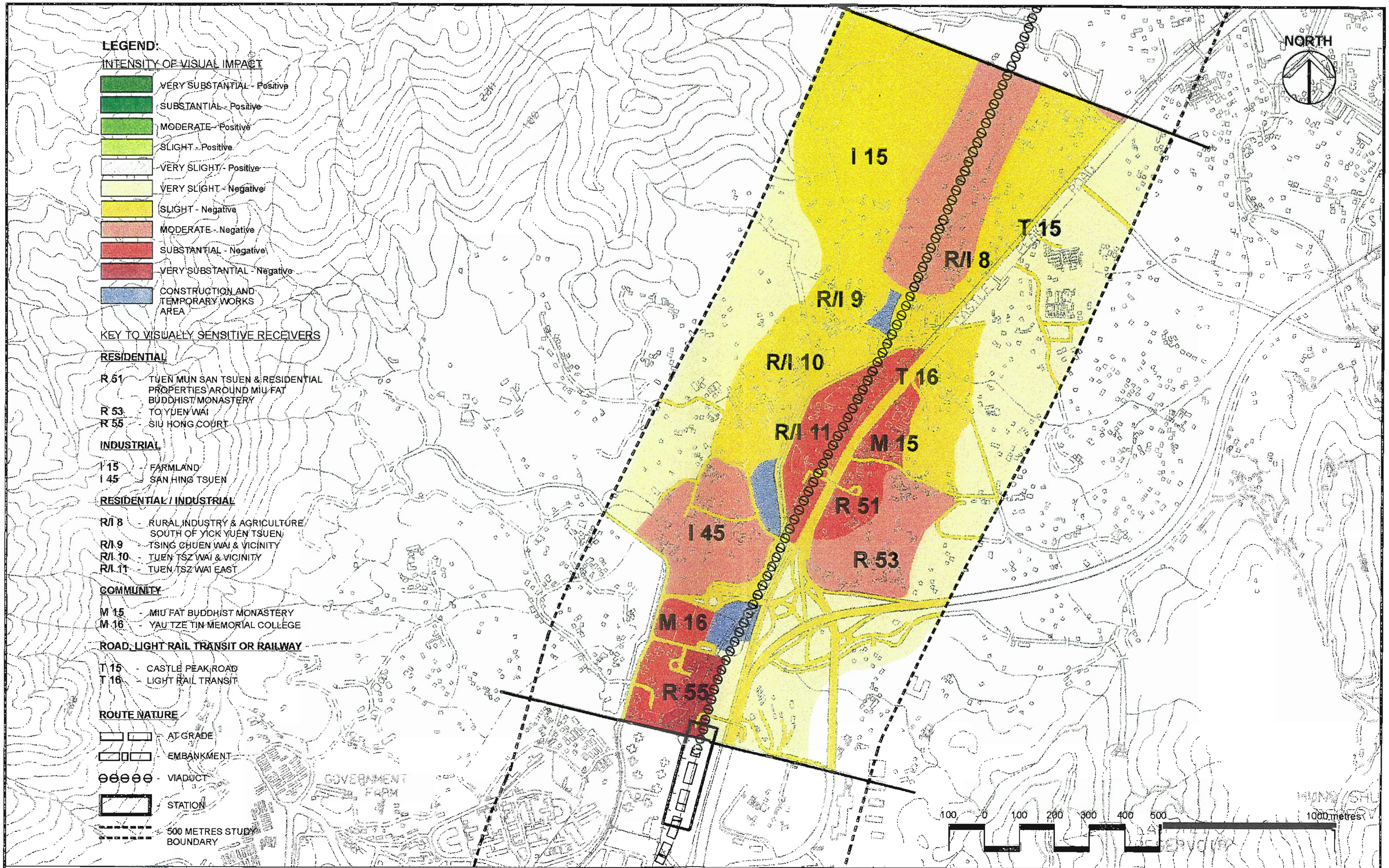

FIGURE 8.6c
WESTERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 3 OF 4
YICK YUEN TSUEN TO TUEN MUN NORTH STATION

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

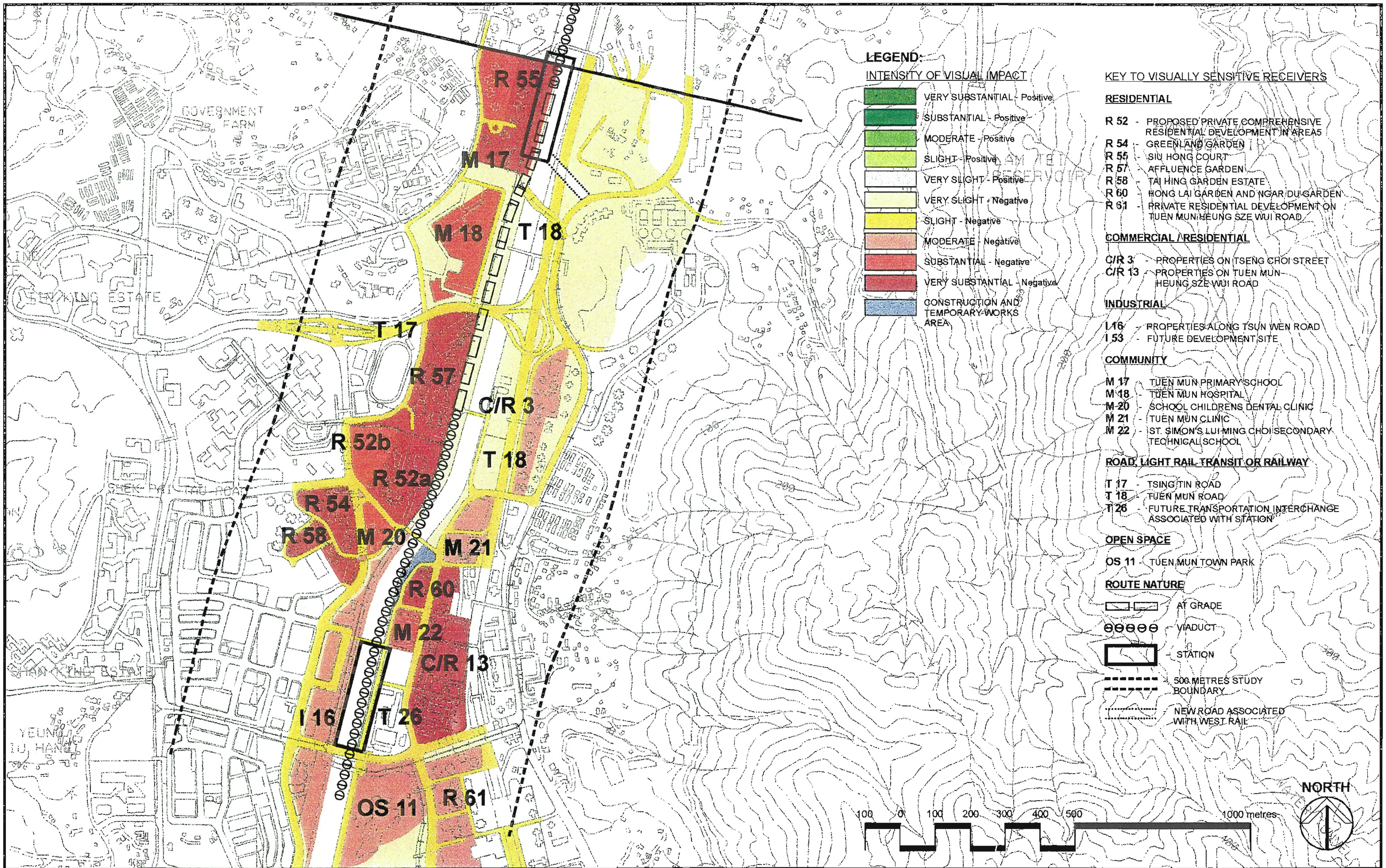

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FIGURE 8.6d
WESTERN SECTION
VISUAL IMPACT DURING CONSTRUCTION PHASE - SHEET 4 OF 4
TUEN MUN NORTH STATION TO TUEN MUN TOWN PARK

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

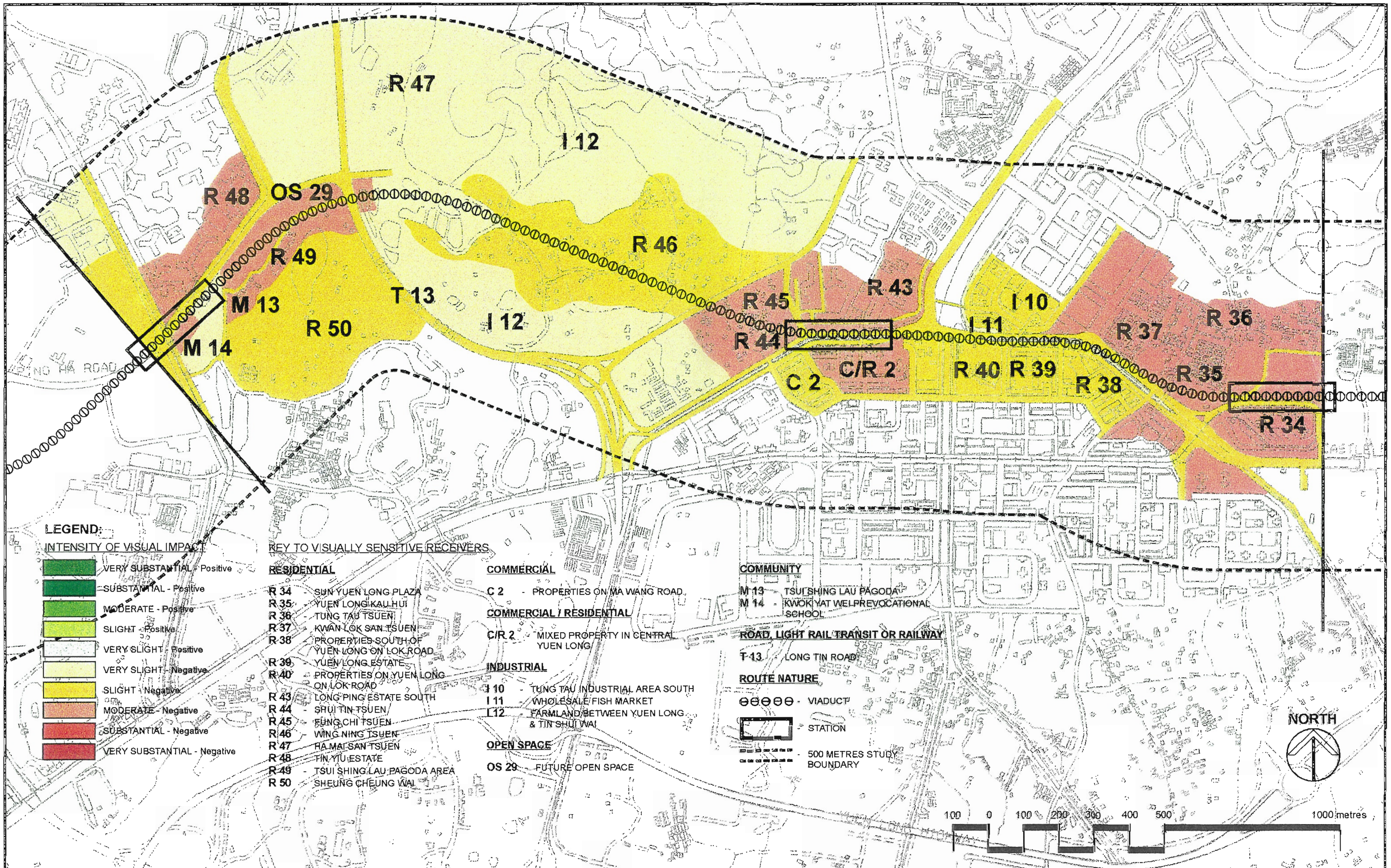

FIGURE 8.6e
WESTERN SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 1 OF 4
LONG PING STATION TO TIN SHUI WAI STATION

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

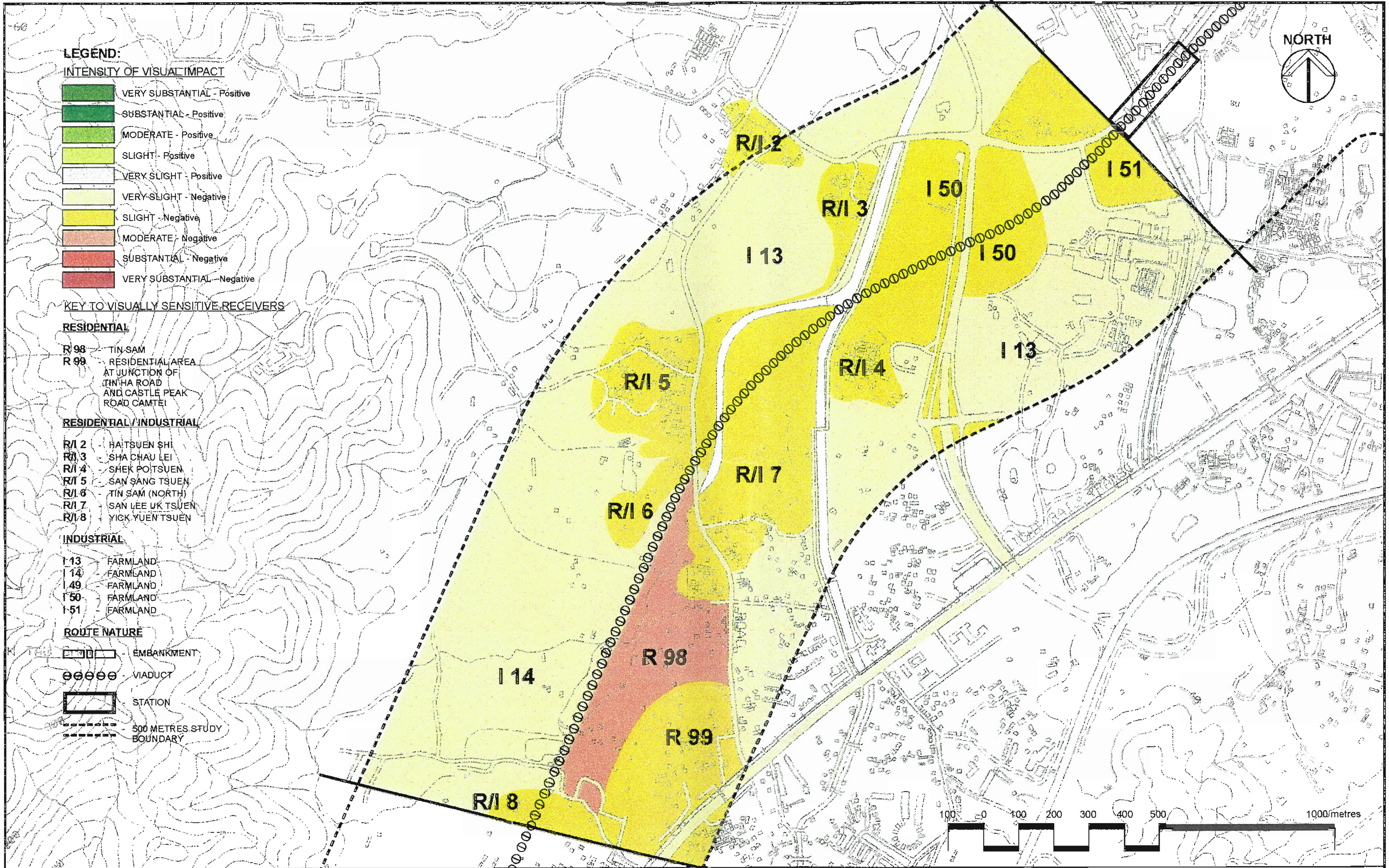

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FIGURE 8.6f
WESTERN SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 2 OF 4
TIN SHUI WAI STATION TO YICK YUEN TSUEN

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KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY

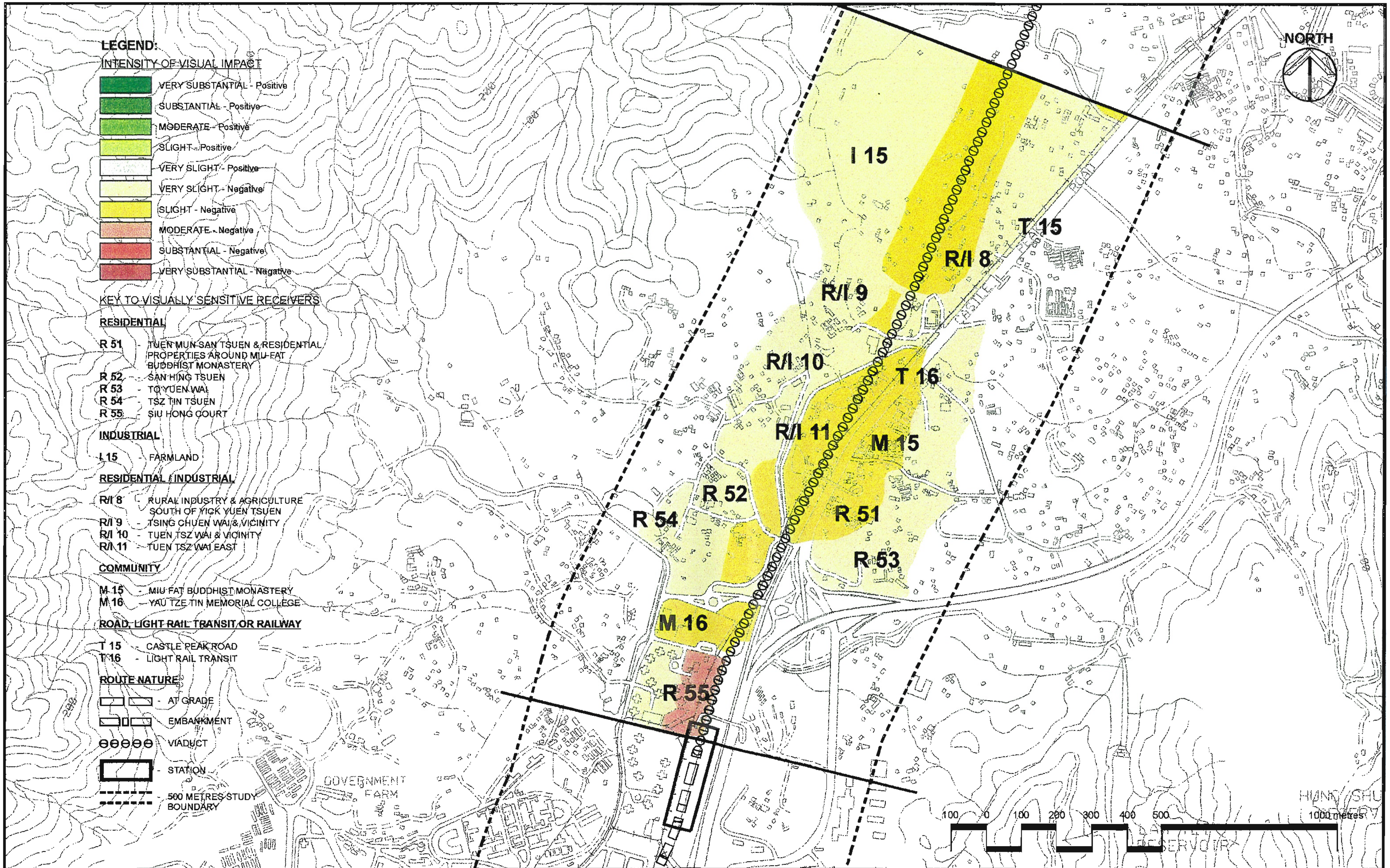

FIGURE 8.6g
WESTERN SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 3 OF 4
YICK YUEN TSUEN TO TUEN MUN NORTH STATION

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY

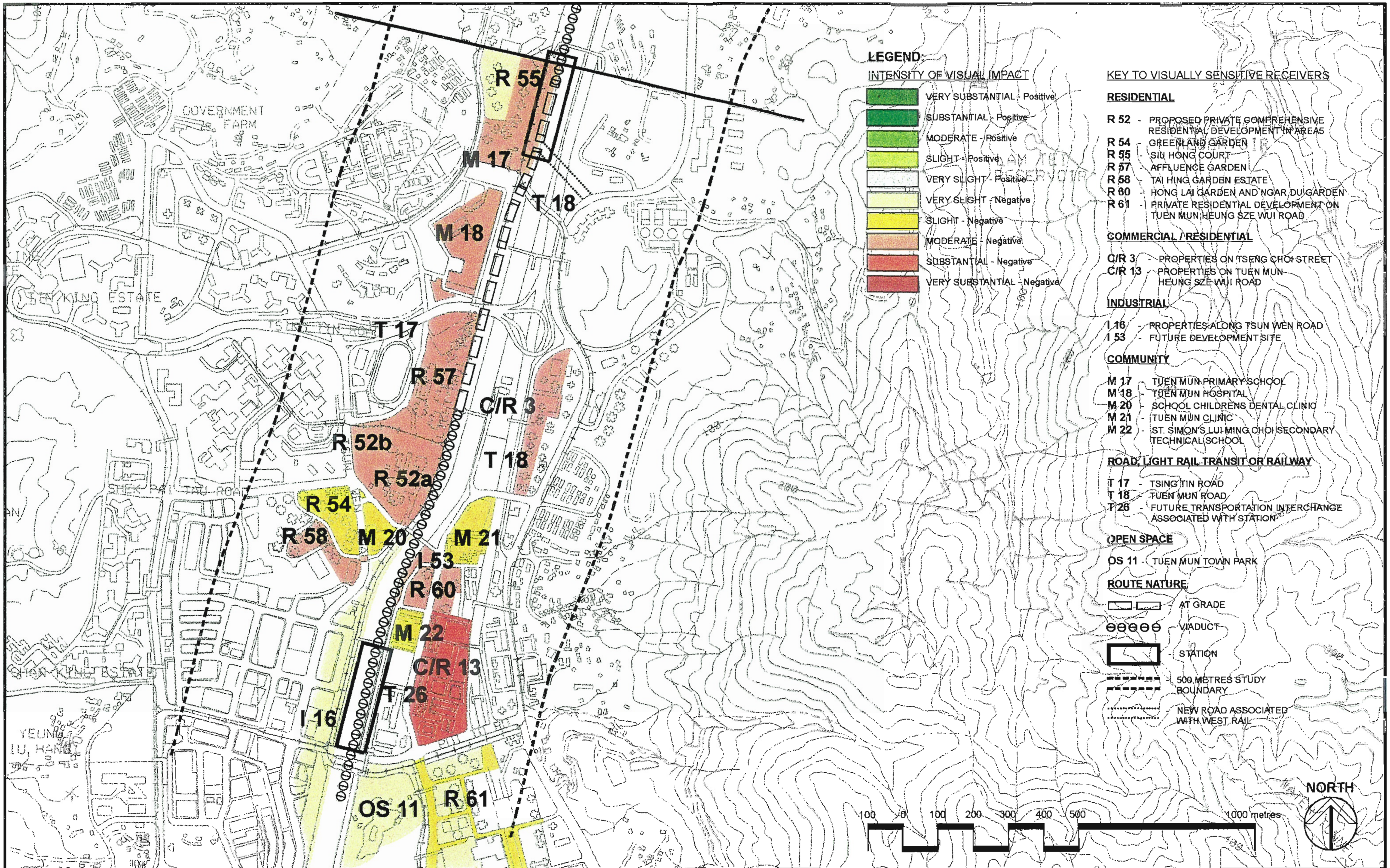

FIGURE 8.6h
WESTERN SECTION
VISUAL IMPACT DURING OPERATIONAL PHASE - SHEET 4 OF 4
TUEN MUN NORTH STATION TO TUEN MUN TOWN PARK

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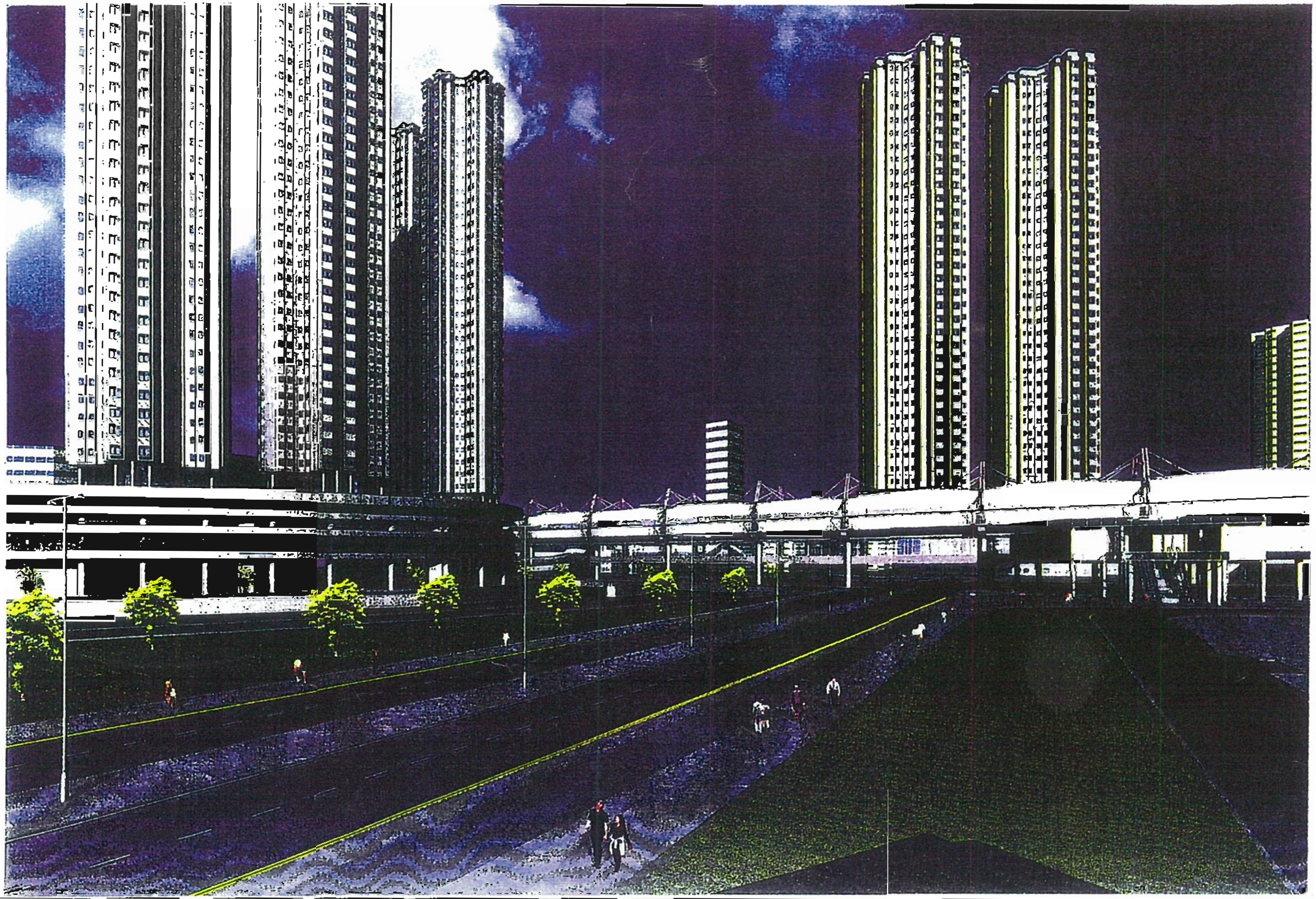
KOWLOON - CANTON RAILWAY CORPORATION
WEST RAIL: TS900 EIA STUDY



A STATION DESIGN EXAMPLE

FIGURE 8.6i

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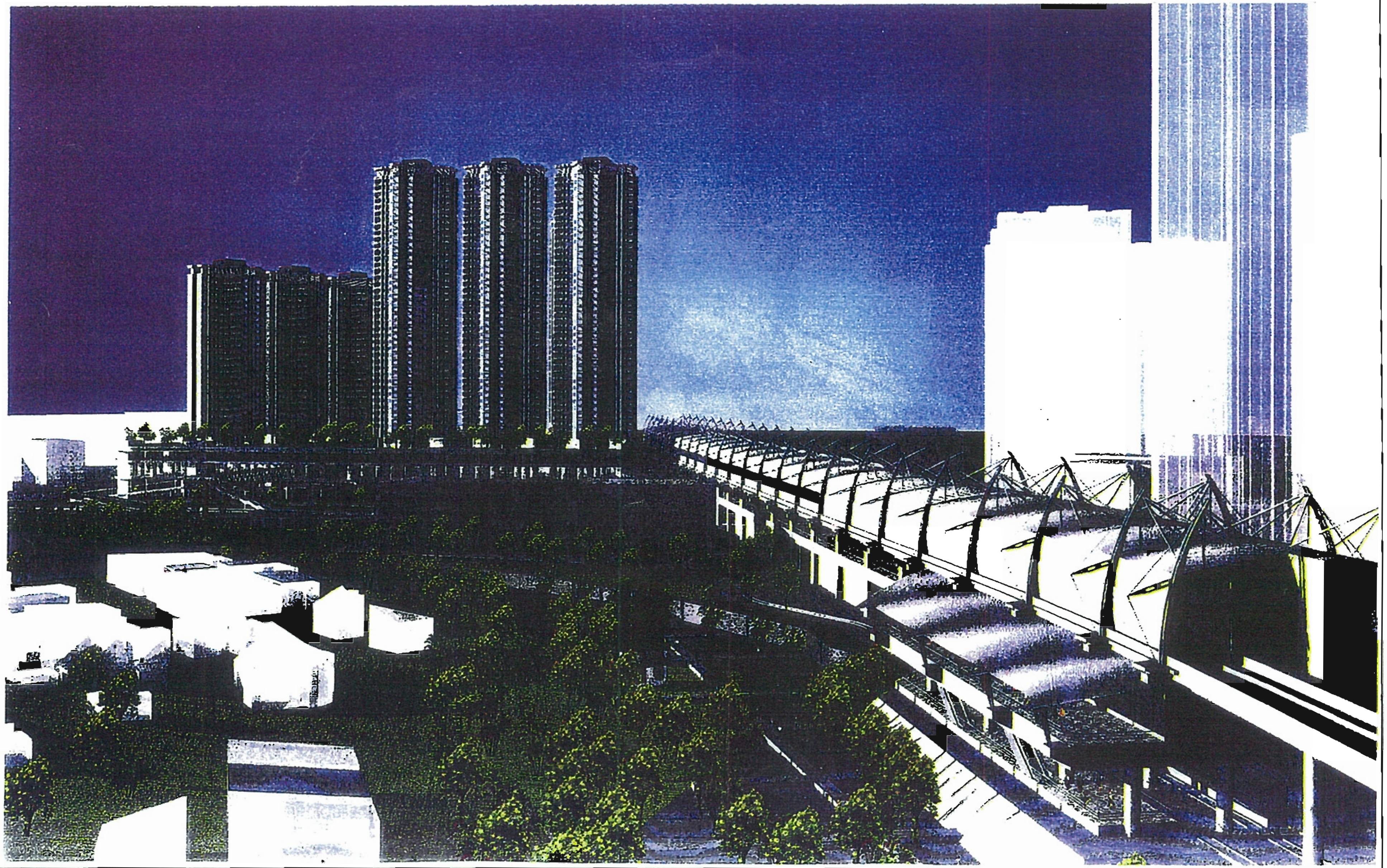
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



A STATION DESIGN EXAMPLE

FIGURE 8.6j

Contract/C1588/C1588_29

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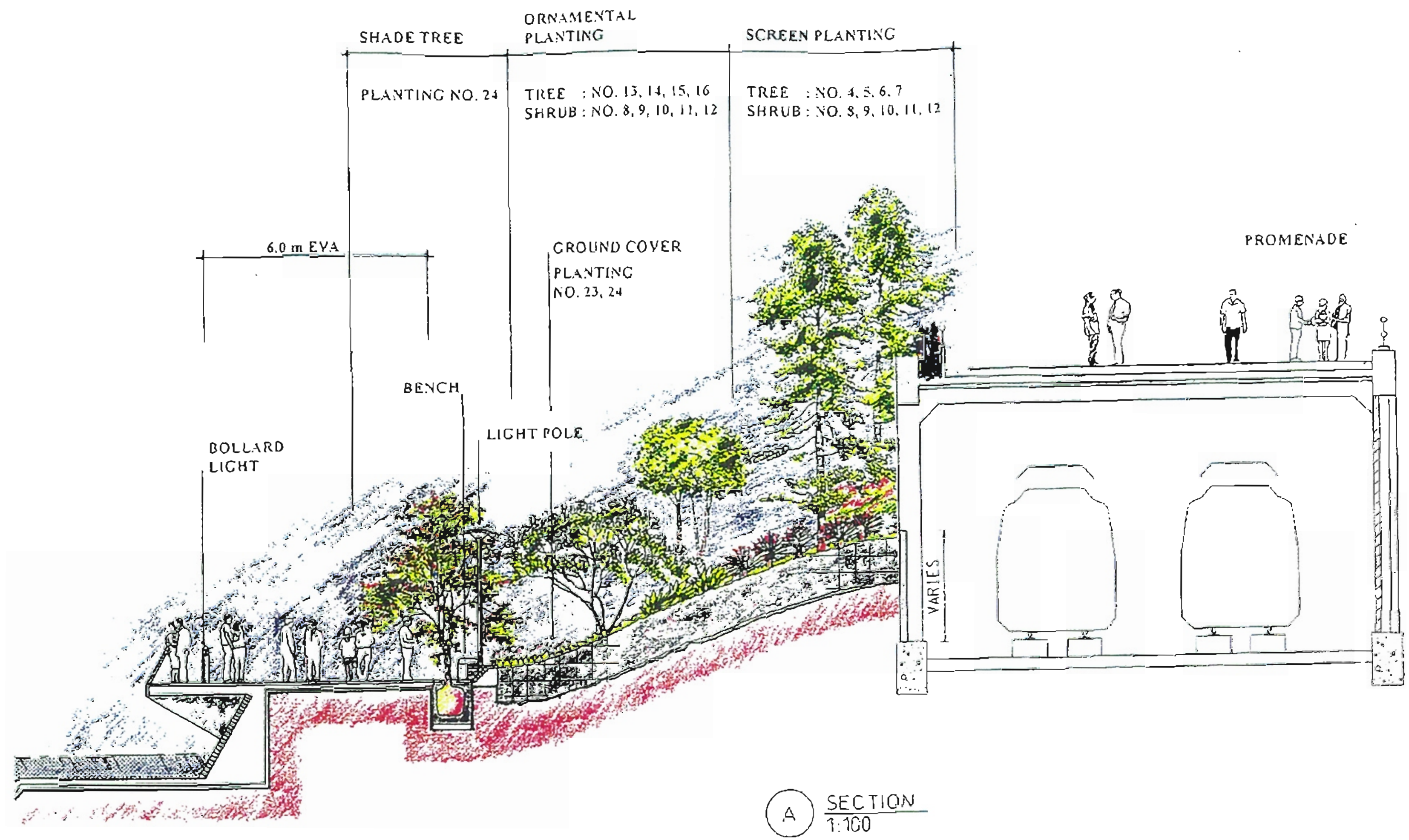
KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY



A SECTION 1:100

NOT TO SCALE

TYPICAL CROSS SECTION THROUGH WEST RAIL ENCLOSURE AT AREA 35 TUEN MUN NORTH STATION

FIGURE 8.6k

Contract/C1588/C1588Z45

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KOWLOON - CANTON RAILWAY CORPORATION

WEST RAIL: TS900 EIA STUDY