





# Civil Engineering and Development Department Agreement No. CE 38/2008 (HY)

Trunk Road T2

Final Environmental Impact Assessment Report

Hyder-Meinhardt Joint Venture 47th Floor, Hopewell Centre 183 Queen's Road East Wanchai Hong Kong Tel: +852 2911 2233 Fax: +852 2805 5028 hyder.hk@hyderconsulting.com www.hyderconsulting.com



## Civil Engineering and Development Department Agreement No. CE 38/2008 (HY)

Trunk Road T2

## Final Environmental Impact Assessment Report

Various	Im
Helen COCHRANE	In.
James PENNY	Sphang.
F0143-EB000560-MIEI	L-HKR-02
11 July 2013	
	Various Helen COCHRANE James PENNY F0143-EB000560-MIEI 11 July 2013

This report has been prepared for Civil Engineering and Development Department in accordance with the terms and conditions of appointment for Kai Tak Development - Trunk Road T2 and Infrastructure at South Apron Investigation, Design and Construction dated July 2009. Hyder Meinhardt Joint Venture cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

G

Printed on recycled paper



AGREEMENT NO: CE 38/2008 (HY) KAI TAK DEVELOPMENT - TRUNK ROAD T2 AND INFRASTRUCTURE AT SOUTH APRON INVESTIGATION, DESIGN AND CONSTRUCTION



## **CONTENTS**

1	<u>INT</u> R	ODUCTION
	1.1	General1-1
	1.2	Description of Project1-1
	1.3	Environment Impact Assessment
	1.4	Structure of the EIA Report
	1.5	Abbreviations
2	CON	SIDERATION OF ALTERNATIVES
	2.1	Introduction
	2.2	Alignment Option Review and Selection
	2.3	Evaluation Methodology2-9
	2.4	Alignment Options and Scenarios2-11
	2.5	Option Assessment2-21
	2.6	Construction Alternatives
3	PROJ	ECT DESCRIPTION
	3.1	Scope of the Project
	3.2	South Apron
	3.3	Subsea Tunnel Alignment
	3.4	Cha Kwo Ling
	3.5	Works Areas
	3.6	Barging Point
	3.7	Slope Works
	3.8	Sewage and Drainage
	3.9	Project Programme
	3.10	Concurrent Projects
	3.11	Traffic Data and Assumptions
	3.12	Environmental Conditions in the Absence of the Project and Environmental
		Benefits
	3.13	Designated Projects Under the EIAO
4	<u>AIR</u> (	QUALITY
	4.1	Introduction
	4.2	Environmental Legislation, Standards and Guidelines
	4.3	Existing Environment





	4.4	Identification of Air Sensitive Receivers	4-5
	4.5	Identification of Potential Air Quality Impacts	4-8
	4.6	Concurrent Projects4	-13
	4.7	Construction Phase Assessment Methodology4	-19
	4.8	Operational Phase Assessment Methodology	-25
	4.9	Construction Air Quality Assessment	-40
	4.10	Operational Air Quality Assessment4	-46
	4.11	Environmental Monitoring and Audit4	-55
	4.12	Summary and Conclusions	-55
5	NOIS	5 <u>E</u>	<u>5-1</u>
	5.1	Introduction	5-1
	5.2	Environmental Legislation, Standards and Guidelines	5-1
	5.3	Existing Environment	5-6
	5.4	Noise Sensitive Receivers	5-6
	5.5	Identification of Potential Noise Impacts5	-14
	5.6	Concurrent Projects	-17
	5.7	Construction Phase Assessment Methodology5	-21
	5.8	Operation Phase Assessment Methodology5	-30
	5.9	Construction Airborne Noise Impact Assessment5	-32
	5.10	Construction Ground-borne Noise Impact Assessment	-37
	5.11	Operational Fixed Plant Noise Impact Assessment5	-38
	5.12	Operational Traffic Noise Impact Assessment5	-39
	5.13	Environmental Monitoring and Audit5	-42
	5.14	Summary and Conclusions	-42
6	WAT		61
<u>U</u>	61	Introduction	<u>0-1</u> 6-1
	6.2	Environmental Legislation Standards and Guidelines	6 1
	0.2 6.3	Environmental Legislation, Standards and Outdennes	67
	0.5 6 4	Construction Phase Impact Assessment	0-7
	0.4 6 5	Operational Phase Impact Assessment	-11
	0.5	Decidual Impacts	-23
	0.0 6 7	Cumulativa Impacts	-21
	0.7	Cumulative impacts	-20
	0.8	Environmental Monitoring and Audit	-29
	0.9	Summary and Conclusions	-29
	6.10	Kererences	-30
7	MAR	INE ECOLOGY	7-1
	7.1	Introduction	7-1
	7.2	Environmental Legislation, Standards and Guidelines	7-2





	7.3	Key Ecological Sensitive Receivers	
	7.4	Literature Review	7-4
	7.5	Evaluation of Ecological Importance	7-11
	7.6	Ecological Impact Assessment Methodology	
	7.7	Construction Phase Impact Assessment	
	7.8	Operational Phase Impact Assessment	
	7.9	Mitigation Measures	
	7.10	Residual Impacts	
	7.11	Cumulative Impacts	
	7.12	Ecological Monitoring and Audit Requirements	
	7.13	Summary and Conclusions	
	7.14	References	
0	FICU	EDIEC	Q 1
0	<u> </u>	Introduction	<u> </u>
	0.1 8 2	Environmental Legislation Standards and Guidelines	
	0.2 8 3	Assessment Methodology	
	0.5 8 1	Assessment Methodology	
	0. <del>4</del> 8 5	Impact Assagement	
	0.J 8.6	Cumulative Impacts	
	8.0 8 7	Mitigation Maguras	
	0.7	Pasidual Impacts	
	0.0 8.0	Environmental Monitoring and Audit	
	0.9 9 10	Environmental Monitoring and Audit	
	0.10 0.11	Beferences	
	0.11	Kelefences	
9	LAN	DSCAPE & VISUAL IMPACT	<u>9-1</u>
	9.1	Introduction	9-1
	9.2	Environmental Legislation, Standards and Guidelines	
	9.3	Assessment Methodology	
	9.4	Scope and Content of the Study	
	9.5	Review of Planning and Development Control Framework	
	9.6	Baseline Study	
	9.7	Landscape Impact Assessment	
	9.8	Visual Impact Assessment	
	9.9	Mitigation Measures	
	9.10	Environmental Monitoring & Audit Requirement	
	9.11	Residual Impacts	
	9.12	Cumulative Landscape & Visual Impacts	
	9.13	Summary and Conclusions	



AGREEMENT NO: CE 38/2008 (HY) KAI TAK DEVELOPMENT - TRUNK ROAD T2 AND INFRASTRUCTURE AT SOUTH APRON INVESTIGATION, DESIGN AND CONSTRUCTION



10	CULT	URAL HERITAGE
	10.1	Introduction
	10.2	Environmental Legislation, Standards and Guidelines
	10.3	Objectives of the Cultural Heritage Impact Assessment
	10.4	Assessment Methodology
	10.5	Terrestrial Archaeology Impact Assessment
	10.6	Built Heritage Impact Assessment
	10.7	Marine Archaeology Impact Assessment
	10.8	Mitigation Measures
	10.9	Cumulative Impacts
	10.10	Residual Impacts
	10.11	Environmental Monitoring and Audit Requirements
	10.12	Summary and Conclusions
	10.13	References
<u>11</u>	WAST	TE MANAGEMENT AND LAND CONTAMINATION11-1
	11.1	Introduction
	11.2	Environmental Legislation, Guidelines and Standards
	11.3	Assessment Methodology
	11.4	Construction Phase Waste Management Assessment
	11.5	Land Contamination Assessment
	11.6	Summary and Conclusions
12	ENVI	RONMENTAL MONITORING AND AUDIT
	12.1	Introduction
	12.2	EM&A Requirements
	12.3	Air Quality
	12.4	Noise
	12.5	Water Quality
	12.6	Marine Ecology12-3
	12.7	Fisheries
	12.8	Landscape and Visual
	12.9	Cultural Heritage
	12.10	Waste Management and Land Contamination
10		
13	SUM	MARY OF ENVIRONMENTAL IMPACTS AND OUTCOMES

13.1	Introduction	13-	-1
10.1		••••••••••••••••	

#### **TABLES**

Table 2.1	Summary of Physical Constraints on Alignment Development
Table 2.2	Summary of Option Grading for Comparison with KTDES Alignment
Table 2.3	Weightings Assigned to Key Constraints and Issues
Table 2.4	Summary of Total Weighted Scores for Each Alignment
Table 2.5	Summary of Total Environmental Weighted Scores for Each Alignment
Table 2.6	Potential Environmental Benefits and Dis-benefits of Different N

- Table 2.6Potential Environmental Benefits and Dis-benefits of Different Numbers of<br/>Ventilation Buildings
- Table 2.7Comparative Assessment of IMT, Cut and Cover, Drill and Break and TBM<br/>Tunnelling Methods
- Table 2.8Potential Environmental Benefits and Dis-benefits of ELS Construction<br/>Methodology Options
- Table 2.9Traffic and Transport Impact Assessment for Establishment of Centre of<br/>Excellence in Paediatrics and Neuroscience and a New Acute Hospital in Kai Tak<br/>Development
- Table 2.10Junction Capacity at Critical Junctions
- Table 2.11Link Capacity at Strategic Road Links
- Table 2.12Junction Capacity at Critical Junctions
- Table 2.13Link Capacity at Strategic Road Links
- Table 3.1Details of Proposed Works Areas
- Table 3.2Estimated Sewage Generation
- Table 3.3Schedule 2 Designated Project under this Project
- Table 4.1Hong Kong Air Quality Objectives
- Table 4.2Tunnel Air Quality Guidelines
- Table 4.3EPD Air Quality Monitoring Data at Kwun Tong Station (2007 2011)
- Table 4.4
   Identified Representative Air Sensitive Receivers
- Table 4.5
   Identified Concurrent Projects and Aspects of Cumulative Impacts
- Table 4.6Method of Assessment of Potential Concurrent Emission Sources
- Table 4.7Assumptions for Calculation of Dust Emission Factors
- Table 4.8Annual Average TSP Results from EPD Kwun Tong Air Quality Monitoring<br/>Station (2007 to 20011)
- Table 4.9Vehicle Classification in EMFAC-HK
- Table 4.10Road Grouping
- Table 4.11Emission Factors for Twin Engine T58-GE-8F
- Table 4.12Daylight Average Marine Traffic Movements in Kwun Tong Entering/Leaving<br/>Typhoon Shelter (Visual Survey 2009)
- Table 4.131-hour, 24-hour and Annual Average Maximum Cumulative Unmitigated TSP<br/>Concentrations (µgm<sup>-3</sup>) at ASRs (Including Background Level)
- Table 4.14Tier 1 Screening Test: 1-hour and 24-hour Averaged Maximum Cumulative TSP<br/>Concentrations  $(\mu g/m^3)$  at ASRs (Including Background Level)
- Table 4.15Contribution of Construction Dust Impact at CKL3 by Various Projects<br/>(Excluding Background Level)

Table 4.16	Tier 2 Focused Cha Kwo Ling Assessment: 1-hour and 24-hour Maximum Cumulative TSP Concentrations ( $\mu$ g/m <sup>3</sup> ) at ASRs (Including Background Level)
Table 4.17	Annual Average Maximum Cumulative TSP Concentrations $(\mu g/m^3)$ at ASRs (Including Background Level)
Table 4.18	Sensitivity Test of Emission Inventories for NO <sub>x</sub> Emissions
Table 4.19	Sensitivity Test of Emission Inventories for RSP Emissions
Table 4.20	Predicted Maximum Overall Hourly, 24-hour and Annual NO <sub>2</sub> and RSP Concentrations ( $\mu g/m^3$ ) at ASRs (including background levels)
Table 4.21a	Breakdown of 1-Hourly NO <sub>2</sub> Contributions ( $\mu g/m^3$ and Percentage)
Table 4.21b	Breakdown of 24-Hourly NO <sub>2</sub> Contributions ( $\mu g/m^3$ and Percentage)
Table 4.21c	Breakdown of Annual NO <sub>2</sub> Contributions ( $\mu g/m^3$ and Percentage)
Table 4.22a	Breakdown of 24-Hourly RSP Contributions (µg/m3 and Percentage)
Table 4.22b	Breakdown of Annual RSP Contributions (µg/m3 and Percentage)
Table 5.1	Construction Noise Criteria for Restricted Working Hours for Activities other than Percussive Piling
Table 5.2	Construction Ground-borne Noise Criteria
Table 5.3	Road Traffic Noise Planning Criteria
Table 5.4	Acceptable Noise Level for Fixed Plant Noise
Table 5.5	Representative Noise Sensitive Receivers for the Construction Phase Assessment
Table 5.6	Representative Noise Sensitive Receivers Identified for the Operational Phase Assessment
Table 5.7	PMEs Identified as Major Noise Sources
Table 5.8	Identified Concurrent Projects and Aspects of Cumulative Impacts
Table 5.9	Comparison of TBM Specifications
Table 5.10	Comparison of Ground Conditions at WIL D012 and at Trunk Road T2 NSRs
Table 5.11	Maximum Noise Levels (dB(A)) during Construction without Noise Mitigation
Table 5.12	Mitigation Measures and Assumed Effectiveness for PMEs
Table 5.13	Maximum Noise Levels (dB(A)) during Construction with Noise Mitigation
Table 5.14	Cumulative Construction Noise Assessment with Concurrent Projects
Table 5.15	Predicted Ground-borne Noise for Eastbound Tunnel based on 10dB(A) Safety Factor
Table 5.16	Predicted Ground-borne Noise for Westbound Tunnel based on 10dB(A) Safety Factor
Table 5.17	Cumulative Operation Fixed Plant Noise Impact
Table 5.18	Predicted Unmitigated Traffic Noise Levels, $L_{10(1 \text{ hour})}$ , dB(A), at Future Noise Sensitive Receivers in the Year 2036
Table 6.1	Water Quality Objectives
Table 6.2	WSD Standards at Flushing Water Intakes
Table 6.3	Standards for Effluents Discharged into the Inshore Waters of Victoria Harbour Water Control Zone
Table 6.4	Standards for Effluents Discharged into the Marine Waters of Victoria Harbour Water Control Zone

Table 6.5	Relevant Water Sensitive Receivers
Table 6.6	Summary of EPD's Routine Water Quality Data (VM1, VM2 and VT4) for
	Victoria Harbour WCZ (Kwun Tong Typhoon Shelter) (2010-2011)
Table 6.7	Wastewater Discharge from Tunnelling and Excavation during Construction Phase
Table 6.8	Spill Response Key Responsibilities
Table 6.9	Potential Concurrent Projects Related to Water Quality
Table 7.1	Species of Conservation Interest Recorded in the Study Area
Table 7.2	Ecological Evaluation of Marine Habitats Present Within the Study Area
Table 7.3	Summary of Marine Habitats and their Ecological Value Within the Study Area
Table 7.4	Overall Impact Evaluation of Marine Habitats to be Indirectly Affected
Table 7.5	Summary of Construction Phase Impacts and Mitigation Measures
Table 7.6	Summary of Operation Phase Impacts and Mitigation Measures
Table 7.7	Potential Concurrent Projects Related to Water Quality
Table 8.1	Recent Hong Kong Capture Fisheries Industry Figures
Table 8.2	Recent Hong Kong Culture Fisheries Industry Figures
Table 8.3	Evaluation of Potential Fisheries Impacts during Construction Phase
Table 8.4	Evaluation of Potential Fisheries Impacts during Operational Phase
Table 8.5	Summary of Fisheries Impacts
Table 8.6	Summary of Cumulative Impacts
Table 9.1	Matrix for Impact Significance Threshold
Table 9.2	List of Landscape Resources and their Sensitivity
Table 9.3	List of Landscape Character Areas and their Sensitivity
Table 9.4	List of the Visually Sensitive Receivers A – Construction Phase
Table 9.5	Assessments of the Degree of Sensitivity: Construction Phase (Eastern Works
	Area)
Table 9.6	Assessments of the Degree of Sensitivity: Construction Phase (Western Works Area)
Table 9.7	Assessments of the Degree of Sensitivity: Operation Phase (Western Works Area)
Table 9.8	Summary of Proposed Treatment of Trees (Overall Site)
Table 9.9	Summary of Proposed Treatment of Trees (Individual Works Areas)
Table 9.10	Impacts on Landscape Resources of the Proposed Works and their Magnitude of Change
Table 9.11	Impacts on Landscape Character Area of the Proposed Works and their Magnitude of Change
Table 9.12	Significance Threshold of Landscape Resources before Mitigation
Table 9.13	Significance Threshold of Landscape Character Areas before Mitigation
Table 9.14	Magnitude of Change to Visually Sensitive Receivers: Eastern Works Area- Construction Phase
Table 9.15	Magnitude of Change to Visually Sensitive Receiver: Western Works Area- Construction Phase
Table 9.16	Magnitude of Change to Visually Sensitive Receiver: Western Works Area- Operation Phase





- Table 9.17Significance Threshold of Visually Sensitive Receiver before Mitigation (Eastern<br/>Works Area)
- Table 9.18Significance Threshold of Visually Sensitive Receiver before Mitigation (Western<br/>Works Area)
- Table 9.19Construction Phase Mitigation Measures
- Table 9.20Operation Phase Mitigation Measures
- Table 9.21Residual Impacts on Landscape Resources after Mitigation
- Table 9.22Residual Impacts on Landscape Character Areas after Mitigation
- Table 9.23Residual Impacts on Visually Sensitive Receivers after Mitigation (Eastern Works<br/>Area)
- Table 9.24Residual Impacts on Visually Sensitive Receivers after Mitigation (Western<br/>Works Area)
- Table 10.1Geological and Topographical Background
- Table 10.2
   Predicted Terrestrial Archaeological Impacts
- Table 10.3Impact Assessment for Built Heritage Resources in Cha Kwo Ling (Tunnel<br/>Alignment)
- Table 10.4Impact Assessment for Built Heritage Resources in Cha Kwo Ling (Works Area 5<br/>at the Cha Kwo Ling Public Cargo Handling Area)
- Table 11.1Sediment Quality Criteria for Classification of Sediment under ETWB TCW<br/>No.34/2002
- Table 11.2Risk-Based Remediation Goals for Soil and Soil Saturation Limit
- Table 11.3Risk-Based Remediation Goals for Groundwater and Solubility Limit
- Table 11.4Sediment Quality and Classification
- Table 11.5Summary of C&D Materials Arising from the Project
- Table 11.6Summary of Surplus C&D Materials and Time of Arising for Disposal
- Table 11.7
   Summary of Surplus C&D Waste Generation and Time of Arising for Disposal
- Table 11.8Recommended Waste Disposal Sites
- Table 11.9Conceptual Site Model
- Table 11.10Summary of SI Works
- Table 12.1Summary of EM&A Requirements
- Table 13.1
   Summary of Environmental Impacts Associated with the Project
- Table 13.2Summary of Key Environmental Outcomes

### FIGURES

Figure 1.1	General Layout Plan
Figure 2.1	KTDES layout
Figure 2.2a	Vertical Alignment and Geological Profile (Eastbound) (Sheet 1 of 4)
Figure 2.2b	Vertical Alignment and Geological Profile (Eastbound) (Sheet 2 of 4)
Figure 2.2c	Vertical Alignment and Geological Profile (Eastbound) (Sheet 3 of 4)
Figure 2.2d	Vertical Alignment and Geological Profile (Eastbound) (Sheet 4 of 4)
Figure 2.3	Jordan Valley Culvert



Figure 2.4	Foundation Layout for Kerry D-G Godown and Public Works Central Laboratory
Figure 2.5	Typical Arrangement for Existing KTTS Breakwater
Figure 2.6	Typical Arrangement for KTBP
Figure 2.7	Typical Arrangement of Submarine Outfall
Figure 2.8	Potential Arrangement of EFLS
Figure 2.9	Layout Plan – Alignment Options (Option 1)
Figure 2.10	Interface with CKR – Kai Tak Interchange
Figure 2.11	Interface with TKO-LTT – Lam Tin Interchange
Figure 2.12	Layout Plan – Alignment Options 1 to 8
Figure 2.13	<u>Highways layout at South Apron – Plan</u>
Figure 2.14	Highways Layout at South Apron Minimum Highway Sections (Sheet 1 of 5)
Figure 2.15	Highways Layout at South Apron Minimum Highway Sections (Sheet 2 of 5)
Figure 2.16	Highways Layout at South Apron Minimum Highway Sections (Sheet 3 of 5)
Figure 2.17	Highways Layout at South Apron Minimum Highway Sections (Sheet 4 of 5)
Figure 2.18	Highways Layout at South Apron Minimum Highway Sections (Sheet 5 of 5)
Figure 3.1a	General Layout Plan – T2 Works (Sheet 1 of 2)
Figure 3.1b	General Layout Plan – T2 Works (Sheet 2 of 2)
Figure 3.2	General Vertical Profile of the Preferred Trunk Road T2 Alignment – Option 3A
	<u>(Sheet 1 of 3)</u>
Figure 3.2a	General Vertical Profile of the Preferred Trunk Road T2 Alignment – Option 3A
	<u>(Sheet 2 of 3)</u>
Figure 3.2b	<u>General Vertical Profile of the Preferred Trunk Road T2 Alignment – Option 3A</u>
	(Sheet 3 of 3)
Figure 3.3	Layout Plan of D4 At-Grade Road
Figure 3.4	<u>T2 Western and Eastern Ventilation Buildings</u>
Figure 3.5a	Typical Section of At-Grade Road
Figure 3.5b	Typical Section of Depressed Road
Figure 3.5c	Typical Section of Cut and Cover Tunnel
Figure 3.5d	Typical Cross Section of the Submarine Tunnel
Figure 3.6	<u>Proposed T2 TBM Support Equipment South Apron – Launching Shaft Area</u>
Figure 3.7	Receiving Shaft Area
Figure 3.8a	Layout – Works Areas (Sheet 1 of 2)
Figure 3.8b	Layout – Works Areas (Sheet 2 of 2)
Figure 3.9a	Layout – T2 Construction Stages (Stage 1)
Figure 3.9b	Layout – T2 Construction Stages (Stage 2)
Figure 3.9c	Layout – T2 Construction Stages (Stage 3)
Figure 3.9d	Layout – T2 Construction Stages (Stage 4)
Figure 3.9e	Layout – T2 Construction Stages (Stage 5)
Figure 3.9f	Layout – T2 Construction Stages (Stage 6)
Figure 3.9g	Layout – T2 Construction Stages (Stage 7)
Figure 3.9h	Layout – T2 Construction Stages (Stage 8)



Figure 3.9i	Layout – T2 Construction Stages (Stage 9)
Figure 3.9j	Layout – T2 Construction Stages (Stage 10)
Figure 3.9k	Layout – T2 Construction Stages (Stage 11)
Figure 3.91	Layout – T2 Construction Stages (Stage 12)
Figure 3.9m	Layout – T2 Construction Stages (Stage 13)
Figure 3.9n	Layout – T2 Construction Stages (Stage 14)
Figure 3.10a	Other Infrastructure Works for KTD (Sheet 1 of 2)
Figure 3.10b	Other Infrastructure Works for KTD (Sheet 2 of 2)
Figure 3.11	Interface with CKE – Kai Tak Interchange
Figure 3.12	Interface with TKO – LTT – Lam Tin Interchange
Figure 4.1a	Identified Existing and Future ASRs at South Apron of Former Kai Tak Airport (Construction Phase)
Figure 4.1b	Identified Existing and Future ASRs at Cha Kwo Ling (Construction Phase)
Figure 4.2a	Identified Existing and Future ASRs at South Apron of Former Kai Tak Airport (Operational Phase)
Figure 4.2b	Identified Existing and Future ASRs at Cha Kwo Ling (Operational Phase)
Figure 4.3a	Road Network at South Apron of Former Kai Tak Airport
Figure 4.3b	Road Network at Cha Kwo Ling
Figure 4.4a	Road Types at South Apron of Former Kai Tak Airport
Figure 4.4b	Road Types at Cha Kwo Ling
Figure 4.5	Location of Core Station
Figure 4.6	<u>1-Hour Averaged Cumulative Unmitigated TSP Concentration in µgm<sup>-3</sup> of Tier 1</u> at 1.5m above Ground Level at KTD (AQO: 500 µgm <sup>-3</sup> )
Figure 4.7	1-Hour Averaged Cumulative Unmitigated TSP Concentration in ugm <sup>-3</sup> of Tier 1
<u>inguio</u> III	at 1.5m above Ground Level at CKL (AOO: 500 µgm <sup>-3</sup> )
Figure 4.8	24-Hour Averaged Cumulative Unmitigated TSP Concentration in ugm <sup>-3</sup> of Tier 1
	at 1.5m above Ground Level at KT (AQO: 260 µgm <sup>-3</sup> )
Figure 4.9	24-Hour Averaged Cumulative Unmitigated TSP Concentration in μgm <sup>-3</sup> of Tier 1 at 1.5m above Ground Level at CKL (AQO: 260 μgm <sup>-3</sup> )
<u>Figure 4.10</u>	Annual Averaged Cumulative Unmitigated TSP Concentration in µgm <sup>-3</sup> at 1.5m above Ground Level at KT (AQO: 80 µgm <sup>-3</sup> )
Figure 4.11	Annual Averaged Cumulative Unmitigated TSP Concentration in µgm <sup>-3</sup> at 1.5m
-	above Ground Level at CKL (AQO: 80 µgm <sup>-3</sup> )
Figure 4.12	1-Hour Averaged Cumulative Mitigated TSP Concentration in µgm <sup>-3</sup> of Tier 1 at
	<u>1.5m above Ground Level at KT (AQO: 500µgm<sup>-3</sup>)</u>
Figure 4.13	1-Hour Averaged Cumulative Mitigated TSP Concentration in µgm <sup>-3</sup> of Tier 1 at
	<u>1.5m above Ground Level at CKL (AQO: 500µgm<sup>-3</sup>)</u>
Figure 4.14	24-Hour Averaged Cumulative Mitigated TSP Concentration in µgm <sup>-3</sup> of Tier 1 at
	<u>1.5m above Ground Level at KT (AQO: 260µgm<sup>-3</sup>)</u>
Figure 4.15	24-Hour Averaged Cumulative Mitigated TSP Concentration in µgm <sup>-3</sup> of Tier 1 at
	<u>1.5m above Ground Level at CKL (AQO: 260µgm<sup>-3</sup>)</u>

Final EIA Report -(F0143-EB000560-MIEL-HKL-02) July 2013





Figure 4.16	1-Hour Averaged Cumulative Mitigated TSP Concentration in $\mu$ gm <sup>-3</sup> of Tier 2 at
	1.5m above Ground Level at CKL (AQU: 500µgm <sup>-</sup> )
Figure 4.17	<u>24-Hour Averaged Cumulative Mitigated TSP Concentration in µgm<sup>-3</sup> of Tier 2 at</u>
<b>F</b> ' <b>1</b> 10	$\frac{1.5111 \text{ above Orbitud Level at CKL (AQO, 200 \mu gm-)}{1.5111 \text{ above Orbitud Level at CKL (AQO, 200 \mu gm-)}$
Figure 4.18	<u>Annual Averaged Cumulative Mitigated TSP Concentration in μgm<sup>-</sup> at 1.5m</u> above Ground Level at KT (AOO: 80μgm <sup>-3</sup> )
Figure 4.19	Annual Averaged Cumulative Mitigated TSP Concentration in ugm <sup>-3</sup> of at 1.5m
	above Ground Level at CKL (AOO: 80ugm <sup>-3</sup> )
Figure 4.20	Overall Cumulative 1hr NO <sub>2</sub> Concentration at 1.5m above Ground Level at KT
	Area (AQO: $300 \ \mu g/m^3$ )
Figure 4.21	Overall Cumulative 1hr NO <sub>2</sub> Concentration at 1.5m above Ground Level at CKL
	Area (AQO: $300 \ \mu g/m^3$ )
Figure 4.22	Overall Cumulative 1hr NO <sub>2</sub> Concentration at 5m above Ground Level at KT Area
	$(AQO: 300 \ \mu g/m^3)$
Figure 4.23	Overall Cumulative 1hr NO <sub>2</sub> Concentration at 20m above Ground Level at KT
	Area (AQO: $300 \ \mu g/m^3$ )
Figure 4.24	Overall Cumulative 1hr NO <sub>2</sub> Concentration at 20m above Ground Level at CKL
	Area (AQO: $300 \ \mu g/m^3$ )
Figure 4.25	Overall Cumulative 24hr NO <sub>2</sub> Concentration at 1.5m above Ground Level at KT
	Area (AQO: 150 $\mu$ g/m <sup>3</sup> )
Figure 4.26	Overall Cumulative 24hr NO <sub>2</sub> Concentration at 1.5m above Ground Level at CKL
-	Area (AQO: 150 $\mu$ g/m <sup>3</sup> )
Figure 4.27	Overall Cumulative 24hr NO <sub>2</sub> Concentration at 5m above Ground Level at KT
	$\frac{\text{Area} (\text{AQO: 150 } \mu\text{g/m}^3)}{150 }$
Figure 4.28	Overall Cumulative 24hr NO <sub>2</sub> Concentration at 20m above Ground Level at KT
	<u>Area (AQO: 150 μg/m<sup>3</sup>)</u>
Figure 4.29	Overall Cumulative 24hr RSP Concentration at 1.5m above Ground Level at KT
	<u>Area (AQO: 180 μg/m<sup>3</sup>)</u>
Figure 4.30	Overall Cumulative 24hr RSP Concentration at 1.5m above Ground Level at CKL
	<u>Area (AQO: 180 μg/m<sup>3</sup>)</u>
Figure 4.31	Overall Cumulative Annual NO <sub>2</sub> Concentration at 1.5m above Ground Level at
	<u>KT Area (AQO: 80 μg/m<sup>3</sup>)</u>
Figure 4.32	Overall Cumulative Annual NO <sub>2</sub> Concentration at 1.5m above Ground Level at
	CKL Area (AQO: $80 \ \mu g/m^3$ )
Figure 4.33	Overall Cumulative Annual NO <sub>2</sub> Concentration at 5m above Ground Level at KT
	Area (AQO: $80 \ \mu g/m^3$ )
Figure 4.34	Overall Cumulative Annual RSP Concentration at 1.5m above Ground Level at
	<u>KT Area (AQO: 55 μg/m<sup>3</sup>)</u>
Figure 4.35	Overall Cumulative Annual RSP Concentration at 1.5m above Ground Level at
	CKL Area (AQO: 55 $\mu$ g/m <sup>3</sup> )
Figure 4.36	Overall Cumulative Annual RSP Concentration at 5m above Ground Level at KT
	Area (AQO: 55 $\mu$ g/m <sup>3</sup> )





Figure 5.1a	Identified Existing and Future NSRs at South Apron of Former Kai Tak Airport
	(Construction Phase)
Figure 5.1b	Identified Existing and Future NSRs at Cha Kwo Ling (Construction Phase)
Figure 5.2a	Identified Existing and Future NSRs at South Apron of Former Kai Tak Airport
	(Operational Phase)
Figure 5.2b	Identified Existing and Future NSRs at Cha Kwo Ling (Operational Phase)
Figure 5.3	Force Density Level of TBM (From Lok Ma Chau)
Figure 5.4	PSR of WIL 2012 Borehole Adopted for GBN Assessment
Figure 5.5	Building Coupling Factor
Figure 5.6	Building Vibration Amplification
Figure 5.7a	Fixed Plant for Trunk Road T2 at South Apron of Former Kai Tak Airport
Figure 5.7b	Fixed Plant for Trunk Road T2 at Cha Kwo Ling
Figure 6.1	Relevant Water Control Zones and Fish Culture Zones
Figure 6.2	Locations of Representative Water Sensitive Receivers and EPD Monitoring
	Stations
Figure 7.1a	Habitat Map (Sheet 1 of 4)
Figure 7.1b	Habitat Map (Sheet 2 of 4)
Figure 7.1c	Habitat Map (Sheet 3 of 4)
Figure 7.1d	Habitat Map (Sheet 4 of 4)
Figure 8.1a	Distribution of Fisheries Production (Adult Fish)
Figure 8.1b	Distribution of Fisheries Production (Fish Fry)
Figure 8.2a	Distribution of Fishing Operations (Vessel not Exceeding 15m in Length)
Figure 8.2b	Distribution of Fishing Operations (Vessel Exceeding 15m in Length)
Figure 9.1	Landscape & Visual Impact Study Area
Figure 9.2	Existing Aerial Photograph
Figure 9.4.1	Existing Oblique Aerial Photograph – West End
Figure 9.4.2	Existing Oblique Aerial Photograph – Central
Figure 9.4.3	Existing Oblique Aerial Photograph– East End
Figure 9.5	Planning & Development Framework (OZP) (Sheet 1 of 9)
Figure 9.5.1	Planning & Development Framework (OZP) (Sheet 2 of 9)
Figure 9.5.2	Planning & Development Framework (OZP) (Sheet 3 of 9)
Figure 9.5.3	Planning & Development Framework (OZP) (Sheet 4 of 9)
Figure 9.5.4	Planning & Development Framework (OZP) (Sheet 5 of 9)
Figure 9.5.5	Planning & Development Framework (OZP) (Sheet 6 of 9)
Figure 9.5.6	Planning & Development Framework (OZP) (Sheet 7 of 9)
Figure 9.5.7	Planning & Development Framework (OZP) (Sheet 8 of 9)
Figure 9.5.8	Planning & Development Framework (OZP) (Sheet 9 of 9)
Figure 9.6.1	Landscape Resources Plan (Sheet 1 of 2)
Figure 9.6.2	Landscape Resources Plan (Sheet 2 of 2)
Figure 9.7.1	Photo of Landscape Resources (Sheet 1 of 4)
Figure 9.7.2	Photo of Landscape Resources (Sheet 2 of 4)



Figure 9.7.3	Photo of Landscape Resources (Sheet 3 of 4)
Figure 9.7.4	Photo of Landscape Resources (Sheet 4 of 4)
Figure 9.8.1	Landscape Character Areas Plan (Sheet 1 of 2)
Figure 9.8.2	Landscape Character Areas Plan (Sheet 2 of 2)
Figure 9.9.1	Photo of Landscape Character Area (Sheet 1 of 2)
Figure 9.9.2	Photo of Landscape Character Area (Sheet 2 of 2)
Figure 9.10.1	Broadbrush Tree Survey Plan (Sheet 1 of 2)
Figure 9.10.2	Broadbrush Tree Survey Plan (Sheet 2 of 2)
Figure 9.11.2	Trunk Road T2 & South Apron Master Landscape Plan
Figure 9.12.1	T2 Western Ventilation Building & Tunnel Portal - General Layout
Figure 9.12.2	T2 Western Tunnel Portal - Section
Figure 9.12.3	T2 Western Ventilation Building - Section
Figure 9.12.4	T2 Western Ventilation Building & Tunnel Portal - Elevation
Figure 9.14	Visually Sensitive Receivers Plan: Construction Phase (Sheet 1 of 8)
Figure 9.14.1	Visually Sensitive Receivers Plan: Construction Phase (Sheet 2 of 8)
Figure 9.14.2	Visually Sensitive Receivers Plan: Construction Phase (Sheet 3 of 8)
Figure 9.14.3	Visually Sensitive Receivers Plan: Construction Phase (Sheet 4 of 8)
Figure 9.14.4	Visually Sensitive Receivers Plan: Construction Phase (Sheet 5 of 8)
Figure 9.14.5	Visually Sensitive Receivers Plan: Construction Phase (Sheet 6 of 8)
Figure 9.14.6	Visually Sensitive Receivers Plan: Construction Phase (Sheet 7 of 8)
Figure 9.14.7	Visually Sensitive Receivers Plan: Construction Phase (Sheet 8 of 8)
Figure 9.15	Visually Sensitive Receivers Plan: Operation Phase (Sheet 1 of 7)
Figure 9.15.1	Visually Sensitive Receivers Plan: Operation Phase (Sheet 2 of 7)
Figure 9.15.2	Visually Sensitive Receivers Plan: Operation Phase (Sheet 3 of 7)
Figure 9.15.3	Visually Sensitive Receivers Plan: Operation Phase (Sheet 4 of 7)
Figure 9.15.4	Visually Sensitive Receivers Plan: Operation Phase (Sheet 5 of 7)
Figure 9.15.5	Visually Sensitive Receivers Plan: Operation Phase (Sheet 6 of 7)
Figure 9.15.6	Visually Sensitive Receivers Plan: Operation Phase (Sheet 7 of 7)
Figure 9.16.1	Photo of Visual Sensitive Receivers (Sheet 1 of 13)
Figure 9.16.2	Photo of Visual Sensitive Receivers (Sheet 2 of 13)
Figure 9.16.3	Photo of Visual Sensitive Receivers (Sheet 3 of 13)
Figure 9.16.4	Photo of Visual Sensitive Receivers (Sheet 4 of 13)
Figure 9.16.5	Photo of Visual Sensitive Receivers (Sheet 5 of 13)
Figure 9.16.6	Photo of Visual Sensitive Receivers (Sheet 6 of 13)
Figure 9.16.7	Photo of Visual Sensitive Receivers (Sheet 7 of 13)
Figure 9.16.8	Photo of Visual Sensitive Receivers (Sheet 8 of 13)
Figure 9.16.9	Photo of Visual Sensitive Receivers (Sheet 9 of 13)
Figure 9.16.10	Photo of Visual Sensitive Receivers (Sheet 10 of 13)
Figure 9.16.11	Photo of Visual Sensitive Receivers (Sheet 11 of 13)
Figure 9.16.12	Photo of Visual Sensitive Receivers (Sheet 12 of 13)
Figure 9.16.13	Photo of Visual Sensitive Receivers (Sheet 13 of 13)



Figure 9.17	Trunk Road T2 & South Apron - Photomontage Key Plan
Figure 9.17.1	View Point No. 1 Photomontages -16th Floor, Megabox
Figure 9.17.2	View Point No. 2 Photomontages - Trunk Road T2 & Road L18
Figure 9.17.3	View Point No. 3 Photomontages – Trunk Road T2 Refuse Collection Point
	Road D4
Figure 9.17.4	View Point No. 4 Photomontages – Top Floor Proposed Residential Block: R3
	Runway Precinct Housing Development
Figure 10.1a	Study Area for Terrestrial Archaeology and Built Heritage at Former Kai Tak
	Airport South Apron
Figure 10.1b	Study Area for Terrestrial Archaeology and Built Heritage at Cha Kwo Ling Road
Figure 10.1c	Study Area for Marine Archaeology (Sheet 1 of 2)
Figure 10.1d	Study Area for Marine Archaeology (Sheet 2 of 2)
Figure 10.2	Geology of Study Area and Location of Works Areas
Figure 10.3	Map Shown the Location of Cha Kwo Ling Law Mansion (HB-10)
Figure 10.4	Historical 1903 Map Showing the Layout of Cha Kwo Ling Village
Figure 10.5	Historical 1972 Map Showing the Layout of Cha Kwo Ling Village
Figure 10.6	Map Shown the Locations of Built Heritage Resources at Cha Kwo Ling
Figure 10.7	Coverage of Existing Mai Surveys and Studies
Figure 10.8	Location of Sonar Contacts within Area A (Agreement CE 32/99)
Figure 10.9	Area for Additional Geophysical Survey
Figure 10.10	Location of 2010 Sonar Contract in Relation to the Study Area
Figure 11.1a	Sediment Sampling Stations (Sheet 1 of 2)
Figure 11.1b	Sediment Sampling Stations (Sheet 2 of 2)
Figure 11.2a	Study Area for Land Contamination Assessment (Sheet 1 of 2)
Figure 11.2b	Study Area for Land Contamination Assessment (Sheet 2 of 2)
-	
APPENDICES	
Appendix 1A	Environmental Mitigation Implementation Schedule
Appendix 2A	Planning Application (Application No. A/K22/13) for Residential Development at
••	the Site Approved by Town Planning Board in March 2012
Appendix 2B	Option Assessment Scores
Appendix 3A	T2 Summary Construction Programme using TBM
Appendix 3B	Not used
Appendix 3C	Summary table of Concurrent Projects
Appendix 3D	Letter from Transport Department confirming no adverse comments on Technical
	Notes No.TN2 and TN3
Appendix 4A	Justification of Percentage of Active Area and Calculation of Watering Efficiency

Appendix 4B Details of Dust Emission Sources of T2

Appendix 4C Details of Dust Emission Sources of Concurrent Projects

Appendix 4D Trips Estimation

Appendix 4E Estimated VKT in Years 2016, 2021 and 2032

Final EIA Report –(F0143-EB000560-MIEL-HKL-02) July 2013



Appendix 4F	Meteorology Information
Appendix 4G	Estimated Emission Factors in Yr 2021, Yr 2026 and Yr 2036
Appendix 4H	Ventilation Building & Portal Emission of Trunk Road T2
Appendix 4I	Ventilation Building & Portal Emission of Central Kowloon Route (CKR)
Appendix 4J	Ventilation Building & Portal Emission of Tseung Kwan O – Lam Tin Tunnel
	(TKO-LTT)
Appendix 4K	Emission of Eastern Harbour Crossing
Appendix 4L	Emission of Kai Tak Cruise Terminal
Appendix 4M	Emission of Hospital Chimney
Appendix 4N	Emission of Helicopter
Appendix 40	Emission of Kwun Tong Typhoon Shelter
Appendix 4P	Sensitivity Test of Emission Inventory
Appendix 4Q	Sample Calculations of the TSP Results of ASRs
Appendix 4R	Emission Factor of Year 2021 for CALINE4 Modelling
Appendix 4S	Sample Calculations of the NO <sub>2</sub> and RSP Results of ASRs
Appendix 4T	In Tunnel Air Quality
Appendix 5A	Identified Representative Noise Sensitive Receivers
Appendix 5B	Lists of Notional Sources and Respective Slant Distances from NSRs
Appendix 5C	Plant Inventory Unmitigated Scenario
Appendix 5D	Geological Profile at the Road T2 NSRs
Appendix 5E	Construction Noise Assessment (Unmitigated Scenario)
Appendix 5F	Plant Inventory Mitigated Scenario
Appendix 5G	Construction Noise Assessment (Mitigated Scenario)
Appendix 5H	Unmitigated Detailed Ground-borne Noise Calculations
Appendix 5I	Operation Fixed Plant Noise
Appendix 5J	Roads Network for the Traffic Noise Impact Assessment
Appendix 5K	Approval Letter from Transport Department
Appendix 5L	Predicted Traffic Noise Results of the Unmitigated Scenario
Appendix 5M	Sample Calculation for 6 Identified NSRs in Traffic Noise Assessment
Appendix 7A1	Representative Photographs of Intertidal Habitats obtained from KTD EIA (EIAO Register No. AEIAR-130/2009)
Appendix 7A2	Locations of the Intertidal Survey and Coral Surveys in KTD EIA (EIAO Register
	<u>No. AEIAR-130/2009)</u>
Appendix 10A	Built Heritage Catalogue
Appendix 10B	2002 Marine Archaeological Investigation Report, Prepared under Agreement No.
	<u>CE 32/99 Comprehensive Feasibility Study for The Revised Scheme of South East</u>
	Kowloon Development, March 2002
Appendix 10C	2008 Baseline Review Report, Prepared under Agreement No. CE 58/2006(HY)
	<u>Central Kowloon Route and Widening of Gascoigne Road Flyover Marine</u> Archaeological Investigation (MAI). November 2008
Appondix 10D	Coophysical Survey Works Order Number CE/2010/02.7 A grooment No. CE
Appendix 10D	38/2008 (HY) Kai Tak Development – Trunk Road T2 and Infrastructure at South





<u>Apron – Investigation, Design and Construction, Archaeological Geophysical</u> <u>Survey</u>

- Appendix 11ASediment Testing and Sampling Plan, Fieldwork Records, Laboratory Test Results,<br/>and Geological Profile based on Previous SI RecordsAppendix 11BSummary of Initial Review for Land Contamination Potential, Contamination
- Assessment Plan, and Contamination Assessment Report
- Appendix 11C Letter from CEDD's Vetting Committee on 28 February 2013
- Appendix 11D Construction and Demolition Material Management Plan