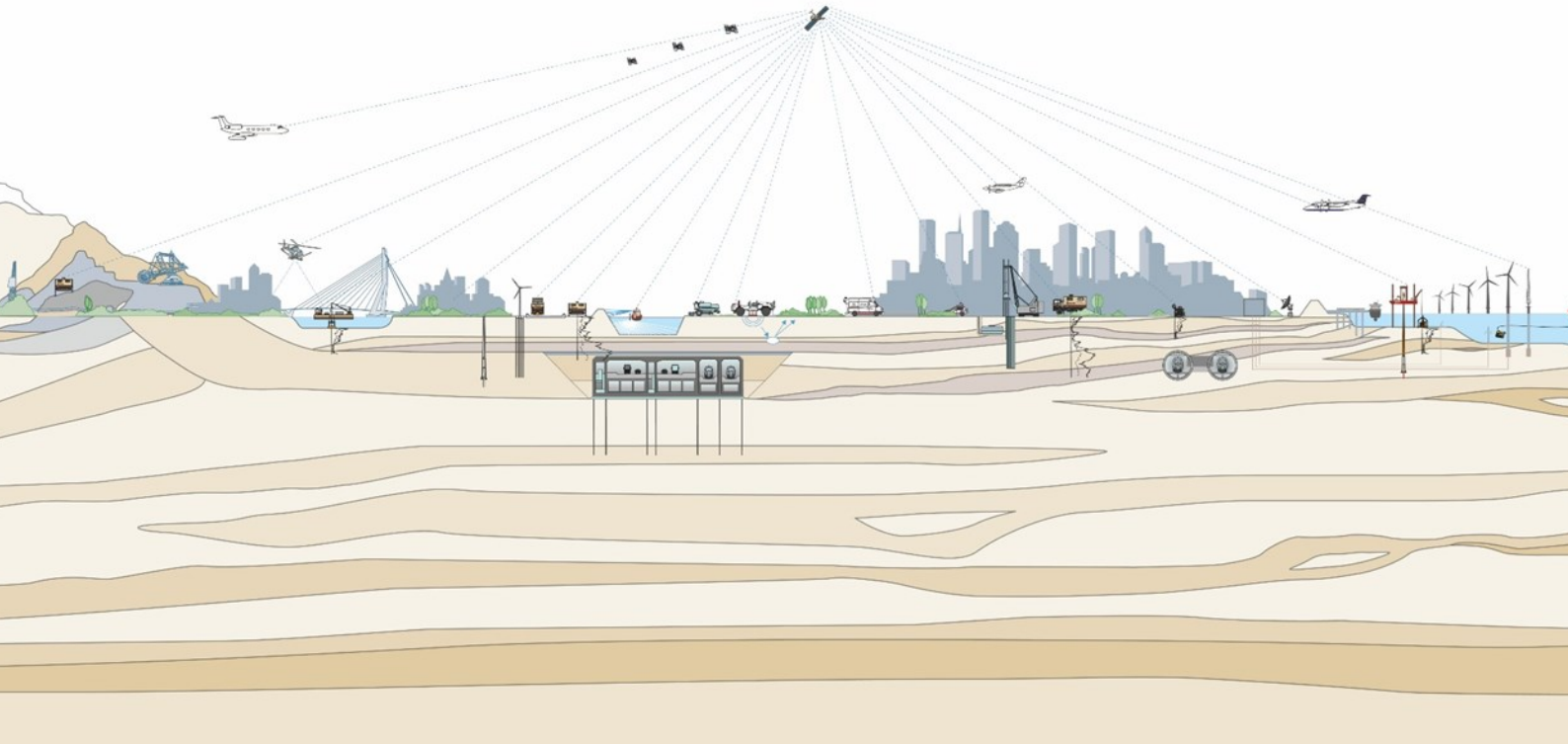
Updated EM&A Manual
for
Advance And First Stage Works of Kwu Tung North and Fanling North New Development Areas

Project Proponent	:	Civil Engineering and Development Department
Project	:	Contract No. NDO 14/2018 - Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas
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CONTENTS

1.	**INTRODUCTION**	**1**
1.1	Background	1
1.2	Project Scope	1
1.3	Purpose of This Manual	2
1.4	Project Organization	3
1.5	Summary Matrix for Environmental Monitoring Requirement	5
1.6	Key Changes of Update EM&A Manual	5
2.	**AIR QUALITY**	**8**
2.1	Introduction	8
2.2	Mitigation Measures	8
2.3	Monitoring Parameters for Construction Phase	8
2.4	Monitoring Equipment for Construction Phase	8
2.5	Laboratory Measurement / Analysis	10
2.6	Monitoring Locations	10
2.7	Baseline Monitoring	12
2.8	Impact Monitoring	13
2.9	Action / Limit Level	13
2.10	Event and Action Plan	14
3.	**NOISE**	**17**
3.1	Introduction	17
3.2	Mitigation Measures	17
3.3	Monitoring Parameters for Construction Phase	17
3.4	Monitoring Equipment for Construction Phase	17
3.5	Monitoring Locations for Construction Phase	18
3.6	Baseline Monitoring for Construction Phase	19
3.7	Impact Monitoring for Construction Phase	19
3.8	Action / Limit Level	20
3.9	Event and Action Plan	20
3.10	Impact Monitoring/Commissioning Test for Operational Phase	22
3.11	Methodology for Operational Phase	23
3.12	Noise Monitoring Stations for Operational Phase	23
4.	**WATER QUALITY**	**25**
4.1	Introduction	25
4.2	Mitigation Measures	25
4.3	Monitoring Locations	25
4.4	Monitoring Parameters	26
4.5	Baseline Monitoring	26
4.6	Impact Monitoring	26
4.7	Verification Monitoring	27
4.8	Monitoring Equipment	27
4.9	Laboratory Measurement / Analysis	28

4.10	Quality Control	29
4.11	Action and Limit Levels	30
4.12	Event and Action Plan	31
5.	**SEWERAGE AND SEWAGE TREATMENT IMPLICATIONS**	**34**
5.1	Introduction	34
5.2	Sewerage and Sewage Treatment Implications during Construction Phase	34
5.3	Mitigation Measures	34
6.	**WASTE MANAGEMENT IMPLICATIONS**	**35**
6.1	Introduction	35
6.2	Mitigation Measures	35
6.3	Waste EM&A Requirements	35
7.	**LAND CONTAMINATION**	**37**
7.1	Introduction	37
7.2	Site Investigations for Inaccessible Potentially Contaminated Sites	37
7.3	Re-appraisal of Surveyed Sites	37
7.4	Treatment Method for Arsenic-containing Soil in KTN	37
7.5	Ambient Arsenic Monitoring	38
8.	**HAZARD TO LIFE**	**43**
8.1	Introduction	43
8.2	Mitigation Measures	43
9.	**LANDFILL GAS HAZARD**	**44**
9.1	Introduction	44
9.2	Monitoring and Mitigation Measures	44
10.	**LANDSCAPE AND VISUAL**	**47**
10.1	Introduction	47
10.2	Mitigation Measures	47
10.3	Audit Requirement	47
11.	**CULTURAL HERITAGE**	**49**
11.1	Introduction	49
11.2	Mitigation Measures	49
11.3	Monitoring and Audit Requirements	51
12.	**ECOLOGY**	**52**
12.1	Introduction	52
12.2	Mitigation Measures	52
12.3	Monitoring and Audit Requirements	55
12.4	Baseline Ecological Monitoring Plan	63
13.	**FISHERIES**	**64**
13.1	Introduction	64

13.2 Mitigation Measures 64
13.3 Monitoring and Audit Requirement 64

14. SITE ENVIRONMENTAL AUDIT 65
14.1 Site Inspection 65
14.2 Compliance with Legal and Contractual Requirements 66
14.3 Environmental Complaints 66

15. REPORTING 68
15.1 General 68
15.2 Baseline Monitoring Report 68
15.3 Monthly Monitoring Reports 69
15.4 Final EM&A Review Reports 74
15.5 Data Keeping 75
15.6 Interim Notifications of Environmental Quality Limit Exceedances 75

FIGURES

Figure 1.1 Locations of the Projects in KTN and FLN NDA (Contract 1)
Figure 1.2 Locations of the Projects in KTN and FLN NDA (Contract 2)
Figure 1.3 Locations of the Projects in KTN and FLN NDA (Contract 3)
Figure 1.4 Locations of the Projects in KTN and FLN NDA (Contract 4)
Figure 1.5 Locations of the Projects in KTN and FLN NDA (Contract 5)
Figure 1.6 Locations of the Projects in KTN and FLN NDA (Contract 6)
Figure 1.7 Locations of the Projects in KTN and FLN NDA (Contract 7)
Figure 2.1 Locations of Dust Monitoring Stations in KTN NDA
Figure 2.2 Locations of Dust Monitoring Stations in FLN NDA
Figure 2.3 Locations of Dust Monitoring Stations (FLN NDA)
Figure 3.1 Locations of Construction Airborne Noise Monitoring Stations in KTN NDA
Figure 3.2 Locations of Construction Airborne Noise Monitoring Stations in FLN NDA
Figure 3.3 Locations of Operational Noise Monitoring Stations in KTN NDA
Figure 3.4 Locations of Operational Noise Monitoring Stations in FLN NDA
Figure 4.1 Locations of Water Quality Monitoring Station in KTN NDA
Figure 4.2 Locations of Water Quality Monitoring Station in FLN NDA
Figure 9.1 Location of Landfill Contamination Zone within NENT NDAs
Figure 9.2 Ma Tso Lung Landfill Site and KTN NDA RODP
Figure 12.1 Areas of Compensatory Planting in KTN NDA
Figure 12.2 Areas of Compensatory Planting in FLN NDA

APPENDICE

Appendix A Project Organization for Environmental Works
Appendix B Project Implementation Schedule
Appendix C Sample Data Sheet for TSP Monitoring and Noise Monitoring
Appendix D Sample Incident Report on Action Level or Limit Level Non-compliance
Appendix E Baseline Ecological Monitoring Plan
Appendix F Comfirmation from RE
Appendix G Preliminary Additional Water Monitoring Programme

1. INTRODUCTION

1.1 Background

1.1.1 The Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) are one of the important sources of land and housing supply in the medium and long term. The development of the KTN and FLN NDAs will be implemented in phase for full completion by 2031. The Phase 1 of the NDAs development, comprising the Advance Works and First Stage Works, is targeted to be implemented from the second half of 2019 progressively. The Advance and First Stage Works would include site formation, engineering infrastructure works (including roads, drainage, sewerage, waterworks, landscaping works, pumping stations, and fresh water and flushing water service reservoirs), soil remediation, reprovisioning of North District Temporary Wholesale Market, development of a nature park at Long Valley and implementation of environmental mitigation measures.

1.1.2 The Environmental Impact Assessment (EIA) report for the North East New Territories (NENT) NDAs Study, which covered the Advance Works and First Stage Works of KTN and FLN NDAs, has been submitted to Environmental Protection Department (EPD) in mid-2013. The report was subsequently approved with conditions by EPD on 19 October 2013 under Register No. AEIAR-175/2013.

1.2 Project Scope

1.2.1 Contract No. NDO 14/2018 is the works package consists of the Advance and First Stage Works of KTN and FLN NDAs. This Contract is governed by 7 Environmental Permits (EPs) (EP-466/2013, EP-467/2013/A, EP-468/2013/A, EP-469/2013, EP-470/2013, EP-473/2013/A and EP-475/2013/A). EP-466/2013, EP-467/2013/A, EP-468/2013/A, EP-469/2013 and EP-470/2013 belongs to KTN NDAs, while EP-473/2013/A and EP-475/2013/A belongs to FLN NDAs.

1.2.2 The scope of works under the Advance and First Stage Works comprises the following and divides into seven Contracts as shown in **Figure 1.1 to Figure 1.7**.

a) The Advance Works (PWP item No. 7747CL-2) consist of:

i) site formation of land (including soil remediation) in KTN and FLN NDAs for housing, community facilities and engineering infrastructure;

ii) construction of roads including the eastern section of Fanling Bypass (FLBP(E)) connecting the FLN NDA to Fanling Highway and other roads with footpaths and cycle tracks, and associated junction/ road improvements;

iii) engineering infrastructure works including drainage. Sewerage (including two sewage pumping stations), waterworks (including a fresh water service reservoir and a flushing water service reservoir in the KTN NDA), landscape works and slopeworks;

iv) part expansion and upgrading of Shek Wu Hui Sewage Treatment Works (SWHSTW);

v) reprovisioning works; and

vi) implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (v) above

b) The First Stage Works (PWP item No. 7759CL) consist of:

i) development of a nature park at Long Valley including provision of a visitor centre and a footbridge spanning across Sheung Yue River for connection between these two facilities;

ii) reprovisioning of two egretry sites in the FLN NDA and enhancement works to an existing egretry site in the KTN NDA;

iii) site formation of land for a village resite area and a district police station in the KTN NDA;

iv) engineering infrastructure works including roads, drainage, sewerage, waterbirds, and landscape works; and

v) implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (iv) above.

1.3 Purpose of This Manual

1.3.1 This Environmental Monitoring and Audit (EM&A) Manual is prepared for "the Advance and First Stage Works of KTN and FLN NDA" and it is developed primarily based on the approved EM&A Manual of the NENT NDAs EIA Study and it takes into account the latest EM&A requirements in accordance with the information and recommendations described in the EIA Report as well as the specific site conditions and development details of the Project.

1.3.2 In accordance with Condition 2.3 of EP-466/2013, EP-467/2013/A, EP-468/2013/A, EP-469/2013, EP-470/2013, EP-473/2013/A and EP-475/2013/A, an updated EM&A Manual, which shall be certified by the Environmental Team (ET) Leader and verified by the Independent Environmental Checker (IEC), shall be submitted to the Director of Environmental Protection at least 4 weeks before the commencement of construction of the Project.

1.3.3 The purposes of this EM&A Manual are to:

- guide the set up of an EM&A programme to ensure compliance with the EIA recommendations;
- specify the requirements for monitoring equipment;
- propose environmental monitoring points, monitoring frequency etc.;
- propose Action and Limit Level; and
- propose Event and Action Plan.

This Manual contains the following information:

- responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET), and the Independent Environmental Checker (IEC) under the context of the EM&A;
- project organization for the EM&A works;
- the basis for, and description of the broad approach underlying the EM&A programme;
- details of the methodologies to be adopted, including all laboratories and analytical procedures, and details on quality assurance and quality control programme;
- the rationale on which the environmental monitoring data will be evaluated and interpreted;
- definition of Action and Limit levels;
- establishment of Event and Action plans;
- requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints; and
- requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures.

1.4 Project Organization

1.4.1 The proposed project organization and lines of communication with respect to environmental protection works are shown in **Appendix A**.

1.4.2 The roles and responsibilities of the various parties involved in the EM&A process and the organizational structure of the organizations responsible for implementing the EM&A programme are outlined below.

The Contractor

- Employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- Provide assistance to ET in carrying out monitoring and auditing;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit levels are exceeded; and
- Adhere to the agreed procedures for carrying out compliant investigation.

Environmental Team

- Set up all the required environmental monitoring stations;
- Monitor various environmental parameters as required in the EM&A Manual;

- Analyze the EM&A data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and take proactive actions to pre-empt problems;
- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the EM&A results to the IEC. Contractor, the ER and EPD or its delegated representative;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- Undertake regular and ad-hoc on-site audits / inspections and report to the Contractor and the ER of any potential non-compliance; and
- Follow up and close out non-compliance actions.

Engineer or Engineer's Representative

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Even and Action Plans;
- Employ an IEC to audit the results of the EM&A works carried out by the ET; and
- Comply with the agreed Event Contingency Plan in the event of any exceedance.

Independent Environmental Checker

- Review the EM&A works performed by the ET (at not less than monthly intervals);
- Audit the monitoring activities and results (at not less than monthly intervals);
- Report the audit results to the ER and EPD in parallel;
- Review the EM&A reports (monthly summary reports) submitted by the ET;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary;
- Report the findings of site inspections and other environmental performance reviews to ER and EPD;

- Coordinate the monitoring and auditing works for all the on-going contracts in the area in order to identify possible sources / causes of exceedances and recommend suitable remedial actions where appropriate; and
- Coordinate the assessment and response to complaints / enquires from locals, green groups, district councils or the public at large.

1.5 Summary Matrix for Environmental Monitoring Requirement

1.5.1 The summary matrix for environmental monitoring requirement for this Contract is shown in **Table 1.1**.

1.6 Key Changes of Update EM&A Manual

1.6.1 Air Quality

FLN NDA

1.6.1.1 The number of air quality monitoring stations during construction phase for this Contract are reduced from 7 to 3. Original air quality stations DMS-5, DMS-6, DMS-8 and DMS-10 are not included in this Contract. The details of proposed air quality monitoring locations are shown in **Table 2.1**.

1.6.2 Noise

KTN NDA

1.6.2.1 One additional noise monitoring location (CP-KTN-NMS6) during construction phase for this Contract is proposed at Ho Sheung Heung (NSR ID in EIA: D1-9(R3010)). Orignial noise monitoring station CP-NMS4 is not included in this Contract. The details of proposed noise monitoring locations are shown in **Table 3.1**.

FLN NDA

1.6.2.2 The number of noise monitoring stations during construction phase for this Contract are 3. Orignial noise monitoring stations CP-NMS6, CP-NMS7, CP-NMS8 and CP-NMS9 are not included in this Contract. The details of proposed noise monitoring locations are shown in **Table 3.1**.

1.6.2.3 The number of noise monitoring stations during operational phase for this Contract are 6. Orignial noise monitoring stations OP-NMS31, OP-NMS32, OP-NMS33, OP-NMS34, OP-NMS35, OP-NMS36 and OP-NMS38 are not included in this Contract. The details of proposed noise monitoring locations are shown in **Table 3.4**.

1.6.3 Ecology

1.6.3.1 The Baseline Ecological Monitoring Plan has been prepared and it has been attached in **Appendix E** of this updated EM&A Manual.

Table 1.1 Summary Matrix for Environmental Monitoring Requirement for this Contract

Location	KTN NDA					FLN NDA	
EP No.	**EP-466/2013**	**EP-467/2013/A**	**EP-468/2013/A**	**EP-469/2013**	**EP-470/2013**	**EP-473/2013A**	**EP-475/2013A**
Project	Castle Peak Road Diversion	Kwu Tung North New Development Area Road P1 and P2 and Associated New Kwu Tung Interchange and Pak Shek Au Interchange Improvement	Kwu Tung North New Development Area Road D1 to D5	Sewage Pumping Stations in Kwu Tung North New Development Area	Utilization of Treated Sewage Effluent (TSE) from Shek Wu Hui Sewage Treatment Works	Fanling Bypass Eastern Section	Reprovision of temporary Wholesale Market in Fanling North New Development Area
Environmental Monitoring Requirement							
Construction Phase							
Construction Dust Monitoring	√ KTN-DMS-4	√ KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4	√ KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4	√ KTN-DMS3		√ FLN-DMS1, FLN-DMS2, FLN-DMS3	
Construction Noise Monitoring	√ CP-KTN-NMS4	√ CP-KTN-NMS2, CP-KTN-NMS4	√ CP-KTN-NMS2, CP-KTN-NMS3, CP-KTN-NMS4	√ CP-KTN-NMS1, CP-KTN-NMS6	√ CP-KTN-NMS5	√ CP-FLN-NMS1, CP-FLN-NMS2, CP-FLN-NMS3	√ CP-FLN-NMS1
Water Quality Monitoring			√ KTN-IS1, KTN-CS1			√ FLN-IS2, FLN-CS2	
Land Contamination / Ambient Arsenic Monitoring	√ KTN-DMS-4	√ KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4	√ KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4	√ KTN-DMS3			
Landfill Gas Monitoring		√ (for infrastructure and the development within the Consultation Zone and within MTLL when the works involve confined spaces)	√ (for infrastructure and the development within the Consultation Zone and within MTLL when the works involve confined spaces)				
Archaeological Monitoring / Action	√	√				√	

Location	KTN NDA					FLN NDA	
EP No.	**EP-466/2013**	**EP-467/2013/A**	**EP-468/2013/A**	**EP-469/2013**	**EP-470/2013**	**EP-473/2013A**	**EP-475/2013A**
Project	Castle Peak Road Diversion	Kwu Tung North New Development Area Road P1 and P2 and Associated New Kwu Tung Interchange and Pak Shek Au Interchange Improvement	Kwu Tung North New Development Area Road D1 to D5	Sewage Pumping Stations in Kwu Tung North New Development Area	Utilization of Treated Sewage Effluent (TSE) from Shek Wu Hui Sewage Treatment Works	Fanling Bypass Eastern Section	Reprovision of temporary Wholesale Market in Fanling North New Development Area
Environmental Monitoring Requirement							
Built Heritage Monitoring	√ (vibration and water table monitoring subject to the findings of Baseline condition survey and baseline vibration impact assessment)	√ (vibration and water table monitoring subject to the findings of Baseline condition survey and baseline vibration impact assessment)	√ (vibration and water table monitoring subject to the findings of Baseline condition survey and baseline vibration impact assessment)			√ (vibration and water table monitoring subject to the findings of Baseline condition survey and baseline vibration impact assessment)	
Ecological Monitoring	√	√	√	√	√	√	
Operation Phase							
Operational Noise Monitoring	√ OP-KTN-NMS1, OP-KTN-NMS2, OP-KTN-NMS3, OP-KTN-NMS4, OP-KTN-NMS5, OP-KTN-NMS6, OP-KTN-NMS9, OP-KTN-NMS16, OP-KTN-NMS19	√ OP-KTN-NMS7, OP-KTN-NMS8, OP-KTN-NMS9, OP-KTN-NMS17	√ OP-KTN-NMS10, OP-KTN-NMS11, OP-KTN-NMS12, OP-KTN-NMS13, OP-KTN-NMS14, OP-KTN-NMS15, OP-KTN-NMS16, OP-KTN-NMS17, OP-KTN-NMS18, OP-KTN-NMS19			√ OP-FLN-NMS1, OP-FLN-NMS2, NMS3, OP-FLN-NMS4, OP-FLN-NMS5, OP-FLN-NMS6	
Water Quality Monitoring	√ (Verification Monitoring)	√ (Verification Monitoring)	√ (Verification Monitoring)			√ (Verification Monitoring)	
Post Construction Ecological Monitoring	√	√	√	√	√	√	

2. AIR QUALITY

2.1 Introduction

2.1.1 In accordance with the EM&A Manual of the NENT NDA EIA study, dust monitoring is considered necessary during construction phase to ensure that the dust control measures are properly implemented.

2.2 Mitigation Measures

2.2.1 The EIA Report has recommended dust control and odour control measures. All the proposed mitigation measures are summarized in the Project Implementation Schedule (PIS) in **Appendix B**.

2.3 Monitoring Parameters for Construction Phase

2.3.1 Monitoring and audit of the TSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

2.3.2 1-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The 24-hour TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50). Upon approval of the IEC, 1-hour TSP levels can be measured by direct reading method which is capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

2.3.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, etc., shall be recorded down in detail. A sample data sheet is shown in **Appendix C**.

2.4 Monitoring Equipment for Construction Phase

2.4.1 High volume sampler (HVS) complying with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

- 0.6 – 1.7 m^3 per minute adjustable flow range;
- Equipped with a timing / control device with +/- 15 minute accuracy for 24 hours operations;
- Installed with elapsed-time meter with +/-2 minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed are of 406 cm^2.
- Flow control accuracy: +/-2.5% deviation over 24-hour sampling period;
- Equipped with a shelter to protect the filer and sampler;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;

- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;
- Incorporated with a manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easily changeable filter; and
- Capable of operating continuously for a 24-hour period.

2.4.2 The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. They shall ensure that sufficient number of HVSs with an appropriate calibration kit is available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled.

2.4.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at fortnightly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The concern parties such as IEC shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

2.4.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded in the data sheet as mentioned in **Appendix C**.

2.4.5 If the ET Proposed to use a direct reading dust meter to measure 1-hour TSP and 24-hour TSP levels, they shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable results to the HVS. The instrument should also be calibrated regularly, and the 1-hour sampling shall be determined periodically by the HVS to check the validity and accuracy of the results measured by direct reading method.

2.4.6 Wind data monitoring equipment shall also be provided and set up for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- The wind sensors should be installed 10m above ground so that they are clear of obstructions or turbulence caused by buildings;
- The wind data should be captured by a data logger, the data shall be downloaded for analysis at least once a month;
- The wind data monitoring equipment should be re-calibrated at least once every six months; and
- Wind direction should be divided into 16 sectors of 22.5 degrees each.

2.4.7 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

2.4.8 Climatological information extracted from “Hong Kong Observatory - Ta Kwu Ling Weather Station” is proposed by the ET Leader as the alternative method to obtain representative wind data for this Project. For Ta Kwu Ling Weather Station, it is located nearby the Project site and situated at approximately 15m above mean sea level. The station’s wind data monitoring equipment is set above the existing ground ten meters in compliance with the general setting up requirement. Furthermore, Ta Kwu Ling Weather Station also provides other climatological information, such as humidity, rainfall, air pressure and temperature etc.. Weather information extracted from Hong Kong Observatory is common alternative method in many development projects in Hong Kong.

2.5 Laboratory Measurement / Analysis

2.5.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.

2.5.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be demonstrated to the satisfaction of the ER and IEC. IEC shall regularly audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his / her reference.

2.5.3 Filter paper of size 8" X 10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.

2.5.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

2.6 Monitoring Locations

2.6.1 The proposed monitoring locations for air quality are summarized in **Table 2.1** and shown in **Figure 2.1** and **Figure 2.2**.

Table 2.1 Proposed Monitoring Locations for Construction Dust

New Monitoring Station ID	Monitoring Station ID	ASR ID in EIA	Planned or Existing	Description
KTN NDA				
KTN-DMS1	DMS-1	KTN-19	Planned	Nursery Classes and Kindergartens; Post Offices
KTN-DMS2	DMS-2	KTN-90	Planned	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre
KTN-DMS3	DMS-3	KTN-326	Planned	Village Resite
KTN-DMS4	DMS-4	KTN-E162	Existing	Temporary Structure near Fanling Highway (near Pak Shek Au)
FLN NDA				
N/A**	DMS-5* (Contract 3)	FLN-20	Planned	Weapons Training Division
FLN-DMS4	DMS-6 (Contract 3)	FLN-35	Planned	Village Resite
FLN-DMS1	DMS-7	FLN-E62	Existing	Scattered Village Houses North of Proposed Potential Ecopark
FLN-DMS5	DMS-8 (Contract 4)	FLN-E124	Existing	Noble Hill (Distance from Contract 4 site boundary 178m)
FLN-DMS2	DMS-9	FLN-243	Planned	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office
N/A**	DMS-10** (Contract 4)	FLN-E104	Existing	Choi Ngan House, Choi Po Court (Distance from Contract 4 site boundary 1822m)
FLN-DMS3	DMS-11	FLN-E143	Existing	House near Tong Hang

* - As comfirmed by RE, there was no construction around the monitoring station in Contract 3 near DMS-5. Therefore, this monitoring station will not be included in this Contract. Related comfirmation from RE was showin in **Appendix F**.

** - The highlighted monitoring stations will not be included in this Contract due to the long distance between the stations and the site. Distance between the stations and the site was shown in **Figure 2.3**.

2.6.2 The status and locations of the air quality sensitive receivers may change after issuing this Manual. The ET shall propose alternative monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.

2.6.3 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

i. at the site boundary or such locations close to the major dust emission source;

ii. close to the air sensitive receivers;

iii. proper position/sitting and orientation of the monitoring equipment; and

iv. take into account the prevailing meteorological conditions.

2.6.4 The ET shall agree with the ER in consultation with the IEC on the position of the HVS for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- no two samplers should be placed less than 2 meters apart;
- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- a minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samplers;
- a minimum of 2 meters separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator flue is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 meters from the dripline;
- any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

2.7 Baseline Monitoring

2.7.1 Baseline monitoring shall be carried out at all of the designated monitoring locations for construction dust for at least 14 consecutive days prior to the commissioning of major construction works to obtain daily 24-hour TSP samples. The selected baseline monitoring stations should reflect baseline conditions at the impact stations. 1-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

2.7.2 During the baseline monitoring, there should not be any major construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that, if required, the ER can conduct on-site audit to ensure accuracy of the baseline monitoring results.

2.7.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations, the ET Leader shall carry out the monitoring at alternative locations that can

effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with the IEC.

2.7.4 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.

2.7.5 Ambient conditions may vary seasonally and shall be reviewed once every three months. When the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and EPD.

2.8 Impact Monitoring

2.8.1 The ET shall carry out impact monitoring at all designated monitoring locations for construction dust during the entire construction period. For regular impact monitoring, the sampling frequency of at least once in every 6 days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least 3 times in every 6 days should be undertaken when the highest dust impact occurs. Before commencing impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the monitoring results.

2.8.2 The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the ET.

2.8.3 In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in the following section, shall be conducted within the specified timeframe after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified, and agreed with the ER and the IEC.

2.9 Action / Limit Level

2.9.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the construction dust impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. **Table 2.2** shows the air quality criteria, namely Action and Limit levels to be used.

Table 2.2 Action / Limit Levels for Construction Dust

Parameters	Action	Limit

24-hour TSP Level in mg/m^3	For baseline level ≤ 200 mg/m^3, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level > 200 mg/m^3 Action level = Limit level	260 mg/m^3
1-hour TSP Level in mg /m^3	For baseline level ≤ 384 mg/m^3, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level > 384 mg/m^3, Action level = Limit level	500 mg/m^3

2.10 Event and Action Plan

2.10.1 Should non-compliance of the air quality criteria occur, actions in accordance with the Event and Action Plan in **Table 2.3** shall be carried out.

Table 2.3 Event and Action Plan for Construction Dust

Event	Action			
	ET	IEC	ER	Contractor
Action Level				
Exceedance for one sample	1. Identify sources, investigate the causes of complaint and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working methods.	1. Notify the Contractor;	1. Rectify any unacceptable practices; 2. Amend working methods agreed with the ER if appropriate.
Exceedance for two or more consecutive samples	1. Identify sources. 2. Inform the IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with the IEC, ER and Contractor on remedial action required; 7. If exceedance continues, arrange meeting with the IEC, Contractor and ER; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working methods; 3. Discuss with the ET, ER and Contractor on possible remedial measures if required; 4. Advise the ER on the effectiveness of proposed remedial measures if required; 5. Supervise implementation of remedial measures	1. Confirm receipt of notification of failure in writing; 2. Notify the Contractor; 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial action to the ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.
Limit Level				
Exceedance for one sample.	1. Identify sources, investigate causes of exceedance and proposed remedial measures; 2. Inform the IEC, ER, and Contractor; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of	1. Check monitoring data submitted by the ET. 2. Check the Contractor's working methods. 3. Discuss with the ET, ER and Contractor on possible remedial measures. 4. Advise the ER and ET on the effectiveness of the proposed remedial measures. 5. Supervise the implementation of	1. Confirm receipt of the notification of exceedance in writing; 2. Notify the Contractor; 3. Ensure remedial measures are properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial action to the ER and copy to the ET and IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.

	the Contractor's remedial action and keep the IEC and ER informed of the results.	remedial measures.		
Exceedance for two or more consecutive samples	1. Notify the IEC, ER and Contractor; 2. Identify sources; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of the Contractor's working procedures with the ER to determine the possible mitigation to be implemented; 6. Arrange meeting with the IEC and ER to discuss the remedial action to be taken; 7. Assess the effectiveness of the Contractor's remedial action and keep the IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst the ER, ET and Contractor on the potential remedial action; 2. Review the Contractor's remedial action whenever necessary to assure their effectiveness and advise the ER and ET accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of the notification of exceedance in writing; 2. Notify the Contractor; 3. In consultation with the IEC and ET, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures are properly implemented; 5. If exceedance continues, consider what portion of works is responsible and instruct the Contractor to stop that portion of works until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial action to the ER and copy to the IEC and ET within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problems still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer's Representation

3. NOISE

3.1 Introduction

3.1.1 In accordance with the EM&A Manual of the NENT NDA EIA study, noise monitoring is considered necessary during construction and operational phase.

3.2 Mitigation Measures

3.2.1 Construction Phase

3.2.1.1 The EIA Report has recommended construction noise control measures including the use of quiet plant and temporary noise barriers, etc. All the proposed mitigation measures are summarized in the PIS in **Appendix B**.

3.2.2 Operational Phase

3.2.2.1 Mitigation measures of noise barriers would need to be implemented along the roadworks for NDAs. All the proposed mitigation measures are summarized in the PIS in **Appendix B**.

3.3 Monitoring Parameters for Construction Phase

3.3.1 Construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq\ 30\ min}$ shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods, $L_{eq\ 5\ min}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

3.3.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in **Appendix C** for reference.

3.4 Monitoring Equipment for Construction Phase

3.4.1 As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.

3.4.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.

3.4.3 The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline

monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labeled.

3.5 Monitoring Locations for Construction Phase

3.5.1 The locations of construction airborne noise monitoring stations are summarized in **Table 3.1** and shown in **Figure 3.1** and **Figure 3.2**

Table 3.1 Proposed Monitoring Locations for Construction Noise

New Monitoring Station ID	Original Monitoring Station ID	NSR ID in EIA	Planned or Existing	Description
KTN NDA				
CP-KTN-NMS1	CP-NMS1	KTN-45 (R3002)	Existing	Residential Buildings at Ma Tso Lung
CP-KTN-NMS2	CP-NMS2	KTN-20 (R3000)	Existing	Residential Buildings at Ma Tso Lung
CP-KTN-NMS3	CP-NMS3	A3-7 (R2141)	Existing	Fung Kong Garden
CP-KTN-NMS4	CP-NMS5	B 2-7 (R8009)	Planned	Primary School
CP-KTN-NMS5	CP-NMS7	A1-2 (R8508)	Planned	N/A
CP-KTN-NMS6	N/A (new monitoring station)	D1-9 (R3010)	Existing	Ho Sheung Heung, Hau Ku Shek Ancestral Hall, Hung Shing Temple & Pai Fung Temple and Sin Wai Nunnery
FLN NDA				
CP-KTN-NMS5	CP-NMS7	A1-2 (R8508)	Planned	Referred to KTN Contract 1
CP-FLN-NMS1	CP-NMS10	FN-31 (R4421)	Existing	Belair Monte
CP-FLN-NMS2	CP-NMS11	FS-11 (R8509)	Existing	Scattered Village Houses in Tong Hang
CP-FLN-NMS3	CP-NMS12	D3-11 (R8602)	Planned	Secondary School

Remarks:
1. Addition of monitoring station CP-KTN-NMS6 is to monitor the noise impact from construction of Sewage Pumping Station at Site D1-3.
2. In FLN NDA, and there is no advance works to be conducted at CP-NMS7, therefore no pre-construction monitoring was conducted at this location. According to KTN NDA, there is advance works of KTN Contract 1 to be conducted at CP-NMS7, thus pre-construction monitoring was conducted at CP-NMS7 and rename as CP-KTN-NMS5.

3.5.2 The ET shall select the monitoring location based on the locations of the construction activities and seek approval from ER and IEC and agreement from EPD on the proposal. The monitoring locations should be chosen based on the following criteria:

- At locations close to the major site activities which are likely to have noise impacts;

- Close to the most affected existing noise sensitive receivers; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

3.5.3 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB (A) shall be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same position.

3.5.4 The IEC may, depending on site conditions and monitoring results, decide whether additional monitoring locations shall be included or any monitoring locations could be removed /relocated during any stage of the construction phase.

3.6 Baseline Monitoring for Construction Phase

3.6.1 The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. There shall not be any construction activities in the vicinity of the stations during the baseline monitoring. Continuous baseline noise monitoring for the A-weighted levels L_{eq}, $L_{10}$and L_{90} shall be carried out daily for a period of at least two weeks in a sample period of 5 minutes or 30 minutes between 0700 and 1900, and 5 minutes between 1900 and 0700. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

3.6.2 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the ER for approval.

3.7 Impact Monitoring for Construction Phase

3.7.1 During normal construction working hour (0700-1900 Monday to Saturday), monitoring of Leq, 30min noise levels (as six consecutive Leq, 5min readings) shall be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

3.7.2 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan, shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

3.7.3 A schedule on the compliance monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

3.8 Action / Limit Level

The ET shall compare the construction noise monitoring results with noise criteria. **Table 3.2** shows the noise criteria, namely Action and Limit levels to be used.

Table 3.2 Action / Limit Levels for Construction Noise

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A)

Notes:
1) If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.
2) Reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

3.9 Event and Action Plan

3.9.1 Should non-compliance of the noise criteria occur, actions in accordance with the Event and Action Plan in **Table 3.3** shall be carried out.

Table 3.3 Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level Exceedance	1.Notify the IEC, ER and Contractor; 2.Carry out investigation; 3.Report the results of investigation to the IEC, ER and Contractor; 4.Discuss jointly with the Contractor and formulate remedial measures; 5.Increase the monitoring frequency to check the mitigation effectiveness.	1. Review the monitoring data submitted by the ET; 2. Review the construction methods and proposed remedial measures by the Contractor, and advise the ET and ER if the proposed remedial measures would be sufficient; 3. Supervise the implementation of remedial measures;	1. Confirm receipt of notification of failure in writing; 2. Notify the Contractor; 3. Require the Contractor to propose remedial measures for the analyzed noise problem; 4. Ensure remedial measures are properly implemented.	1.Submit noise mitigation proposals to the ER and IEC and copy to the ET; 2.Implement noise mitigation proposals.
Limit Level Exceedance	1.Identify sources. 2.Inform IEC, ER, EPD and Contractor; 3.Repeat measurements to confirm findings; 4.Increase the monitoring frequency; 5.Carry out analysis of the Contractor's working procedures with the ER and Contractor to determine possible mitigations to be implemented; 6.Inform IEC, ER, EPD and Contractor the causes and actions taken for the exceedances; 7.Assess the effectiveness of the Contractor's remedial action with the ER and keep the IEC informed of the results; 8.If exceedance stops, cease additional monitoring.	1.Discuss amongst the ER, ET and Contractor on the potential remedial actions; 2.Review the Contractor's remedial action whenever necessary to assure their effectiveness and advise the ER accordingly; 3.Supervise the implementation of remedial measures.	1.Confirm receipt of notification of exceedance in writing; 2.Notify the Contractor. 3.Require the Contractor to propose remedial measures for the analyzed noise problems; 4.Ensure remedial measures are properly implemented; 5.If exceedance continues, consider what portion of work is responsible and instruct the Contractor to stop that portion of works until the exceedance is abated.	1.Take immediate action to avoid further exceedance; 2.Submit proposals for remedial action to the ER and IEC and copy to the ET within 3 working days of notification; 3.Implement the agreed proposals; 4.Resubmit proposals if problems still not under control; 5.Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer's Representative

EPD – Environmental Protection Department

3.10 Impact Monitoring/Commissioning Test for Operational Phase

Road Traffic Noise

3.10.1 Traffic noise monitoring shall be carried out at all the designated traffic noise monitoring stations. The following is an initial guide on the traffic noise monitoring requirements during the operational phase:

- One set of measurements at the morning traffic peak hour on normal weekdays.
- One set of measurement at the evening traffic peak hour on normal weekdays.
- The traffic noise shall be measured in terms of the A-weighted L_{10} (1 hour) over 2 hourly periods. As supplementary information for data auditing, statistical results such as L_{eq}, L_{90} and L_{max} shall also be obtained for reference.
- A concurrent census of traffic flow and percentage heavy vehicles shall be conducted for the far-side and near-side of the road and the existing road network in the vicinity of each measurement points.
- Average vehicle speed estimated for far-side and near-side of the road and the existing road network in the vicinity of each measuring points.
- The two sets of monitoring data shall be obtained within the first year of operation.
- Measured noise levels shall be compared with the predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement.

Fixed Noise

3.10.2 Fixed noise commissioning test shall be carried out at fixed noise sources such as District Cooling System, Sewage Pumping Station and Pumping Station to determine the maximum allowable sound power level as stated in the EIA report. The SWL criteria shall be implemented by Contractor before operation of the Project, in order to ensure of the compliance of the operational airborne noise levels with the TM's stipulated noise standard.

3.10.3 For the Sports Ground / Sports Complex, upon any rehearsal and main event, the organizer should appoint an appropriate person to monitor the noise situation by sound level meter at the most affected noise sensitive receivers. That person should provide feedback to the organizer for immediate action, such as adjustment of the speaker output level, whenever necessary. Noise measurement should be conducted at least hourly during the event, of which the results should be recorded properly and submitted to the venue operator subsequently. The venue operator will provide the recorded measurements for reference to EPD when requested for any necessary follow up investigation.

3.10.4 The ET should prepare and deposit to EPD, at least 6 months before the operation of the Project, a commissioning test for the purpose of fixed noise. The commissioning should contain locations, measurement schedules, methodology of noise measurement including noise measurement procedures and data analysis of measured noise level. The commissioning test should be certified by the ET Leader before deposit with EPD.

3.11 Methodology for Operational Phase

3.11.1 For the traffic noise, the measured/monitored noise levels shall be compared with the predicted results and the predicted traffic flow conditions (calculated noise levels based on concurrent traffic census obtained). In case discrepancies are observed, explanation shall be given to justify the discrepancies.

3.12 Noise Monitoring Stations for Operational Phase

3.12.1 The locations of operational airborne noise monitoring stations are summarized in **Table 3.4** and shown in **Figure 3.3** and **Figure 3.4**.

Table 3.4 Proposed Traffic Noise Monitoring Locations

New Monitoring Station ID	Origincal Monitoring Station ID	NSR ID in EIA (Assessment Point)	Alternative NSR ID & Assessment	Status	Remarks
KTN NDA					
OP-KTN-NMS1	OP-NMS1	KTN-11 (R1103)	-	Existing	Europa Garden Phase I
OP-KTN-NMS2	OP-NMS2	KTN-9 (R1086)	-	Existing	Valais
OP-KTN-NMS3	OP-NMS3	KTN-9 (R1089)	-	Existing	Valais
OP-KTN-NMS4	OP-NMS4	B2-6 (R3421)	B2-6 (N3442)	Planned	N/A
OP-KTN-NMS5	OP-NMS5	B2-10 (R2764)	-	Planned	N/A
OP-KTN-NMS6	OP-NMS6	C1-3 (R2021)	-	Planned	N/A
OP-KTN-NMS7	OP-NMS7	A2-2 (R2623)	A2-2 (N2622)	Planned	N/A
OP-KTN-NMS8	OP-NMS8	D1-7 (R2786)	D1-7 (N2785)	Planned	N/A
OP-KTN-NMS9	OP-NMS9	C1-3 (R2022)	-	Planned	N/A
OP-KTN-NMS10	OP-NMS10	H1-1 (R1506)	-	Planned	N/A
OP-KTN-NMS11	OP-NMS11	D1-11 (R2830)	-	Planned	N/A
OP-KTN-NMS12	OP-NMS12	E1-3 (R3702)	-	Planned	N/A
OP-KTN-NMS13	OP-NMS13	A3-3 (R2724)	-	Planned	N/A
OP-KTN-NMS14	OP-NMS14	A2-2 (R2628)	A2-2 (N2628)	Planned	N/A
OP-KTN-NMS15	OP-NMS15	A1-2 (R2503)	A1-2 (N2503)	Planned	N/A
OP-KTN-NMS16	OP-NMS16	B2-5 (R3402)	B2-5 (W-2)	Planned	N/A
OP-KTN-NMS17	OP-NMS17	A1-9 (R2602)	-	Planned	N/A
OP-KTN-NMS18	OP-NMS18	A1-8 (R2583)	A1-8 (N2583)	Planned	N/A
OP-KTN-NMS19	OP-NMS19	B2-10 (R2762)	-	Planned	N/A
FLN NDA					
OP-FLN-NMS1	OP-NMS37	FN-8 (R4151)	FN-8 (N4155)	Existing	Scattered Village Houses north of Fanling Bypass Eastern Section
OP-FLN-NMS2	OP-NMS39	D2-9 (R5362)	D2-9 (N5362)	Planned	N/A
OP-FLN-NMS3	OP-NMS40	D2-12 (R5382)	-	Planned	N/A
OP-FLN-NMS4	OP-NMS41	FS-1 (R4541)	FN-1 (R4431)	Existing	Green Code
OP-FLN-NMS5	OP-NMS42	FS-11 (R4661)	-	Existing	Scattered Village Houses in Tong Hang
OP-FLN-NMS6	OP-NMS43	RWHS1 (RWHS1)	-	Existing	Scattered Village Houses in Wo Hop Shek

3.12.2 The ET shall select the monitoring location based on the locations of the construction activities and seek approval from ER and agreement from the IEC and EPD on the proposal. The monitoring locations should be chosen based on the following criteria:

- At locations close to the noise mitigation measures such as noise barriers;
- Close to the most affected existing noise sensitive receivers; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

3.12.3 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB (A) shall be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted.

4. Water Quality

4.1 Introduction

4.1.1 The EIA Report has assessed the water quality impacts associated with the Project. According to the EIA Report, no adverse impact in anticipated with full implementation of the mitigation measures. The water quality monitoring programme as discussed below could ensure the implementation of the recommended mitigation measures and provide continue improvements to the environmental conditions.

4.2 Mitigation Measures

4.2.1 The EIA Report has recommended good site practices as the construction phase mitigation measures. All the proposed mitigation measures are summarized in the Project Implementation Schedule (PIS) in **Appendix B**.

4.3 Monitoring Locations

4.3.1 Water quality monitoring at the rivers is required during the construction period. The proposed locations are classified as Impact Station and Control Station according to their functions. The ET shall seek approval from IEC and EPD for any alternative monitoring locations.

4.3.2 The locations of water quality monitoring stations are summarized in **Table 4.1** and shown in **Figure 4.1** and **Figure 4.2**.

Table 4.1 Proposed Water Quality Monitoring Locations

New Monitoring Station	Original Monitoring Station ID	Description	Locations	Measurment Periods
KTN NDA				
KTN-CS1	CS1	Control Station for KTN NDA	Centerline of river, upstream of the channel	During construction of channel
KTN-IS1	IS1	Impact Station for KTN NDA	Centerline of river, downstream of the channel	During construction of channel
FLN NDA				
FLN-CS1	CS2	Control Station for FLN NDA	Centerline of river, upstream of the channel	During construction of channel
FLN-IS1	IS2	Impact Station for FLN NDA	Centerline of river, downstream of the channel	During construction of channel

Additional Water Monitoring Locations

4.3.3 Additional water quality monitoring shall be conducted at River Beas, River Indus and near Siu Hang San Tsuen Stream. Detailed additional monitoring programme are shown in **Appendix G**.

4.4 Monitoring Parameters

4.4.1 The monitoring shall normally be established by measuring the Dissolved Oxygen (DO), temperature, turbidity, pH, Suspended Solids (SS), unionized ammonia, nitrate nitrogen and orthophosphate at all designated locations.

4.4.2 Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. DO, temperature, pH and turbidity should be measured in-situ whereas SS should be determined by an accredited laboratory.

4.4.3 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, weather conditions and any special phenomena or work underway at the construction site.

4.4.4 Measurements shall be taken at 3 water depths, namely, lm below water surface, mid-depth and 1m above river bed, except where the water depth is less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored.

4.5 Baseline Monitoring

4.5.1 Baseline conditions for water quality shall be established and agreed with EPD prior to commencement of construction works in the rivers. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations.

4.5.2 The baseline conditions shall normally be established by measuring the water quality parameters as mentioned above. The measurement shall be taken at all designated monitoring stations, 3 days per week, for four weeks prior to the commencement of the works.

4.5.3 There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

4.5.4 In the exceptional case when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

4.6 Impact Monitoring

4.6.1 The impact monitoring shall be conducted during the works period. The purpose of impact monitoring is to ensure the implementation of the recommended mitigation

measures, provide effective control of any malpractices, and provide continuous improvements to the environmental conditions.

4.6.2 The monitoring shall be undertaken three days per week at all the designated monitoring stations. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit Levels, in which case the monitoring frequency will be increased.

4.7 Verification Monitoring

4.7.1 The ET shall propose and implement a verification monitoring programme in light of latest stormwater drainage plan to verify the efficiency and effectiveness of silt trap and cleaning frequency of non-point source loading during rainstorm events. The verification monitoring programme, including parameters and frequencies, shall be verified by IEC and approved by EPD prior to measurement.

4.8 Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

4.8.1 The dissolved oxygen (DO) measuring instruments should be portable and weatherproof. The equipment should also complete with cable and sensor, and DC power source. It should be capable of measuring:

- A DO level in the range of 0 - 20 mg/L and 0 - 200% saturation; and
- A temperature of 0 - 45 degree Celsius

4.8.2 The equipment should have a membrane electrode with automatic temperature compensation complete with a cable.

4.8.3 Should salinity compensation not be built-in to the DO equipment, in-situ salinity should be measured to calibrate the DO measuring instruments prior to each measurement.

pH Measuring Equipment

4.8.4 A portable pH meter capable of measuring a pH range between 0.0 and 14.0 shall be provided under the specified conditions (e.g., Orion Model 250A or an approved similar instrument).

Turbidity Measuring Equipment

4.8.5 The turbidity measuring instruments should be a portable and weatherproof with DC power source. It should have a photoelectric sensor capable of measuring turbidity level between 0 -1000 NTU (for example, Hach model 2100P or an approved similar instrument).

Water Depth Detector

4.8.6 A portable, battery-operated echo sounder should be used for water depths determination at each designated monitoring station. The detector can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Water Sampler

4.8.7 A water sampler is required for SS monitoring. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Sample Containers and Storage

4.8.8 Water samples for SS determinations should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

Calibration of In-situ Instrument

4.8.9 The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at quarterly basis throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring station.

Back-up Equipment

4.8.10 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, malfunction, etc.

4.8.11 A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency. Depending on the actually operation, more than one field survey vessels might be required simultaneously to ensure the monitoring are conducted within the acceptable monitoring period. The ET shall also consider the use of unattended automatic sampling /monitoring devices at fixed stations where monitoring are required throughout the construction for WCR piers and ECR underpass in the Meander. The use of such unattended automatic devices, however, shall be subject to the approval of the ER, IEC and EPD.

4.9 Laboratory Measurement / Analysis

4.9.1 At least 2 replicate samples from each independent sampling event are required for the suspended solids measurement which shall be carried in a HOKLAS or international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analytical Method for water quality parameters are presented in **Table 4.2**. ET may propose alternative analytical method and reporting limit, which shall be agreed with IEC.

Table 4.2 Analytical Method for Water Quality Parameters

Parameters	Analytical method	Reporting Limit
Suspended Solid (SS)	APHA 17e 2540D	2 mg/L
Ammonia as N	APHA 4500-NH_3 H	0.02 mg/L
Unionized ammonia	By calculation	By calculation
Nitrate as N	APHA 4500-NO_3 I	0.01 mg/L
Orthophosphate	APHA 4500-P G	0.02 mg/L

4.10 Quality Control

Field Logs

4.10.1 Field logs shall be maintained for all monitoring work, noting the date, equipment, monitoring manager and the record of all construction related activities and observations. The field log records shall be retained for the duration of the entire project and archived on completion.

4.10.2 In-situ monitoring results shall be digitally recorded from the instruments and converted into spreadsheet format or manually noted. Both hard and soft copies shall be retained for file records. Any deviation from the standard procedure and the reasons for deviation shall be noted in the log.

Measurement Procedures

4.10.3 All in-situ monitoring instruments shall be checked, calibrated and certified and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring, or as required by the manufactures specification. Certificate(s) of Calibration specifying the instrument shall be attached to the monitoring reports.

Sampling

4.10.4 The Contractor will record all data from in situ testing and from any analysis carried out in a Field Log. All samples will be identified with a unique date /time /location /depth /sample-type code which will be attached to the sample container or written in indelible ink directly on the container. In order to avoid contamination of the samples, all containers will be new and unused and of analytical grade quality. Sources of

contamination will be isolated from the working area and any sample contaminated by local material will be discarded and the sampling repeated.

Transport of Samplers

4.10.5 All samples transferred from one sub-contractor to another will be accompanied by Chain of Custody (COC) forms. Any missing or damaged samples require notification to ET Leader following logging in the laboratory QA system. The number of samples, the parameters to be tested and the time of delivery should be clearly stated on the COC forms to ensure that samples are analyzed for the correct parameters and suitable time is provided to the analytical laboratory for provision of resources required in the analyses.

4.11 Action and Limit Levels

4.11.1 The ET shall compare the water quality impact monitoring results with the water quality criteria. **Table 4.3** shows the water quality criteria, namely Action and Limit levels to be used.

Table 4.3 Action / Limit Levels for Water Quality

Parameters	Action	Limit
DO in mg/L (depth average)	5 percentile of baseline data.	4 mg/L or 1 percentile of baseline data.
SS in mg/L (deep averaged)	95 percentile of baseline data or 120% of upstream control station.	20 mg/L or 99 percentile of baseline data or 130% of upstream control station.
Turbidity in NTU (depth averaged)	95 percentile of baseline data or 120% of upstream control station.	99 percentile of baseline data or 130% of upstream control station.
Unionized ammonia in mg/L (depth averaged)	95 percentile of baseline data or 120% of upstream control station.	0.021mg/L or 99 percentile of baseline data or 130% of upstream control station.
Nitrate nitrogen in mg/L (depth averaged)	95 percentile of baseline data or 120% of upstream control station.	99 percentile of baseline data or 130% of upstream control station.
Orthophosphate in mg/L (depth averaged)	95 percentile of baseline data or 120% of upstream control station.	99 percentile of baseline data or 130% of upstream control station.

Notes:
1) "Depth-averaged" is calculated by taking the arithmetic mean of all three depths.
2) For DO, non-compliance occurs when monitoring results is lower than the limits.
3) For SS, turbidity, non-compliance occurs when monitoring results is larger than the limits.

4.12 Event and Action Plan

4.12.1 Should non-compliance of the water quality criteria occur, actions in accordance with the Event and Action Plan in **Table 4.4** shall be carried out.

Table 4.4 Event / Action Plan for Water Quality

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling day	1. Inform IEC, Contractor and ER; 2. Check monitoring data, all plant, equipment and Contractor's working methods; and 3. Discuss remedial measures with IEC and Contractor and ER.	1. Discuss with ET, ER and Contractor on the implemented mitigation measures; 2. Review proposals on remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the implemented mitigation measures; 2. Make agreement on the remedial measures to be implemented; 3. Supervise the implementation of agreed remedial measures.	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment; 5. Consider changes of working methods; 6. Discuss with ER, ET and IEC and purpose remedial measures to IEC and ER; and 7. Implement the agreed mitigation measures.
Action level being exceeded by more than one consecutive sampling days	1. Repeat in-situ measurement on next day of exceedance to confirm findings; 2. Inform IEC, Contractor and ER; 3. Check monitoring data, all plant, equipment and Contractor's	1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and	1. Discuss with ET, IEC and Contractor on the proposed mitigation measures; 2. Make agreement on the remedial measures to be implemented; and 3. Discuss with ET,IEC and Contractor on the	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of

Event	Action			
	ET	IEC	ER	Contractor
	working methods; 4. Discuss remedial measures with IEC, contractor and ER 5. Ensure remedial measures are implemented	3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	effectiveness of the implemented remedial measures.	working methods; 5. Discuss with ET, IEC and ER and submit proposal of remedial measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	1. Repeat measurement on next day of exceedance to confirm findings; 2. Inform IEC, Contractor and ER; 3. Rectify unacceptable practice; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Consider changes of working methods; 6. Discuss mitigation measures with IEC, ER and Contractor; and 7. Ensure the agreed remedial measures are implemented	1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with ET, IEC and Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; and 4. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures.
Limit level being exceeded by more than one	1. Inform IEC, contractor and ER;	1. Discuss with ET, Contractor and ER on the	1. Discuss with ET, IEC and Contractor on	1. Identify source(s) of impact;

Event	Action			
	ET	IEC	ER	Contractor
consecutive sampling days	2. Check monitoring data, all plant, equipment and Contractor's working methods; 3. Discuss mitigation measures with IEC, ER and Contractor; and 4. Ensure mitigation measures are implemented; and 5. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days	implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; 4. Discuss with ET and IEC on the effectiveness of the implemented mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the dredging activities until no exceedance of Limit level.	2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures. 7. As directed by the ER, to slow down or stop all or part of the dredging activities until no exceedance of Limit level.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer's Representative

5. Sewerage and Sewage Treatment Implications

5.1 Introduction

5.1.1 An assessment of potential impacts due to the sewage arising from the proposed Project has been assessed in Section 6 of the EIA Report.

5.2 Sewerage and Sewage Treatment Implications during Construction Phase

5.2.1 The sewage generated during the construction stage from the on-site workers will be collected in chemical toilets and disposed of off-site. Therefore, no sewerage impacts are expected from the site during the construction phase. As such, environmental monitoring and audit of the sewerage system is considered not required.

5.3 Mitigation Measures

5.3.1 The implementation schedule of the relevant mitigation measures is presented in **Appendix B**.

6. Waste Management Implications

6.1 Introduction

6.1.1 The quantity and timing for the generation of waste during the construction phase have been estimated. Measures including the opportunity for on-site sorting, reusing excavated materials etc., are devised in the construction methodology to minimize the surplus materials to be disposed off-site. Proper disposal of chemical waste should be via a licensed waste collector.

6.2 Mitigation Measures

6.2.1 All the proposed mitigation measures are stipulated in the EIA Report and summarized in the PIS in **Appendix B**.

6.2.2 The types and quantities of waste that would be generated during the operational phase have been assessed. It is anticipated there would not be any insurmountable impacts during the operational phase. A trip-ticket system should be operated to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility for final treatment and disposal.

6.2.3 EM&A requirements are required for waste management during the construction phase only and the effective management of waste arising during the construction phase will be monitored through the site audit programme. The aims of the waste audit are:

- To ensure the waste arising from the works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner; and
- To encourage the reuse and recycling of material.

6.3 Waste EM&A Requirements

6.3.1 The Contractor shall be required to pay attention to the environmental standard and guidelines and carry out appropriate waste management and obtain the relevant licence/permits for waste disposal. The ET shall ensure that the Contractor has obtained from the appropriate authorities the necessary waste disposal permits or licences including:

- Chemical Waste Permits/licenses under the Waste Disposal Ordinance (Cap 354);
- Public Dumping Licence under the Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Marine Dumping Permit under the Dumping at Sea Ordinance (Cap 466); and
- Effluent Discharge Licence under the Water Pollution Control Ordinance.

6.3.2 The Contractor shall refer to the relevant booklets issued by the EPD when applying for the license/permit and the ET shall refer to these booklets for auditing purposes.

6.3.3 Regular audits and site inspections should be carried out during construction phase by the ET to ensure that the recommended good site practices and other recommended mitigation measures are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation,

storage, recycling, transport and disposal. Apart from site inspection, documents including licenses, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.

7. Land Contamination

7.1 Introduction

7.1.1 The EIA Report has assessed the land contamination associated with the Project. The assessment involved site appraisal, site investigation, assessment of contamination level, and health risk assessment for high natural background of arsenic detected in KTN.

7.1.2 Site investigation (SI) works involving sampling and testing of soil and groundwater were conducted at 4 identified government sites (i.e. 3 in KTN and 1 in FLN). No soil and groundwater contamination was detected, except the anomalistic high arsenic was detected in all 3 sites in KTN.

7.1.3 All other potentially contaminated sites identified in 2 NDAs (include Fanling Bypass) were inaccessible and hence no SI was conducted during the course of this study. Nevertheless, detailed SI for these sites should be conducted when they are resumed and handed over to the Project Proponent (PP).

7.1.4 The required actions to be conducted after land resumption and handed over to the PP are listed below and have been summarized in the PIS in **Appendix B**.

7.2 Site Investigations for Inaccessible Potentially Contaminated Sites

7.2.1 Detailed SI for those identified potentially contaminated but inaccessible sites should be conducted when they are resumed and handed over to the PP. The PP would prepare and submit the Supplementary CAP to EPD prior to the commencement of SI works. Following on from the submission of CAP and completion of SI, the PP would prepare CAR, RAP and RR for contaminants other than Arsenic which shall follow the recommendations of the Health Risk Assessment of Chapter 8, and submit to EPD for agreement prior to commencement of the development works on these sites.

7.3 Re-appraisal of Surveyed Sites

7.3.1 Although many of the sites were not identified as potentially contaminated or could not be accessed for visual inspection during the site survey, these sites would still be in operation until commencement of construction. Any potential change of land uses may result in potential land contamination. Re-appraisal of these sites is therefore required if they become part of the land requirement for NDA development.

7.4 Treatment Method for Arsenic-containing Soil in KTN

7.4.1 A preliminary estimated volume of 1,181,000 m^3 arsenic-containing soil is required to be treated by the government. Solidification/Stabilization is recommended for the treatment of arsenic-containing soil and details of the treatment and associated testing could be referred to Chapter 8 of the EIA Report.

7.4.2 Mitigation measures during excavation and treatment of the arsenic-containing soil have been proposed in Appendix 8.4 of the EIA and summarized in the Project Implementation Schedule (PIS) in **Appendix B** in order to safeguard the general environmental, health and safety on site during the construction phase.

7.5 Ambient Arsenic Monitoring

7.5.1 General

7.5.1.1 A health risk assessment has been conducted for the high natural background of soil arsenic detected in KTN. Findings of the assessment concluded that with the implementation of the mitigation measure proposed (i.e. dust control measure as summarized under "Construction Dust Impact" in the Project Implementation Schedule (PIS) in **Appendix B**), the health risk of arsenic through inhalation of arsenic-containing dust during construction stage of KTN development will be insignificant.

7.5.1.2 Nevertheless, to ensure the health risk associated with the inhalation of arsenic-containing dust is within the acceptable level, an ambient arsenic monitoring is proposed to be conducted in KTN during the clean-up processes of arsenic-containing soil and the construction phase.

7.5.2 Monitoring Equipment

7.5.2.1 The Respirable Suspended Particulate (RSP, or PM10) shall be measured by High Volume Sampler (HVS) equipped with PM10 selector.

7.5.3 Measurement Methodology

Methodology of RSP Measurement

7.5.3.1 RSP should be measured by following the "Reference Method fojr the Determination of Particulate Matter as PM10 in the Atmosphere" Part 50 Chapter 1 Appendix J, Title 40 of the Code of Federal Regulations of the USEPA.

7.5.3.2 Dust-laden air should be drawn through PM10 HVS fitted with a conditioned pre-weighting filter paper, at a controlled rate. After sampling for 24-hour (refer Section 9.5.5 for details on measurement period), the filter paper with retained PM10 particulates shall be collected and returned to the laboratory for drying in a desiccators followed by accurate weighting. 24-hour average RSP levels shall be calculated from the ratio of the mass of PM10 particulates retained on the filter paper to the total volume of air sampled.

Methodology of Arsenic Testing

7.5.3.3 The weighted filter paper shall be prepared for arsenic testing through a "Hot Acid Extraction Procedure". The extracted material shall be tested for arsenic by using Inductively Coupled Plasma/Mass Spectrometry (ICP/MS). The extraction and testing shall be referenced to the following methods:

- Compendium Method 10-3.1 Selection, Preparation and Extraction of Filter Material, Center for Environmental Research Information, Office of Research and Development, USEPA, June 1999; and
- Compendium Method 10-3.5 determination of Metals in Ambient Particulate Matter using Inductively Coupled Plasma/Mass Spectrometry (ICP/MS., Center for Environmental Research Information, Office of Research and Development, USEPA, June 1999.

7.5.4 Measurement Locations

7.5.4.1 Locations of these monitoring stations are given in **Table 7.1** below and are shown in **Figure 2.1**.

Table 7.1 Proposed Monitoring Locations for Ambient Arsenic Monitoring

New Monitoring Station ID	Original Monitoring Station ID	ASR ID in EIA	Planned or Existing	Description
KTN NDA				
KTN-DMS1	DMS-1	KTN-19	Planned	Nursery Classes and Kindergartens; Post Offices
KTN-DMS2	DMS-2	KTN-90	Planned	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre
KTN-DMS3	DMS-3	KTN-326	Planned	Village Resite
KTN-DMS4	DMS-4	KTN-E162	Existing	Temporary Structure near Fanling Highway (near Pak Shek Au)

7.5.4.2 Should there be any changes to the dust monitoring locations, the ET leader shall seek approval from ER and agreement from the IEC on whether the ambient arsenic monitoring stations should also be relocated to the new dust monitoring locations.

7.5.5 Measurement Period

7.5.5.1 Measurement shall be carried out over a 24-hour period at a frequency of one sample per every six days throughout the clean-up processes of arsenic-containing soil and the construction phase in KTN.

7.5.6 Action/ Limit Levels

7.5.6.1 With a maximum soil arsenic concentration of 1,220 ng/m^3 according to the findings of various environmental site investigation and ground investigation works conducted in KTN, the highest ambient arsenic concentration during the construction phase with mitigation measures implemented is predicted to be 11.7ng/m^3.

7.5.6.2 Assuming under the worst case scenario where the ambient arsenic concentration remains at this maximum level throughout the entire construction period i.e. 11.7ng/m^3 for 10 years, this would translate into a health risk level of 8.64 x 10-6 which is below the lifetime cancer risk of 1 x 10-5 as mentioned by World Health Organization (WHO).

7.5.6.3 As such, this worst case ambient arsenic concentration of 11.7ng/m^3 shall be taken as the limit level, and 80% of this i.e. 9.36ng/m^3 as the action level. Should there be any exceedance, the ET shall compare the monitoring results to these two values and take necessary actions.

7.5.6.4 The action and limit levels for the ambient arsenic monitoring are summarized in **Table 7.2** below.

Table 7.2 Action and Limit Levels for Ambient Arsenic Monitoring

Parameters	Action Level	Limit Level
Ambient arsenic concentration	9.36 ng/m^3 -80% of 11.7ng/m3 – the highest ambient concentration predicted during the construction phase with mitigation measures implemented	11.7 ng/m^3 - the highest ambient arsenic concentration predicted during the construction phase with mitigation measures implemented

7.5.7 Event and Action Plan

7.5.7.1 Should non-compliance of the action and limit levels occur, actions in accordance with the Even/ Action Plan in **Table 7.3** should be carried out.

Table 7.3 Event / Action Plan for Ambient Arsenic Monitoring

Event	Action			
	ET	IEC	ER	Contractor
Action Level				
Exceedance for one sample	5. Identify sources, investigate the causes of complaint and propose remedial measures; 6. Inform IEC and ER; 7. Repeat measurement to confirm finding; 8. Increase monitoring frequency to daily.	3. Check monitoring data submitted by the ET; 4. Check the Contractor's working methods.	2. Notify the Contractor; 6.	3. Rectify any unacceptable practices; 4. Amend working methods agreed with the ER if appropriate.
Exceedance for two or more consecutive samples	9. Identify sources. 10. Inform the IEC and ER; 11. Advise the ER on the effectiveness of the proposed remedial measures; 12. Repeat measurements to confirm findings; 13. Increase monitoring frequency to daily; 14. Discuss with the IEC, ER and Contractor on remedial action required; 15. If exceedance continues, arrange meeting with the IEC, Contractor and ER; 16. If exceedance stops, cease additional monitoring.	7. Check monitoring data submitted by the ET; 8. Check the Contractor's working methods; 9. Discuss with the ET, ER and Contractor on possible remedial measures if required; 10. Advise the ER on the effectiveness of proposed remedial measures if required; 11. Supervise implementation of remedial measures	4. Confirm receipt of notification of failure in writing; 5. Notify the Contractor; 6. Ensure remedial measures properly implemented.	4. Submit proposals for remedial action to the ER within 3 working days of notification; 5. Implement the agreed proposals; 6. Amend proposal if appropriate.
Limit Level				
Exceedance for one sample.	6. Identify sources, investigate causes of exceedance and proposed remedial measures; 7. Inform the IEC, ER, and Contractor; 8. Repeat measurement to confirm finding; 9. Increase monitoring	6. Check monitoring data submitted by the ET. 7. Check the Contractor's working methods. 8. Discuss with the ET, ER and Contractor on possible remedial measures. 9. Advise the ER and ET on the effectiveness of the proposed	4. Confirm receipt of the notification of exceedance in writing; 5. Notify the Contractor; 6. Ensure remedial measures are properly implemented.	5. Take immediate action to avoid further exceedance; 6. Submit proposals for remedial action to the ER and copy to the ET and IEC within 3 working days of notification; 7. Implement the agreed proposals; 8. Amend proposal if appropriate.

	frequency to daily; 10. Assess effectiveness of the Contractor's remedial action and keep the IEC and ER informed of the results.	remedial measures. 10. Supervise the implementation of remedial measures.		
Exceedance for two or more consecutive samples	9. Notify the IEC, ER and Contractor; 10. Identify sources; 11. Repeat measurements to confirm findings; 12. Increase monitoring frequency to daily; 13. Carry out analysis of the Contractor's working procedures with the ER to determine the possible mitigation to be implemented; 14. Arrange meeting with the IEC and ER to discuss the remedial action to be taken; 15. Assess the effectiveness of the Contractor's remedial action and keep the IEC, EPD and ER informed of the results; 16. If exceedance stops, cease additional monitoring.	4. Discuss amongst the ER, ET and Contractor on the potential remedial action; 5. Review the Contractor's remedial action whenever necessary to assure their effectiveness and advise the ER and ET accordingly; 6. Supervise the implementation of remedial measures.	6. Confirm receipt of the notification of exceedance in writing; 7. Notify the Contractor; 8. In consultation with the IEC and ET, agree with the Contractor on the remedial measures to be implemented; 9. Ensure remedial measures are properly implemented; 10. If exceedance continues, consider what portion of works is responsible and instruct the Contractor to stop that portion of works until the exceedance is abated.	6. Take immediate action to avoid further exceedance; 7. Submit proposals for remedial action to the ER and copy to the IEC and ET within 3 working days of notification; 8. Implement the agreed proposals; 9. Resubmit proposals if problems still not under control; 10. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Notes:

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ER – Engineer's Representative

8. Hazard to Life

8.1 Introduction

8.1.1 Part of NDAs development is located inside the 1-km Consultation Zone (CZ) of Sheung Shui Water Treatment Works (SSWTW), which is classified as a Potentially Hazardous Installation (PHI). A hazard to life assessment has been conducted in this EIA study and it is concluded that individual risk and societal risk of SSWTW are acceptable for the proposed NDAs development (both construction stage and operational stage).

8.2 Mitigation Measures

8.2.1 Implementation of further risk mitigation measures is not required since the risk level is at the acceptable level.

9. Landfill Gas Hazard

9.1 Introduction

9.1.1 The landfill gas (LFG) hazard assessment undertaken in the EIA Study of potential risk associated with LFG on proposed development in the KTN and FLN NDAs. Ma Tso Lung Landfill (MTLL, close to KTN NDA) is located near the proposed KTN NDA.

9.1.2 The MTLL is situated in the vicinity of the KTN NDA. A portion of the development falls within the MTLL and its 250m Consultation Zone. Therefore, a qualitative assessment of LFG hazard on these sensitive receivers has been carried out and is given in this EIA study. **Figure 9.1** shows the locations of the MTLL and its Consultation Zones within KTN and FLN NDAs. **Figure 9.2** shows the Ma Tso Lung Landfill Site and KTN NDA RODP. The designated project mentioned in EP-467/2013/A is within the Landfill Consultation Zones.

9.2 Monitoring and Mitigation Measures

9.2.1 General protection and precautionary measures have been proposed for consideration during the construction, design and operational phases of the developments.

Design Phase

9.2.2 A detailed qualitative LFG hazard assessment (QLFGHA) should be carried out by individual developer during the detailed design stage in accordance with the Guidance Notes for Landfill Gas Hazard Assessment. The requirements of operational monitoring and mitigation measures, if required, should be recommended in the detailed QLFGHA.

9.2.3 In addition, the design and construction method of the proposed development within MTLL (i.e. the proposed recreational area in site E1-1) should be provided to EPD for agreement in the design stage to ensure compatibility with the landfill restoration facilities and aftercare works within MTLL, such that these facilities and works will not be affected by the construction or operation of the proposed development.

Construction Phase

9.2.4 To protect the site workers and future owners within MTLL and the Landfill Consultation Zone, it is recommended that monitoring of any LFG which may be migrated to the site should be undertaken during the construction of infrastructure and the development within the Consultation Zone and within MTLL when the works involve confined spaces. Routine gas monitoring should be undertaken during groundwork construction and in all excavations. Monthly gas monitoring should also be conducted for offices, stores etc set up on site. The monitoring requirements and procedures specified in Paragraphs 8.23 to 8.28 of EPD's Guidance Note are highlighted as follows:

- The monitoring equipment used should be capable of measuring methane, carbon dioxide and oxygen concentrations. The equipment should be intrinsically safe and calibrated according to the manufacturer’s instructions.

- When portable monitoring equipment is to be used, the frequency and areas to be monitored should be set down prior to commencement of the works either by the Safety Officer or by an appropriately qualified person.
- All measurements should be made with the monitoring tube located not more than 10 mm from the surface.
- A standard form, detailing the location, time of monitoring and equipment used together with the gas concentrations measured, should be used when undertaking manual monitoring to ensure that all relevant data are recorded.
- If methane (flammable gas) or carbon dioxide concentrations are in excess of the trigger levels or that of oxygen is below the level specified in the Emergency Management in the following sections, then evacuation should be initiated.

9.2.5 Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or another appropriately qualified person. As a minimum these should encompass those actions specified in **Table 9.1**.

Table 9.1 Actions in the event of LFG being detected

Parameter	Monitoring Results	Actions
O_2	<19% v/v	Increase underground ventilation to restore O_2 to >19% v/v
	<18% v/v	Stop works, evacuate all personnel, prohibit entry, and increase ventilation to restore O_2 level to >19%
CH_4	>10% LEL	Prohibit hot works, increase ventilation to restore CH_4 to <10% LEL
	>20% LEL	Stop works, evacuate all personnel, increase ventilation further to restore CH_4 to <10% LEL
CO_2	>0.5% v/v	Increase ventilation to restore CO_2 to <0.5% v/v
	>1.5% v/v	Stop works, evacuate all personnel, increase ventilation further to restore CO_2 to <0.5%

9.2.6 In order to ensure that evacuation procedures are implemented in the event of the trigger levels specified in the table above being exceeded, it is recommended that a person, such as the Safety Officer, is nominated, with deputies, to be responsible for dealing with any emergency which may occur due to LFG.

9.2.7 In an emergency situation the nominated person, or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas. The following organizations should also be contacted as appropriate:

Hong Kong Police Force;
Fire Services Department;
Environmental Protection Department.

Operational Phase

9.2.8 The requirements of operational monitoring by future site developers should be determined in the detailed QLFGHA during the detailed design stage when the risk potential and mitigation measures, if required, are confirmed.

9.2.9 It is expected that with the proposed precautionary measures in place, the potential risk of LFG migration to the developments would be minimal.

9.2.10 The design and construction within the sites E1-2 and E1-3 etc should avoid interference or disturbance to the off-site landfill gas, surface water and ground water monitoring wells. Should it be technically unavoidable, prior approval should be obtained from EPD for the required modification or relocation of the monitoring wells.

9.2.11 The protection and precautionary measures to minimize LFG hazards for the areas within KTNNDA during detailed design, construction and operational phases are summarized in the PIS in **Appendix B**.

10. Landscape and Visual

10.1 Introduction

10.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during both the construction and operational phases of the project. The design, implementation and maintenance of landscape and visual mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape measures and any other works of the project would be resolved as early as practical without affecting the implementation of the mitigation measures.

10.2 Mitigation Measures

10.2.1 The proposed mitigation measures for landscape and visual impacts are summarized in the Project Implementation Schedule (PIS) in **Appendix B**. The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be adopted as early as possible during construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

10.3 Audit Requirement

10.3.1 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives.

10.3.2 Site inspections should be undertaken by the ET at least once every two weeks during the construction period, preferably by a Registered Landscape Architect (RLA) employed by the Contractor. Particularly audits should be carried out during site clearance when proposed tree felling, and transplantation may occur. For all soft landscaping work, including measures involving trees such as transplantation and compensatory planting, there should be at least a 12 month establishment period which will commence once soft landscaping in an area has been planted.

10.3.3 Operational phase auditing will be restricted to the 12 months establishment works of the landscaping proposals, with the appropriate agents taking over the maintenance and monitoring after this period as identified in the EIA Report.

10.3.4 The audit of the compensatory planting will also extend during the one year maintenance period, to ensure the establishment of the compensatory planting.

10.3.5 In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 10.1**.

Table 10.1 Event / Action Plan for Landscape and Visual During Construction Phase

Event	Action			
	ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the Contractor, IEC and ER; 2. Discuss remedial actions with IEC, ER and Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check Contractor's working method 3. Discuss with ET, ER and Contractor on possible remedial measures 4. Advise ER on effectiveness of proposed remedial measures	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify source(s) 2. Inform the Contractor, IEC and ER; 3. Discuss inspection frequency 4. Discuss remedial actions with IEC, ER and Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report Check Contractor's working method 2. Discuss with ET, ER and Contractor on possible remedial measures 3. Advise ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer's Representative

11. Cultural Heritage

11.1 Introduction

11.1.1 In accordance with the recommendations of the EIA, mitigation measures during pre-construction stage and construction stage have been proposed and are summarized below.

11.2 Mitigation Measures

11.2.1 All the proposed mitigation measures of cultural heritage impacts are summarized in the PIS in **Appendix B**.

Pre-construction Phase

11.2.2 Archaeology

11.2.2.1 Survey-cum-rescue Excavation

In KTN NDA, for Sites 1, 2, 3, Spots C and I and in FLN NDA, for Site 5, survey-cum-Rescue Excavations should be conducted in the impacted areas after land resumption but before construction commencement of the zones.

11.2.2.2 Preservation in-situ with Further Archaeological Survey

Preservation in-situ of the cultivation deposits in Site 7 is proposed. If disturbance to the site by the design of the Central Park is unavoidable, further archaeological survey should be conducted in Site 7 to assess the feasibility to incorporate Site 7 into the design of the development plan of the proposed park. Appropriate follow-up actions would then be considered based on the survey result with the consent of AMO.

11.2.2.3 Archaeological Impact Assessment

An Archaeological Impact Assessment to be conducted after land resumption and before construction when detail construction information is available to determine the need for archaeological follow up actions in the impacted area (Area B1-8 and B1-9 at AI) is recommended. Should there be any development work within the rest of AI, it is recommended that an Archaeological Impact Assessment is required after land resumption and before construction when detail construction work information is available to determine the need for further archaeological follow up actions.

11.2.2.4 Further Archaeological Survey

Further archaeological surveys are recommended in impacted area in AI and in the not-yet-surveyed-area with medium archaeological potential identified located in the areas with proposed development after land resumption and before construction to be conducted before any follow up actions.

11.2.2.5 Induction Training

Induction training is recommended to be provided to the construction contractor before the commencement of the excavation works in Spots A and D to H and Sites 4 and 10 as part of the environmental health and safety induction programme to all site staff before they are deployed on site. The first induction briefing will be video recorded and it will be used as induction briefing material for new site staff.

11.2.3 Built Heritage

11.2.3.1 Baseline Condition Survey and Baseline Vibration Impact Assessment

Baseline condition survey and baseline vibration impact assessment should be conducted for sites G202, G203, G303, G308; HKTO3 (Main Building), KT57; HFL05, FL02, FL04, FL05, FL18, FL22, FL24, FL27, FL31and FL36 during the pre-construction stage. Baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or qualified structural engineer to define the vibration limit (a vibration limit at 7.5mm/s and 15mm/s could be adopted for graded historical buildings and historical buildings, respectively) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase to ensure the construction performance meets with the vibration standard stated in the EIA report. The condition survey of graded historic buildings should be submitted to the AMO for information.

11.2.3.2 Photographic and Cartographic Recording

For sites to be removed or relocated, cartographic and photographic recording should be conducted to preserve the structures by record. A copy of the result should be provided to AMO for record. These sites include the ancillary structures of G303, HKT01-02, HKTO3 (Entrance Gate), HKT04, HKT08, KTO1 to KT10, KT12, KT13, KT16, KT17, KT18, KT36, KT38 to KT41, KT43 to KT45, KT47, KT50, KT52, KT54, KT61 to KT63, KT69; FL01, FL11, FL16, FL19, FL33 and FL35.

11.2.3.3 Relocation of Built Heritages

Relocation of built heritages may be required for HKT01, HKT02, Entrance Gate of HKTO3 under KTN NDA and FL19 under FLN NDA.

11.2.3.4 Drainage System and Access Route Design

For the retained built heritage items in developable area, drainage system and access route would be designed to prevent the persevered flooding and maintain the accessibility to the built heritage.

Pre-construction Phase

11.2.4 Archaeology

11.2.4.1 Inform Upon Archaeological Discovery

Pursuant to the Antiquities and Monuments Ordinance, the construction contractor should inform the AMO immediately in case of discovery of antiquities or supposed

antiquities in the course of excavation works in construction stage. Special attention should be given to areas evaluated to have archaeological potential or significance.

11.2.5 Built Heritage

11.2.5.1 Vibration Monitoring

Based on the recommendation of baseline condition survey and baseline vibration impact assessment conducted prior to commencement of construction works, if the evaluated and/or measured vibrations have been found to exceed the allowable values or if damage to either structural or non-structural elements of the historic buildings have been identified, the construction work should be stopped and the construction method and appropriate mitigation measures should be reviewed.

11.2.5.2 Water Table Monitoring

Since the construction works and development activities may induce change in the water table. It is recommended the contractor should ensure that the change of water table induced by the construction works and development activities will not result in settlement of built heritage.

11.3 Monitoring and Audit Requirements

11.3.1 Archaeology

11.3.1.1 The archaeological fieldworks as mentioned above should be conducted by professional archaeologist and prior to fieldwork commencement. The archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance. Prior to the application for the licence, archaeological proposals detailing the objectives, work scope, methodology, staffing plan and work programme of the archaeological works should be agreed with the AMO.

11.3.2 Built Heritage

11.3.2.1 For built heritage sites that required vibration monitoring, the monitoring should be on a regular basis and if the evaluated and/or measured vibrations have been found to exceed the allowable values or if damage to either structural or non-structural elements of the historic buildings have been identified, the construction work should be stopped and the construction method and appropriate mitigation measures should be reviewed.

11.3.2.2 Meanwhile, since the construction works and development activities may induce change in the water table. It is recommended the contractor should ensure that the change of water table induced by the construction works and development activities will not result in settlement of built heritage.

12. Ecology

12.1 Introduction

12.1.1 The ecological impact assessment has evaluated the predicted ecological impacts of the NDAs project and has concluded that ecological impacts can be avoided or reduced to a low and acceptable level with the implementation of appropriate mitigation measures.

12.1.2 Major mitigation measures proposed include the creation of the Long Valley Nature Park (LVNP) where wetland habitat will be created or enhanced in order to compensate for loss and for indirect and fragmentation impacts on wetland habitat, as well as impacts on wetland fauna arising from such impacts.

12.1.3 In situ mitigation measures are required in order to address direct, indirect and fragmentation impacts on habitats of ecological importance and mortality, indirect, and fragmentation impacts on fauna and flora of conservation significance. Habitats of ecological importance include, but are not limited to: Long Valley, the Ng Tung, Sheung Yue and Shek Sheung Rivers, Ma Tso Lung Stream and its tributaries, Siu Hang San Tsuen Stream and Ho Sheung Heung fung shui and secondary woodland and shrubland on Crest Hill.

12.1.4 In addition, the unavoidably loss of the Man Kam To egretry site will be compensated for by provision of egretry habitat at FLN A1-7 and additional mitigation measures as necessary. Loss of secondary woodland and hillside plantation of higher ecological significance will be compensated for by woodland habitat creation.

12.1.5 The required measures to mitigate for ecological impacts of the project were identified in Section 13.8 of the EIA Report and are described below. The proposed ecological mitigation measures should be checked as an element of the environmental monitoring and audit program under the project.

12.2 Mitigation Measures

12.2.1 Mitigation measures have been identified and designed in accordance with Annex 16 of the EIAO-TM as is described in Section 13.8 of the EIA Report. The Implementation Schedule for these measures is detailed in **Appendix B**. For a number of measures, a more detailed design will be required at a later stage of the project, either as is described below and in **Appendix B** or, in default of this, at the detailed design stage of the relevant element of the project. Required measures are described in more detail below.

Wetland Habitat Loss

12.2.2 The impacts of unavoidable loss of 9.0ha of wetland habitat across the two NDAs, and impacts on fauna arising from the loss, disturbance and fragmentation of these habitats, will be mitigated for by creation and enhancement of approximately 37ha of wetland habitat in the LVNP, and by restoration of riparian wetland at Ma Tso Lung Stream. Detail design and proposed management and maintenance of this wetland habitat will be included in the Detailed Habitat Creation & Management Plan for LVNP.

Indirect and Fragmentation Impacts on Wetland Habitats and fauna using these habitats

12.2.3 Indirect and fragmentation impacts on the Long Valley and the Ng Tung, Sheung Yue and Shek Sheung River habitats and on fauna of conservation significance, primarily large waterbirds, foraging in these areas will occur during the construction and operational stages of the project.

12.2.4 Construction phase in situ mitigation measures proposed to address these impacts include:

- erection of a 2m high, dull green site boundary fence between the river channels and Long Valley and any active works area within 200m of the channels;
- working hours for construction of the new pedestrian bridges over the Sheung Yue River to the south of KTN area D1-1 and the bridge over the tidal Ng Tung River between KTN area C2-1 and FLN area A2-1 to be restricted to 09.00 to 17.30 during 1st March to 31st July (the ardeid breeding season);
- no works under the NDA project in KTN areas C2-1 and C1-8, including any works on or to the bridge over the Sheung Yue River between areas C2-1 and C1-8 during 1st March to 31st July.
- permanent construction and operational phase in situ mitigation measures proposed to address these impacts include:
- stringent planning control to be exercised in the area of Long Valley north and west of the Sheung Yue River which will retain its agricultural zoning; details of how this stringent planning control will be exercised will be included in an explanatory statement in the relevant Layout Plan;
- requirement that in the detailed design of Open Space zones along the rivers planting buffers should be maximised, making use of existing and additional trees, between the rivers and areas that will be used relatively intensive by people, especially along the southwestern section of the Sheung Yue River and on the south side of the Ng Tung River between FLN area B2-2 and B3-7;
- requirement that in the detailed design of new bridges a review of design and construction methods is undertaken in order to determine the optimum design to minimize construction and operational phase impacts on the rivers and large waterbirds and other fauna using the rivers.
- requirement for a 30m setback of development in KTN area B3-12 from the eastern boundary of the area (B3-14) and formation of a planted bund along the northern and northeastern boundaries of KTN area C1-1 and setback of development by 15m from these boundaries.
- In addition, any residual construction and operational phase impacts on large waterbirds in Long Valley and on the main river channels will be mitigated by habitat management measures in LVNP and by provision of additional foraging grounds at suitable sites along main river channels.

12.2.5 Any residual construction or operational phase impacts on large waterbirds in Long Valley or the main river channels will be mitigated by habitat management measures in Long Valley.

Woodland Habitat Loss

12.2.6 The unavoidable loss of 8.88ha of secondary woodland and plantation of ecological significance will be compensated for by planting native tree and shrub species at an area ratio of at least 1:1. Areas of grassland of low ecological value totalling16.03ha have been identified for compensatory planting (**Figure 12.1 – Figure 12.2)**. The area identified for planting is approximately twice the area of loss. This allows for both the lower initial ecological value of the areas to be planted and also makes an allowance for parts of the areas to be identified being found to be unsuitable for planting (for example due to topography, soil conditions, existing vegetation or footpaths).

12.2.7 A site of 0.14ha in Al-7, FLN has been identified for the planting of bamboos and trees to compensate for the loss of the site of the Man Kam To Road egretry. This site is on land comprising a former meander of the Ng Tung River which is currently managed as compensatory wetland habitat. No loss of wetland will be involved in this compensatory provision which will be undertaken on dry land within the ox-bow of the meander. Compensatory planting and measures to attract egrets (decoy models and calls) should be undertaken as advance works for the NDAs project and well in advance of the existing egretry site being impacted.

12.2.8 It should be noted that compensatory provision of this nature has been successful overseas but success cannot be assured as it is dependent on the birds relocating under their own volition.

Measures to minimize impacts to Ma Tso Lung Stream, Siu Hang San Tsuen Stream, Shui Hau River and Ha Shan Kai Wat Stream

12.2.9 Impacts to Ma Tso Lung Stream and its tributaries will be avoided by Green Belt zoning throughout the catchment, except for a section of the lower Ma Tso Lung Stream which will be impacted by the construction of the LMC Loop Eastern Connection Road. Mitigation measures to minimize ecological impacts will include the avoidance of direct impacts at the point where the road crosses the stream by the road being placed on viaduct. A short section of stream will be diverted and a buffer corridor with a minimum width of 15m from the road (and 45m in total) will be reinstated with natural riparian vegetation and maintained during the operational period of the Project.

12.2.10 In addition, construction-phase impacts to the stream will be minimized by ensuring that the hydrological linkage between sections of the stream is maintained and a buffer zone of 15-30m width on both sides of the stream is designated and protected by a solid dull-green barrier, 2m in height at the edge of any active works area, which will prevent any construction or other materials being deposited in the stream. Operational phase mortality impacts on fauna will be minimized by the erection of a1.2m high permanent barrier along the sides of any at-grade section of the LMC Loop Eastern Connection Road and the Project Area boundary and a fauna underpass will be formed under the road at a point to the south of KTN area F1-1 to maintain linkages between the riparian corridor and KTN area H1-1 for terrestrial fauna.

12.2.11 Run-off and pollution impacts on the stream will be minimized during the operational period. Run-off from the LMC Loop Eastern Connection Road will be collected and

conveyed to a discharge point, while surface-water run-off from the Sports Ground/ Sports Complex in KTN area F1-1 and the Research and Development Facility in F1-3 will be collected, sediment will be trapped and the clean water will be discharged into the stream in area F1-3.

12.2.12 Detailed mitigation measures will be designed at the detailed design stage of the road.

12.2.13 The lower reaches of Siu Hang San Tsuen Stream will be crossed by the Fanling Bypass and will lie within Open Space Zone D1-3. The bypass will be on viaduct at this point, which should serve to minimize impacts to the stream and stream fauna. Details of measures to reduce any impacts to an acceptable level will be designed at the detailed design stage of the road and the D1-3 zone. Construction-phase impacts to the stream are minimized by ensuring that the hydrological linkage between the stream and the Ng Tung River is maintained and a 10m wide buffer zone on either side of the stream is designated and protected by a 2m high solid barrier to prevent any construction or other materials being deposited in the stream. Subject to the finalisation of the design of the bypass (clear headroom in relation to width of the bypass), replanting of shade-tolerant native shrub and herb species should be undertaken.

12.2.14 Upon completion of the Fanling Bypass, a 10m wide buffer zone is recommended to be designated throughout the stream.

Measures to minimize indirect and fragmentation impacts on ecologically sensitive habitats and on fauna and flora species of conservation significance

12.2.15 Mitigation measures to minimize indirect and fragmentation impacts on ecologically sensitive habitats and areas, and to minimize indirect, fragmentation and mortality impacts on fauna and flora of conservation significance, are required at a number of locations in the Study and Project Areas, as is stated in Section 13.8 and Section 13.9 of the EIA Report and in **Appendix B**. These measures include the provision of site hoarding around construction areas (where possible in phases) to minimize disturbance to adjacent habitats and species; the checking of areas for the presence of species of conservation significance prior to the commencement of any site clearance; and the minimisation of impacts on these species by adjustment to the project programme, amendment to design, additional in situ mitigation measures, and transplantation/translocation to appropriate receptor sites. Design of the barrier, and a phasing plan for barrier erection and dismantling should be designed at the detailed design stage of the relevant project element.

12.2.16 Good construction site practice to minimize dust generation and other pollution control measures proposed under **Appendix B** should be followed on all construction sites.

12.2.17 In addition to the mitigation requirements detailed above, it is stated, for the avoidance of any doubt, that all mitigation measures which are recommended in Section 13.8 and Section 13.9 of the EIA Report should be implemented in accordance with the recommendations made in these Sections.

12.3 Monitoring and Audit Requirements

12.3.1 Environmental Audit

12.3.1.1 The implementation of mitigation measures described in Section 12.2 above shall be audited periodically during the implementation of the project. Requirements of the environmental audit are given in Section 14 of this manual. This will cover implementation of the mitigation measures described in Section 13 of the EIA Report and in the Implementation Schedule detailed in **Appendix B**.

12.3.2 Environmental Monitoring

Monitoring of Construction and Operation of LVNP (including creation of compensatory wetland habitat) and monitoring of impacts on Long Valley and on fauna in Long Valley

12.3.2.1 The monitoring measures for the construction of the LVNP, including the creation and enhancement of wetland to compensate for wetland loss will be detailed in the LVNP Detailed Management Plan. After the construction and establishment stages management and monitoring of the habitats and species will be undertaken by AFCD.

12.3.2.2 As noted below, monitoring should also be undertaken in all areas where impacts on habitats and fauna may arise as a consequence of the project. This includes the LVNP where impacts on disturbance-sensitive fauna are predicted in the absence of mitigation measures (including adaptive management measures in Long Valley). The ecological monitoring protocol to be followed in LVNP should, therefore satisfy three objectives, as follows:

- Monitoring of numbers and distribution of fauna (especially species of conservation significance) relative to adaptive management targets;
- Monitoring of numbers and distribution of fauna (especially species of conservation significance) for which habitat enhancement and other measures in LVNP are required to mitigate for impacts of the project on their use of Long Valley habitats;
- Monitoring of numbers and distribution of fauna (especially species of conservation significance) for which habitat enhancement and other measures in LVNP are required to mitigate for impacts of the project on their use of habitats in the main river channels.

12.3.2.3 It follows that the monitoring protocol in order to address the second and third of these requirements should be consistent with that described below in respect of monitoring of measures to mitigate for impacts on wetland-dependent fauna using the Ng Tung Sheung Yue and Shek Sheung Rivers.

12.3.2.4 Details of monitoring protocol will be included in the HCMP for LVNP. Subject to confirmation following the completion of pre-construction baseline surveys and the adoption and implementation of the HCMP, the following survey methodologies and frequencies are recommended in respect of fauna species and groups of species which are the targets for mitigation measures:

- Mammals: infra-red camera 'traps' to be deployed;

- Birds: weekly surveys following similar methodologies to those utilised by HKWBS since 2005 (in order to allow comparability of data), together with any additional surveys required in order to address the need for survey data to be comparable with that collected in respect to bird use of the main river channels, as described below;
- Herpetofauna: monthly transect surveys, including night-time surveys during March to July; and
- Butterflies and dragonflies: monthly transect surveys; exuviae monitoring in any areas managed with creation or enhancement of conditions as a breeding site.

Monitoring of Measures to Minimize Disturbance to Waterbirds on Ng Tung, Sheung Yue and Shek Sheung Rivers

12.3.2.5 Where development under the NDAs project is undertaken within 200m (the maximum distance at which it is predicted there may be some disturbance, and hence a reduction in numbers, of large waterbirds) of the Ng Tung, Sheung Yue and Shek Sheung Rivers and Long Valley the monitoring protocol detailed in **Table 12.1** should be followed. A transect should be undertaken throughout the sections of the rivers where NDA construction activities are proposed; as the sensitive receivers (large waterbirds) are easily visible, the transect route needs only follow one bank of the rivers. The transect route should remain the same during the different phases in order to ensure that data are comparable. As stated in this report, it is predicted that there will be some construction and operational phase disturbance impacts on large waterbirds using these rivers, and mitigation will in part be provided by enhancement measures for large waterbirds in LVNP. Monitoring of large waterbirds should, therefore, also be undertaken with the same frequency in LVNP (see above). A detailed monitoring plan would be formulated at least one year before the commencement of construction phase.

12.3.2.6 Monitoring should be conducted by the Environmental Team (ET) and supervised by a qualified ecologist who will be a member of the ET.

Table 12.1 Monitoring of Measures to Minimize Disturbance to Waterbirds on the Ng Tung, Sheung Yue and Shek Sheung Rivers

Phase	Methodology
Pre-construction (Baseline)	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and LVNP area for 12 months prior to the commencement of construction.
Construction	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and LVNP and identify any sources of actual or potential disturbance to birds due to construction activities throughout the construction period.

Post-construction	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and LVNP and identify any sources of actual or potential disturbance to birds due to operational activities for 12 months following the completion of the construction period.

12.3.2.7 Measures to respond to decrease in numbers of large waterbirds using the river channels and action and limit levels to trigger these measures are detailed in **Table 12.2**. Note that waterbird numbers refer to combined numbers using the channels and LVNP.

Table 12.2 Action and Limit Levels and Responses to Evidence of Disturbance to Waterbirds using in Ng Tung, Sheung Yue and Shek Sheung Rivers

Action Level	Response	Limit Level	Response
Construction Phase			
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to NDAs project instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if caused identified as related to NDAs project instigate remedial action. Review and adjust LVNP management measures to improve conditions for affected species.
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to NDAs project instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if caused identified as related to NDAs project instigate remedial action. Review and adjust LVNP management measures to improve conditions for affected species.
Operational Phase			
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to NDAs review and adjust LVNP management measures to improve conditions for affected species in LVNP.	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if cause identified as related to NDAs consider and implement additional mitigation measures (e.g. additional screening and screen planting, adjustments to infrastructure design).
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to NDAs review and adjust LVNP management measures to improve conditions for affected species.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if cause identified as related to NDAs consider and implement additional mitigation measures (e.g. additional screen planting, adjustments to infrastructure design).

* Whether numbers are significant will depend on species and season and should be determined following collection and evaluation of Baseline survey data.

Monitoring of Existing Egretry and Compensatory Egretry Habitat Provision

12.3.2.8 Site clearance works at the current egretry location at Man Kam To Road should be undertaken outside the ardeid breeding season (typically 1st March to 31st July). Irrespective of the foregoing, egretry location should be checked for any evidence of occupation by a qualified ecologist of the ET prior to the commencement of any works activity within 100m of the egretry.

12.3.2.9 An Egretry Habitat Creation and Management Plan that includes the monitoring and reporting requirements will be prepared and the measures proposed in this plan shall be implemented as an advance works element of the project.

12.3.2.10 The plan should detail any site preparation works, including changes to ground levels in the proposed compensatory planting site in FLN area A1-7. Consideration should be given as to whether the area and type of wetland and non-wetland habitats should be adjusted, subject to ensuring that the principle of 'no net loss' of wetland function is adhered to.

12.3.2.11 The plan should also include a detailed planting plan, including, but not limited to, planting a clump of *Bambusa eutuldoidesas* a compensatory breeding site. Measures to protect the site from disturbance including fencing, use of water as a barrier to inhibit disturbance, and screen planting and bunding should be included.

12.3.2.12 The plan should also detail post-construction methods to attract breeding ardeids including, but not limited to use of decoy models and recordings of breeding vocalizations to attract birds, following current best international practice.

12.3.2.13 In addition, a construction phase; post-construction 'attraction-phase'; and operational phase (i.e. if, and when, attraction is successful) programme for monitoring site conditions and use of the site by ardeids and any other species of conservation significance should be specified.

Monitoring of Measures to Minimize Impacts to Ma Tso Lung Stream and Siu Hang San Tsuen Stream

12.3.2.14 Aquatic faunal monitoring should be carried out during a 12-month pre-construction phase, the construction phase and the first 12 months of the operational phase.

Table 12.3 Monitoring of Measures to Minimize Impacts to Ma Tso Lung Stream and Siu Hang San Tsuen Streams

Phase	Methodology
Pre-construction (Baseline)	Monthly quantitative replicate surveys of stream fauna using standardised methodology at fixed points, the number of which should be determined prior to the first monitoring event.
Construction	Monthly quantitative replicate surveys of stream fauna using standardised methodology at the fixed points determined in the pre-construction phase.
Post-construction	Monthly quantitative replicate surveys of stream fauna using standardised methodology at the fixed points determined in the pre-construction phase.

12.3.2.15 Measures to respond to decreases in numbers of aquatic fauna using the watercourses and action and limit levels to trigger these measures are detailed in **Table 12.4**. Monitoring in the post-construction phase should continue for 12 months or until a time when neither the action nor limit levels are exceeded, whichever is the later.

Table 12.4 Action and Limit Levels and Responses to Evidence of Declines in Aquatic Fauna

Action Level	Response	Limit Level	Response
Construction Phase			
Reduction in taxa diversity such that Action Level response is triggered.	Investigate cause and if cause identified as related to Project instigate remedial action to remove or reduce source of disturbance.	Reduction in taxa diversity such that Limit Level response is triggered.	Investigate cause and if caused identified as related to Project instigate remedial action.
Operational Phase			
Reduction in taxa diversity such that Action Level response is triggered.	Investigate cause and if cause identified as related to Project review and adjust LVNP management measures to improve conditions for affected species.	Reduction in taxa diversity such that Limit Level response is triggered.	Investigate cause and if cause identified as related to Project consider and implement additional mitigation measures.

* Whether numbers are significant will depend on species and season. Significance threshold for each species should be reviewed following collection of Baseline survey data.

Monitoring of Measures to Minimize Impacts on ecologically sensitive habitats from disturbance and pollution

12.3.2.16 In order to monitor the effectiveness of measures to minimize impacts on ecologically sensitive habitats from disturbance and pollution standard faunal transect surveys should be carried out in the following areas:

- Ma Tso Lung riparian zone and associated wetland habitats
- Siu Hang San Tsuen Stream
- Areas in the western part of KTN
- Green belt areas E1-8, D1-8 and G1-3 in KTN NDA
- AGR zone C2-4 and C2-2 in KTN NDA
- Fanling North Freshwater Service Reservoir
- Areas north of Ng Tung River
- South side of Fanling Highway in the vicinity of Pak Shek Au
- Areas west and east of the southern limit of the Fanling bypass works area

12.3.2.17 Monitoring of measures to minimize impacts should be carried out during a 12-month pre-construction phase, the construction phase and the first 12 months of the operational phase.

Table 12.5 Monitoring of Measures to Minimize Impacts on ecologically sensitive habitats from disturbance and pollution

Phase	Methodology
Pre-construction (Baseline)	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.
Construction	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.
Post-construction	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.

12.3.2.18 Measures to respond to decreases in numbers of fauna and action and limit levels to trigger these measures are presented in **Table 12.6**. Monitoring in the post-construction phase should continue for 12 months or until a time when neither the action nor limit levels are exceeded, whichever is the later.

Table 12.6 Action and Limit Levels and Responses to Evidence of Declines in Aquatic Fauna

Action Level	Response	Limit Level	Response
Construction Phase			
Reduction in species diversity such that Action Level response is triggered.	Investigate cause and if cause identified as related to Project instigate remedial action to remove or reduce source of disturbance.	Reduction in taxa diversity such that Limit Level response is trggered.	Investigate cause and if caused identified as related to Project instigate remedial action.
Operational Phase			
Reduction in species such that Action Level response is triggered.	Investigate cause and if cause identified as related to Project review and adjust LVNP management measures to improve conditions for affected species.	Reduction in taxa diversity response is triggered.	Investigate cause and if cause identified as related to Project consider and implement additional mitigation measures.

* Whether numbers are significant will depend on species and season. Significance threshold for each species should be reviewed following collection of Baseline survey data.

12.4 Baseline Ecological Monitoring Plan

12.4.1 The Baseline Ecological Monitoring Plan (BEMP) prepared by ET was approved by Agriculture, Fisheries and Conservation Department (AFCD) on 4th July, 2019. The approved BEMP is attached in **Appendix E**.

13. Fisheries

13.1 Introduction

13.1.1 The only potential fisheries impact of significance was the potential loss of a fish fry farm at Fung Kong in KTN NDA. Other than that, the fisheries impact assessment has evaluated the predicted fisheries impact of the NDAs project and concluded that the fisheries impact can be avoided or reduced to a minor and acceptable level with the implementation of mitigation measures.

13.2 Mitigation Measures

13.2.1 The scale of loss of fish ponds as a consequence of the NDAs development is not significant and no in-situ mitigation is required.

13.2.2 However, the fish fry farm at Fung Kong is an important operational element of culture fishery in Hong Kong; approximately 70% of fish fry supplied to Hong Kong culture fisheries pass through this farm. Accordingly timely notification of the fish fry farm operator and/or the Hong Kong N.T. Fish Culture Association of the need for relocation or reprovision of the fish farm is required in order to avoid disruption to the fish fry supply chain.

13.2.3 However, mitigation measures for water quality proposed in the EIA Report are also pertinent in ensuring that fisheries impacts of the project do not occur downstream of the NDAs area in Inner Deep Bay and, specifically, downstream of the works to be undertaken within the Ma Tso Lung Stream catchment.

13.3 Monitoring and Audit Requirement

13.3.1 There are no monitoring and audit requirements in respect of fisheries.

14. Site Environmental Audit

14.1 Site Inspection

14.1.1 Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

14.1.2 The ET shall be responsible for formulating the environmental site inspection programme as well as the deficiency and action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.

14.1.3 Regular site inspections shall be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly, by the construction site activities of the Project. The ET shall make reference to the following information in conducting the inspection. During the inspection, the following information should be referred to:

14.1.4 EIA Report recommendations on environmental protection and pollution control mitigation measures;

works progress and programme;

individual works methodology proposals (which shall include the proposal on associated pollution control measures);

contract specifications on environmental protection;

relevant environmental protection and pollution control legislations; and

previous site inspection results.

14.1.5 The Contractor shall keep the ER and ET Leader updated with all relevant environmental related information on the construction contract necessary for him to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.

14.1.6 The ER, ET and the Contractor should also carry out ad-hoc site inspections if significant environmental problems are identified. Inspections may also be required

subsequent to receipt of a valid environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for the EM&A programme.

14.1.7 The ET and IEC would monitor the installation of temporary noise barriers according to the traffic noise mitigation plan (TNMP) approved under EP-473/2013/A.

14.2 Compliance with Legal and Contractual Requirements

14.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

14.2.2 In order that the works comply with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to ensure sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarised in **Appendix B**.

14.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.

14.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works checking could be carried out effectively. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary shall also be available for the ET Leader's inspection upon his request.

14.2.5 After reviewing the document, the ET Leader shall advise the IEC and Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and ER accordingly.

14.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to correct the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

14.3 Environmental Complaints

14.3.1 The following procedures should be undertaken upon receipt of any environmental complaint:

14.3.2 The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;

14.3.3 The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;

14.3.4 The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;

14.3.5 The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;

14.3.6 The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;

14.3.7 The ET to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;

14.3.8 If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up actions stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and

14.3.9 The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

15. Reporting

15.1 General

15.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted on diskettes or other approved media. The formats for air quality, noise and water quality monitoring data to be submitted shall be separately agreed.

15.1.2 The ET is responsible for establishing and maintaining a dedicated website throughout the entire construction period for publishing all the relevant environmental monitoring data (including but not limited to the baseline and impact monitoring). The ET shall propose the format and functionality of the website for agreement with the ER and IEC prior to publishing of data. Once the monitoring data are available (e.g. noise, dust, water quality etc) and vetted by the IEC, the ET is responsible to upload the relevant data to the dedicated website.

15.1.3 Types of reports that the ET shall prepare and submit include baseline monitoring report, monthly EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports shall be made available to the Director of Environmental Protection.

15.2 Baseline Monitoring Report

15.2.1 The ET should prepare and submit a Baseline Environmental Monitoring Report at least two weeks before commencement of construction of the Project. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, ER and EPD. The ET should liaise with the relevant parties on the exact number of copies require.

15.2.2 The baseline monitoring report shall include at least the following:

- up to half a page executive summary;
- brief project background information;
- drawings showing locations of the baseline monitoring stations;
- monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring date, Time, frequency and duration; and
- quality assurance (QA) / Quality control (QC) results and detection limits;
- details of influencing factors, including:
- major activities, if any, being carried out on the site during the period;

- weather conditions during the period; and
- other factors which might affect monitoring results;
- determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data; revisions for inclusion in the EM&A Manual; and comments, recommendations and conclusions.
- revisions for inclusion in the EM&A Manual; and
- comments, recommendations and conclusions.

15.3 Monthly Monitoring Reports

15.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The EM&A report shall be prepared and submitted to EPD within 10 working days of the end of each reporting month, with the first report due the month after construction commences. Copies of each monthly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD. Before submission of the first EM&A report, the ET shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

15.3.2 The ET shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

15.3.3 The first monthly EM&A report shall include at least the following:

a) Executive

- breaches of Action and Limit levels;
- compliant log
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

b) Basic project information:

- project organization including key personnel contact names and
- telephone numbers;
- programme;
- management structure; and
- works undertaken during the month.

c) Environmental status:

- advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;

- works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and

- drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).

d) A brief summary of EM&A requirements including:

- all monitoring parameters;

- environmental quality performance limits (Action and Limit levels);

- Event-Action Plans;

- Environmental mitigation measures, as recommended in the project EIA study final report; and

- Environmental requirements in contract documents.

e) Implementation status

- Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report.

f) Monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;

- name of laboratory and types of equipment used and calibration

- details;

- monitoring parameters;

- monitoring locations;

- monitoring date, time, frequency, and duration;

- weather conditions during the period;

- any other factors which might affect the monitoring results; and

- QA / QC results and detection limits.

g) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of noncompliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

h) Others

- an account of the future key issues as reviewed from the works programme and work method statements;
- advice on the solid and liquid waste management status;
- record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

Subsequent monthly EM&A Reports

Subsequent monthly EM&A reports shall include at least the following:

i) Executive summary (1-2 pages):

- breaches of Action and Limit levels;
- compliant log
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

j) Basic project information:

- project organization including key personnel contact names and telephone numbers;
- programme;
- management structure; and
- works undertaken during the month; and.
- any updates as needed to the scope of works and construction methodologies.

k) Environmental status:

- advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
- works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
- drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations.

l) Implementation status

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report.

m) Monitoring result (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- monitoring parameters;
- monitoring locations;
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and

- QA / QC results and detection limits.

n) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;

- review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and

- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

o) Others

- an account of the future key issues as reviewed from the works programme and work method statements;

- advice on the solid and liquid waste management status;

- record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and

- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

p) Appendices

- Action and Limit levels;

- graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
  a) major activities being carried out on site during the period;

  b) weather conditions during the period; and

  c) any other factors that might affect the monitoring results.

- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

15.4 Final EM&A Review Reports

15.4.1 The EM&A programme should be terminated upon the completion of the construction activities that have the potential to result in significant environmental impacts.

15.4.2 Prior to the proposed termination, it may be advisable to consult relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project Proponent followed by approval from the Director of Environmental Protection.

15.4.3 The final EM&A report should contain at least the following information:

a) Executive summary (1-2 pages):

b) Drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations;

c) Basic project information including a synopsis of the project organization, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;

d) A brief summary of EM&A requirements including:

- environmental mitigation measure, as recommended in the project EIA Report;
- environmental impact hypotheses tested;
- environmental quality performance limits (Action and Limit levels);
- all monitoring parameters;
- Event and Action Plans;

e) A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report, summarised in the updated implementation schedule;

f) Graphical plots and the statistical analysis of the trends of monitoring parameter over the course of the project, including the post-project monitoring for all monitoring stations annotated against:

- the major activities being carried out on site during the period;

- weather conditions during the period; and
- any other factors which might affect the monitoring results;

g) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

h) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

i) A description of the actions taken in the event of non-compliance;

j) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;

k) A review of the validity of EIA predictions and identification of shortcomings in EIA recommendations;

l) Comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and

m) Recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

15.5 Data Keeping

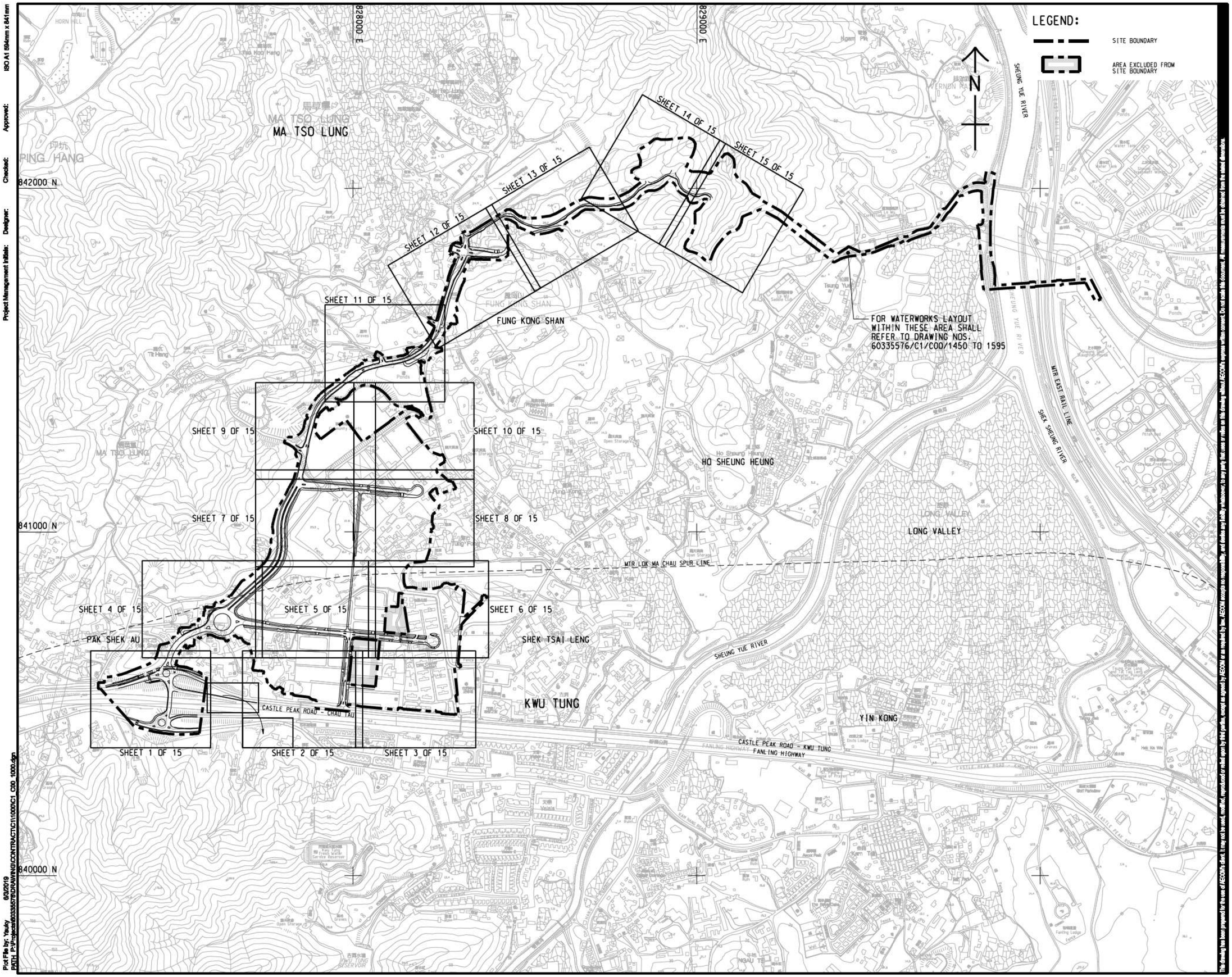
15.5.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

15.6 Interim Notifications of Environmental Quality Limit Exceedances

15.6.1 With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in **Appendix D**.

FIGURES

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm



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AECOM

PROJECT

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

KWU TUNG NORTH NEW DEVELOPMENT AREA, PHASE 1: SITE FORMATION AND INFRASTRUCTURE WORKS

CLIENT

土木工程拓展署
CEDD Civil Engineering and Development Department

CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

Figure 1.1
Location of the Project in KTN and FLN NDA (Contract 1)

ISSUE/REVISION

IVR	DATE	DESCRIPTION	CHK.

STATUS

SCALE A1 1 : 5000

DIMENSION UNIT METRES

KEY PLAN

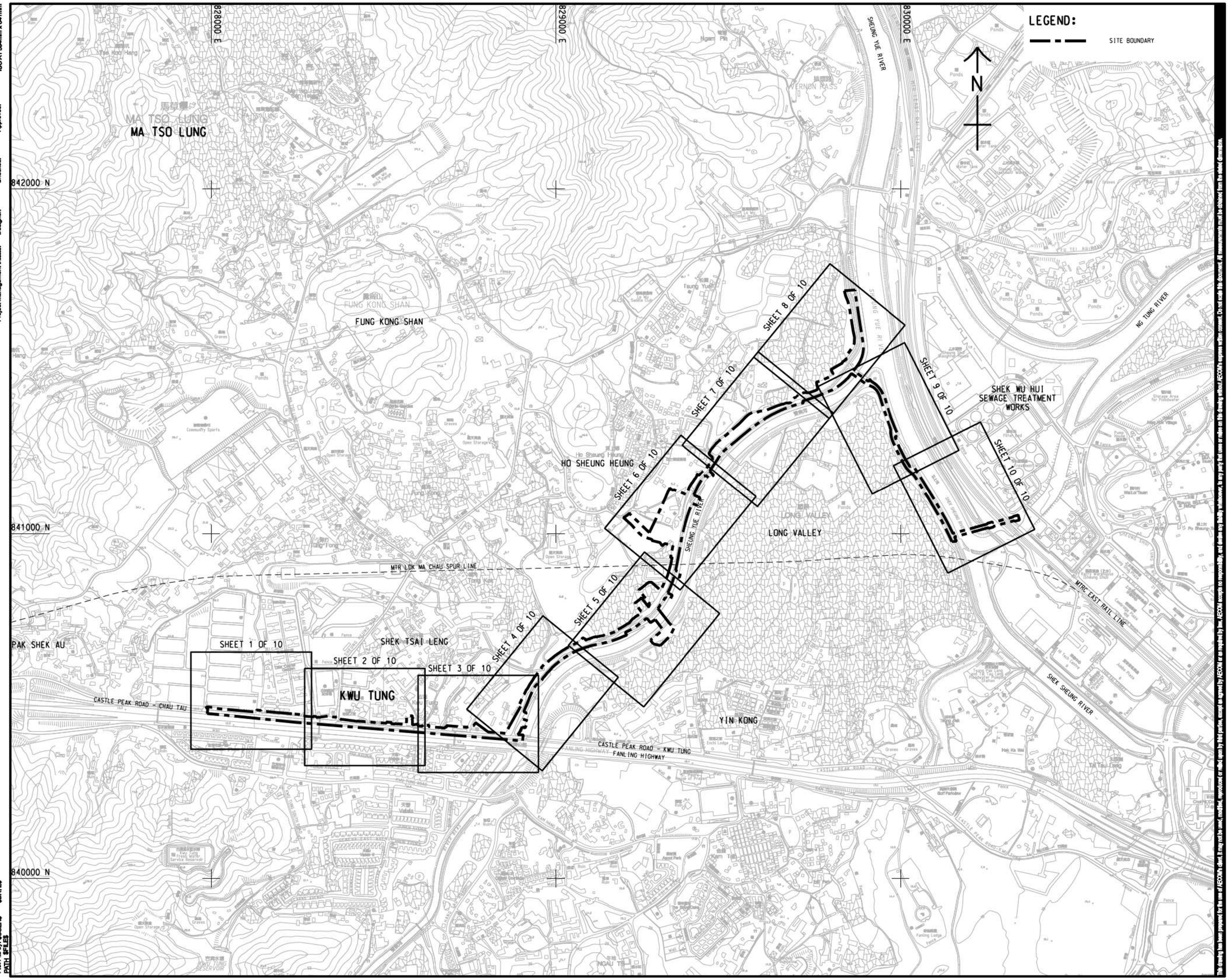
PROJECT NO. 60335576

CONTRACT NO. ND/2019/01

SHEET TITLE
KEY PLAN

SHEET NUMBER
60335576/C1/C00/1000

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm



Plot File by: $USER$ $DATE$
PATH: $FILES

AECOM

PROJECT
UTILITIES ALONG FANLING HIGHWAY AND RIVER BEAS AND RESITE AREA

CLIENT
土木工程拓展署
CEDD Civil Engineering and Development Department

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

Figure 1.2
Location of the Project in KTN and FLN NDA (Contract 2)

ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS
PRELIMINARY

SCALE: A1 1 : 5000
DIMENSION UNIT: METRES

KEY PLAN

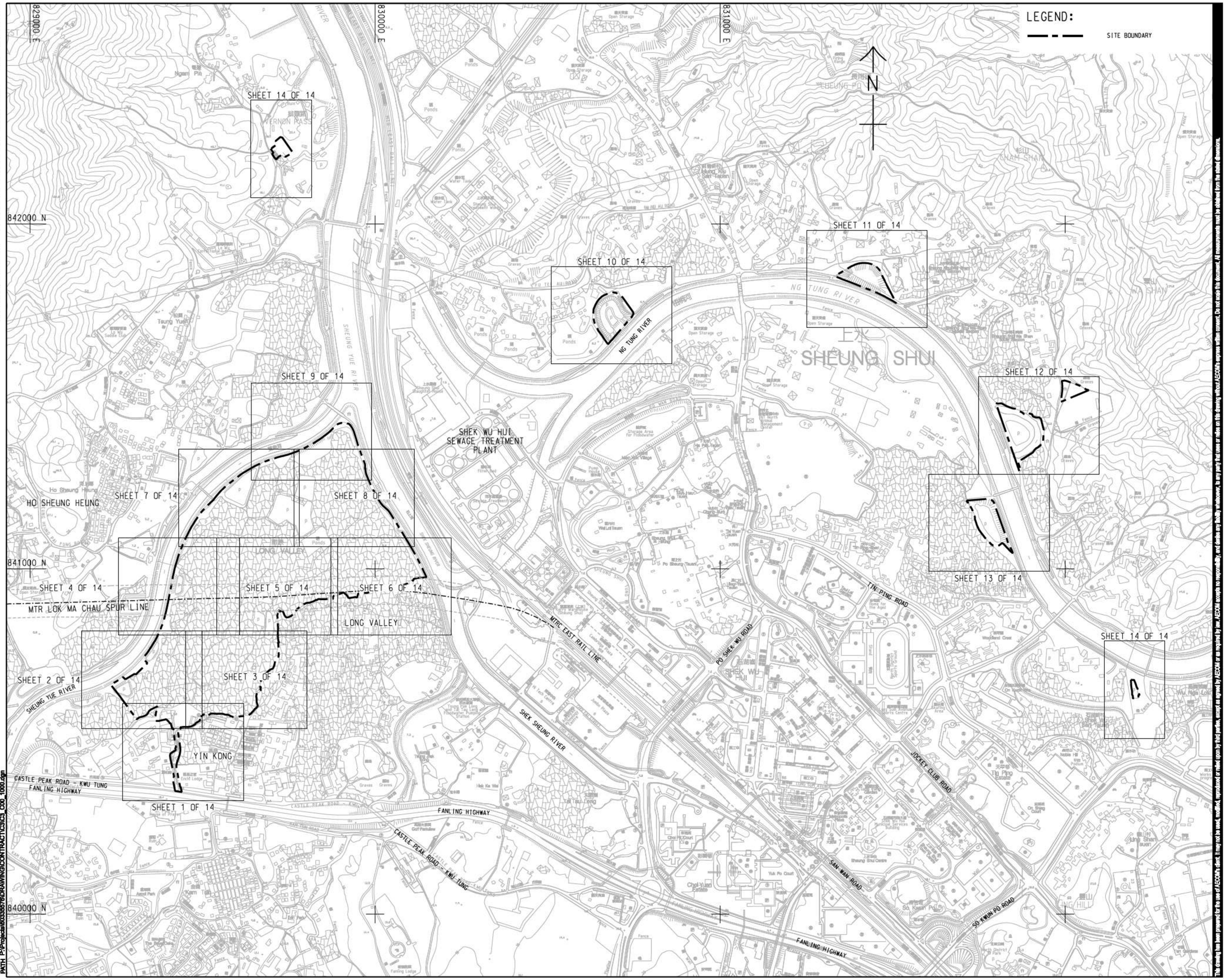
PROJECT NO.: 60335576
CONTRACT NO.: CE 13/2014 (CE)

SHEET TITLE
KEY PLAN

SHEET NUMBER
60335576/C2/C00/1000

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Approved: IHWL
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AECOM

PROJECT
項目

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1: DEVELOPMENT OF LONG VALLEY NATURE PARK

CLIENT
客戶

土木工程拓展署
Civil Engineering and Development Department

CONSULTANT
工程顧問合約號

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分包工程顧問合約號

Figure 1.3
Location of the Project in KTN and FLN NDA (Contract 3)

ISSUE/REVISION
修訂

-	JUN. 19	TENDER DRAWING	CYCH
NR 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS
狀況

SCALE 比例
A1 1 : 5000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60335576

CONTRACT NO. 合約編號
ND/2019/03

SHEET TITLE
圖紙名稱
KEY PLAN OF GENERAL LAYOUT

SHEET NUMBER
圖紙編號
60335576/C3/C00/1000

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Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

LEGEND:

SITE BOUNDARY

N

831000 E

832500 E

840000 N

838500 N

SHEET 1 OF 8

SHEET 2 OF 8

SHEET 3 OF 8

SHEET 4 OF 8

SHEET 5 OF 8

SHEET 6 OF 8

SHEET 7 OF 8

SHEET 8 OF 8

SHEUNG SHUI

FANLING

SIU HANG TSUEN

SAN UK TSUEN

LUNG YEUK TAU

WING NING TSUEN

WO HOP SHEK

NG TUNG RIVER

PO SHEK WU ROAD

JOCKEY CLUB ROAD

WA SIK ROAD

FANLING HIGHWAY

FAN LENG LAU ROAD

LUNG YEUK TAU – YUEN LONG ROAD

MTR EAST RAIL LINE

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PROJECT

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

FANLING NORTH NEW DEVELOPMENT AREA, PHASE 1: FANLING BYPASS EASTERN SECTION BETWEEN SHEK WU SAN TSUEN NORTH AND LUNG YEUK TAU

CLIENT

土木工程拓展署
Civil Engineering and Development Department

CONSULTANT

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Figure 1.4
Location of the Project in KTN and FLN NDA (Contract 4)

ISSUE/REVISION

IR	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A1 1 : 7000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60335576

CONTRACT NO.: ND/2019/04

SHEET TITLE

KEY PLAN AND LOCATION PLAN

SHEET NUMBER

60335576/C5A/C00/1000

Project Management Initials:
Designer: WHWY Checked: RPCM Approved: IHWL
ISO A1 594mm x 841mm



Plot File by: ZENKGLY2 2019/5/20
PATH: P:\Projects\60335576\Drawing\contract\C5B\1000\C5B_C00_1000.dgn

AECOM

PROJECT
項目

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

FANLING NORTH NEW DEVELOPMENT AREA, PHASE 1: FANLING BYPASS EASTERN SECTION (SHUNG HIM TONG TO KAU LUNG HANG)

CLIENT
委託

土木工程拓展署
Civil Engineering and Development Department

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

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分判工程顧問公司

Figure 1.5
Location of the Project in KTN and FLN NDA (Contract 5)

ISSUE/REVISION
發出/修訂

IR 參照	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對
-	MAY-19	TENDER DRAWING	RPCM

STATUS
狀況

SCALE 比例: A1 1 : 7000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60335576

CONTRACT NO. 合約編號: ND/2019/05

SHEET TITLE
圖紙名稱

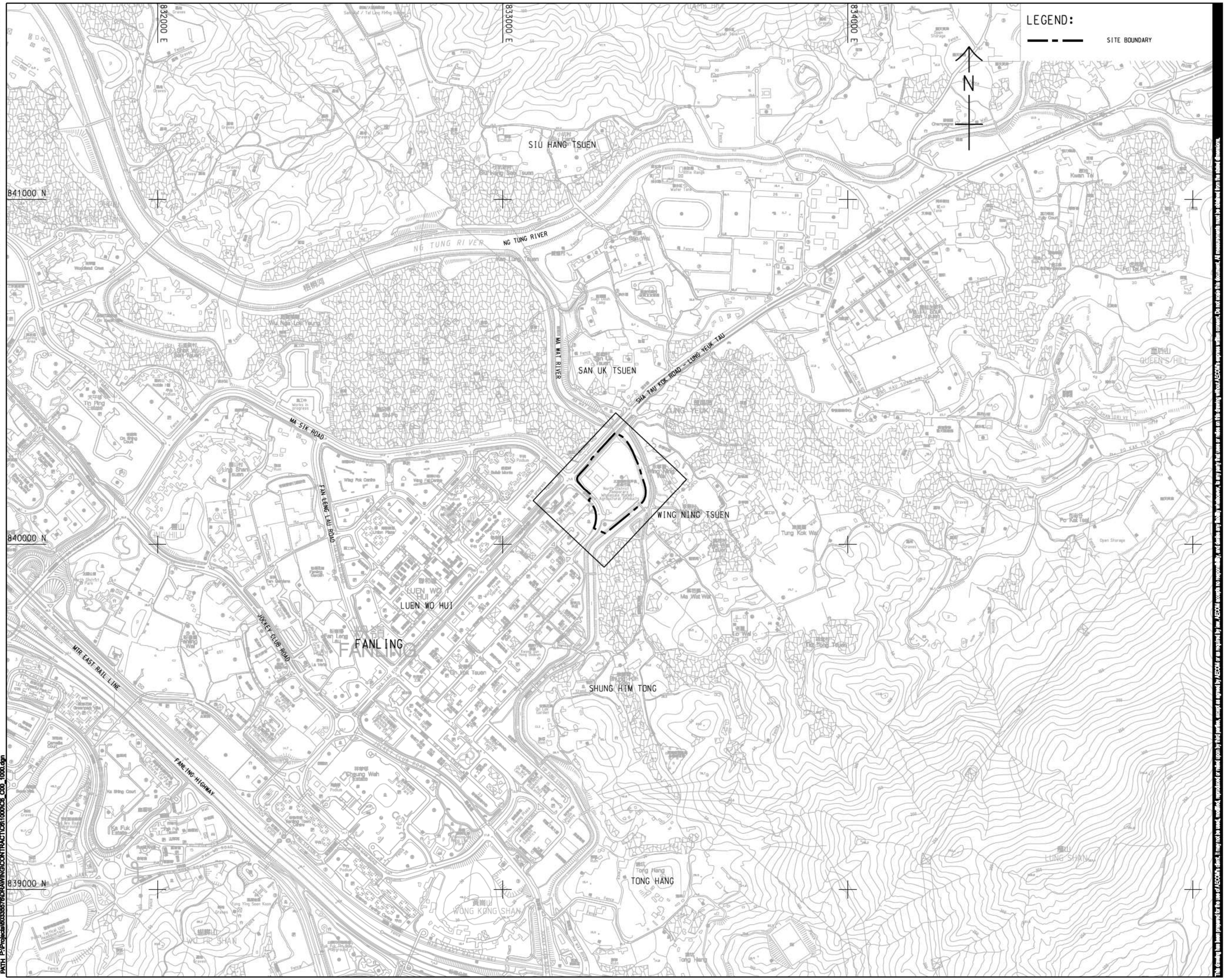
KEY PLAN AND LOCATION PLAN

SHEET NUMBER
圖紙編號

60335576/C5B/C00/1000

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Project Management Initials: Designer: DMCH Checked: ALUI Approved: IHWL ISO A1 594mm x 841mm



Plot File by: Yauky 24/4/2019
PATH: P:\Projects\60335576\DWG\CONTRACT\C6\1000\C6_C00_1000.dgn

AECOM

PROJECT

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

FANLING NORTH NEW DEVELOPMENT AREA, PHASE 1: REPROVISIONING OF NORTH DISTRICT TEMPORARY WHOLESALE MARKET FOR AGRICULTURAL PRODUCTS

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Figure 1.6
Location of the Project in KTN and FLN NDA (Contract 6)

ISSUE/REVISION

-	FEB-19	TENDER DRAWING	ALUI
IR	DATE	DESCRIPTION	CHK.

STATUS

SCALE A1 1 : 5000

DIMENSION UNIT METRES

KEY PLAN

PROJECT NO. 60335576

CONTRACT NO. ND/2019/08

SHEET TITLE

KEY PLAN AND LOCATION PLAN

SHEET NUMBER

60335576/C6/C00/1000

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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

LEGEND:

SITE BOUNDARY

N

842000 N

841000 N

840000 N

829000 E

828000 E

831000 E

832000 E

833000 E

840000 E

841000 E

SHEUNG SHUI WA SHAN NORTH SECTION

SHEUNG SHUI WA SHAN SOUTH SECTION

NG TUNG RIVER

上水

SHEUNG SHUI

SIU HANG TSUEN

SHEET 1 OF 4

SHEET 2 OF 4

SHEET 3 OF 4

SHEET 4 OF 4

SHA TIN SEWAGE TREATMENT WORKS

SHA TIN RACECOURSE

SHING MUN RIVER CHANNEL

SHA TIN FISHERMEN'S NEW VILLAGE

A KUNG KOK

TATE'S CAIRN HIGHWAY

A KUNG KOK SHAN ROAD

SHEK MUN INTERCHANGE

HOLF SITE

MA WAT RIVER

SAN UK TSUEN

SHA TAU KOK ROAD – LUNG YEUK TAU

KUNG YEUK TAU

MA SIK ROAD

FAN LENG LAU ROAD

JOCKEY CLUB ROAD

LUEN WO HUI

FANLING

WING NING TSUEN

SHUNG HIM TONG

Pict File by: yeuky 27/12/2018

PATH: P:\Projects\60335576\DRAWING\CONTRACT\C7\C7 C00 1000.dgn

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AECOM

PROJECT

DEVELOPMENT OF KWU TUNG NORTH AND FANLING NORTH NEW DEVELOPMENT AREAS, PHASE 1

CONTRACT TITLE:

FANLING NORTH NEW DEVELOPMENT AREA, PHASE 1: SITE FORMATION AND INFRASTRUCTURE WORKS

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CONSULTANT

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Figure 1.7
Location of the Project in KTN and FLN NDA (Contract 7)

ISSUE/REVISION

RVN.	DATE	DESCRIPTION	CHK.

STATUS

PRELIMINARY

SCALE: A1 1 : 5000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60335576

CONTRACT NO.: ND/2019/07

SHEET TITLE

KEY PLAN OF GENERAL LAYOUT

SHEET NUMBER

60335576/C7/C00/1000

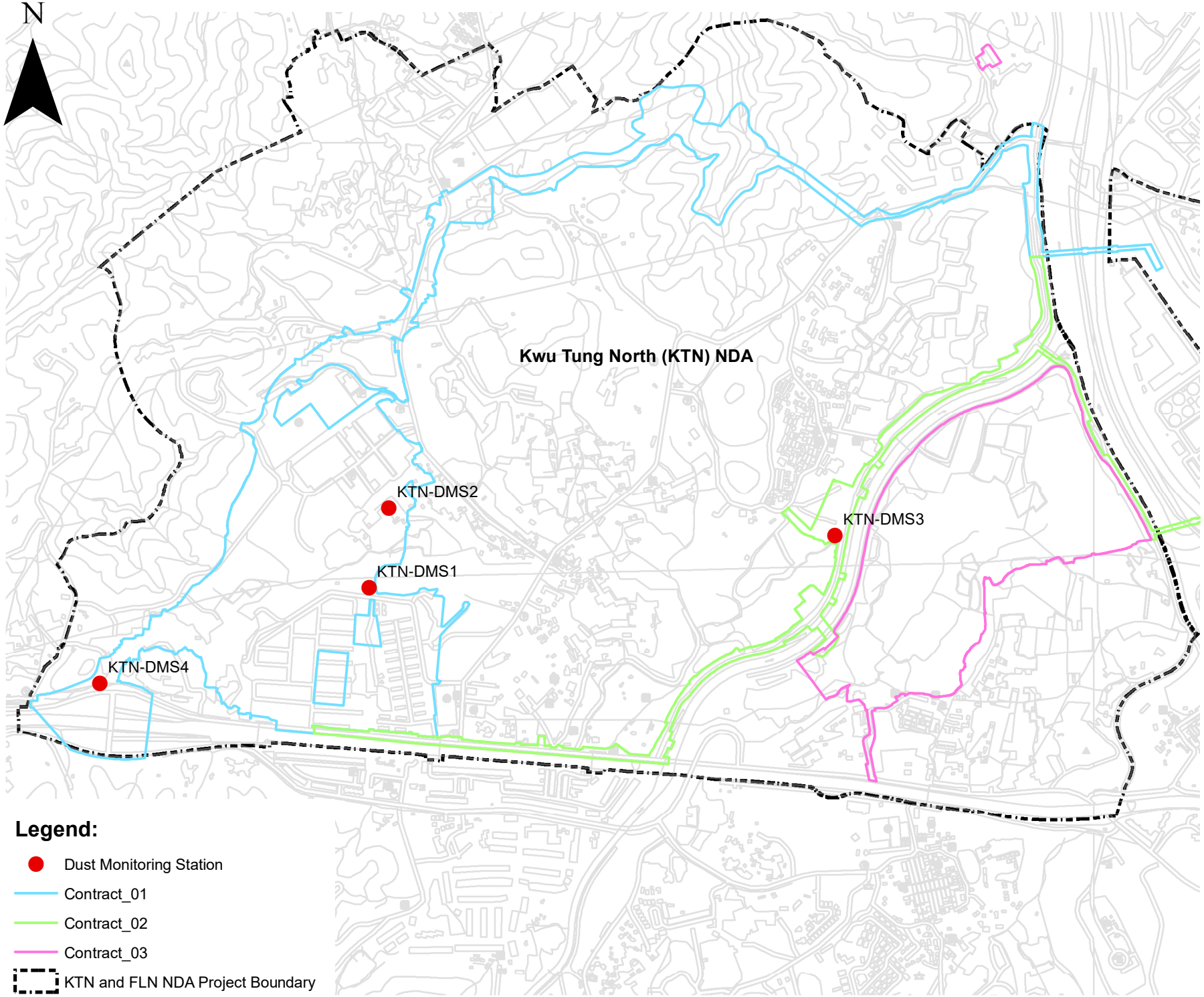


Figure 2.1
Locations of Dust Monitoring Station in KTN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 9,500 19,000 38,000 57,000
Kilometers

Contract No: NDO 14/2018

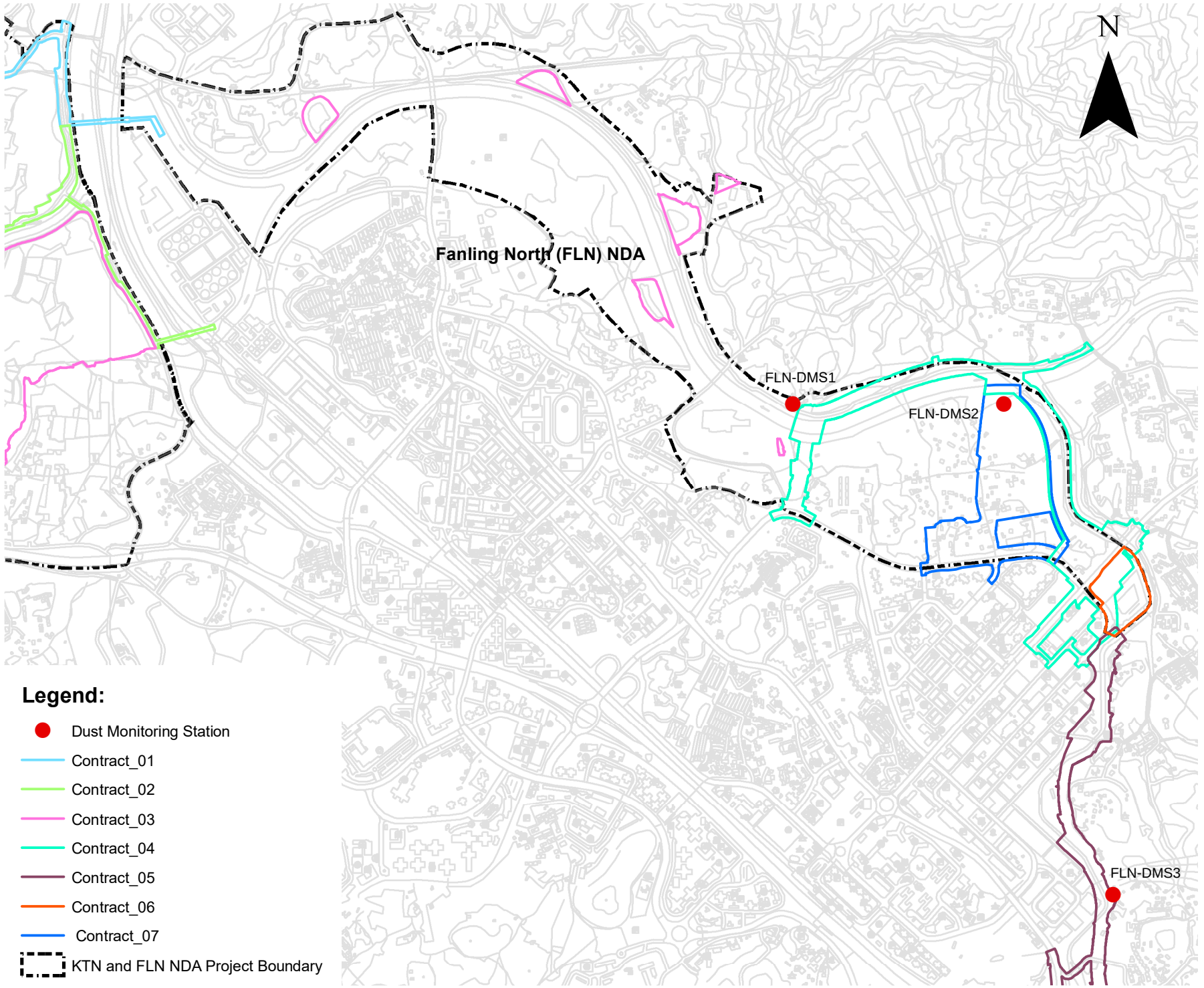


Figure 2.2
Locations of Dust Monitoring Stations in FLN NDA

FUGRO

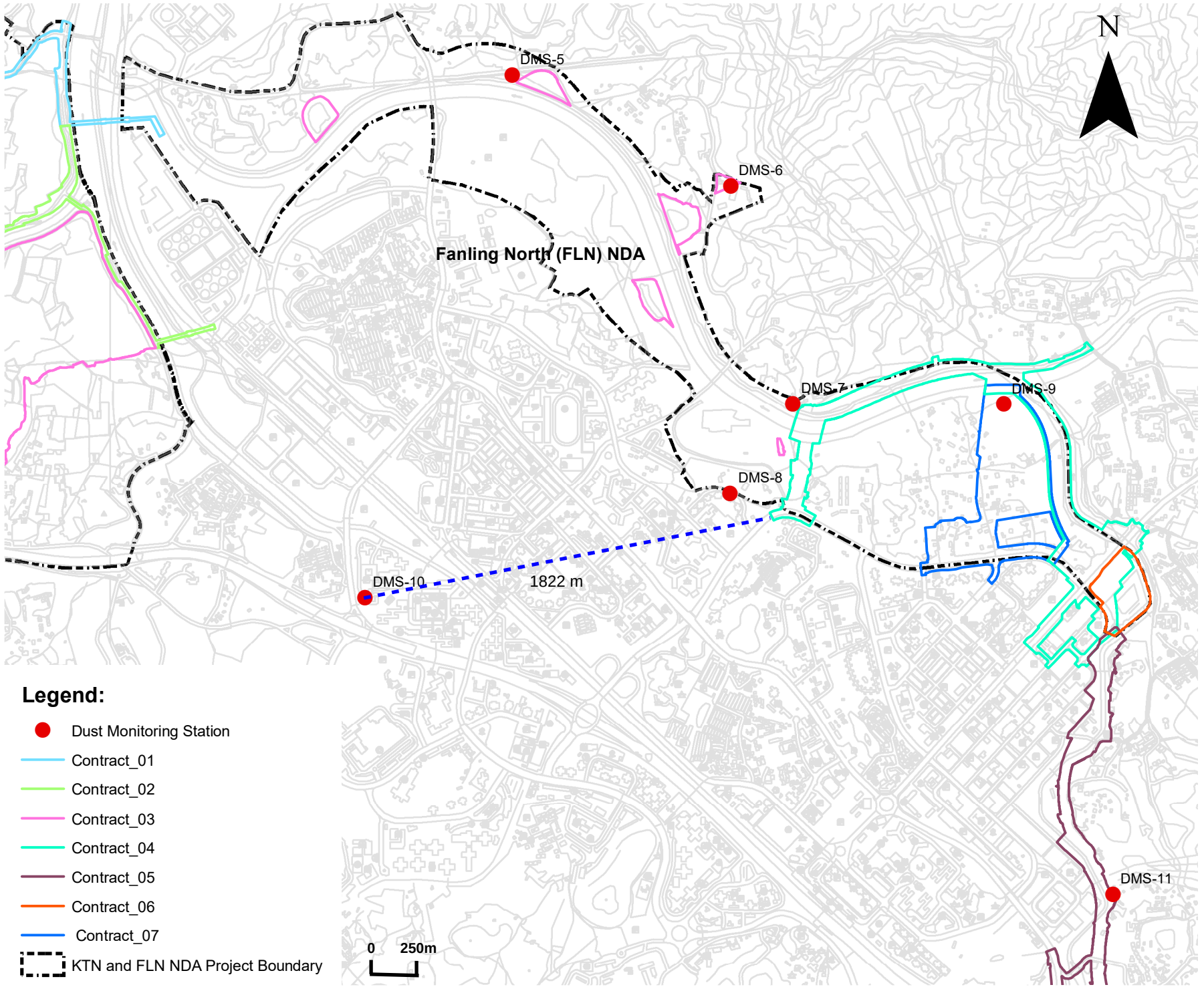
PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 12,000 24,000 48,000 72,000
Kilometers

Contract No: NDO 14/2018



Locations of Dust Monitoring Stations (FLN NDA)

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 12,000 24,000 48,000 72,000
Kilometers

Contract No: NDO 14/2018

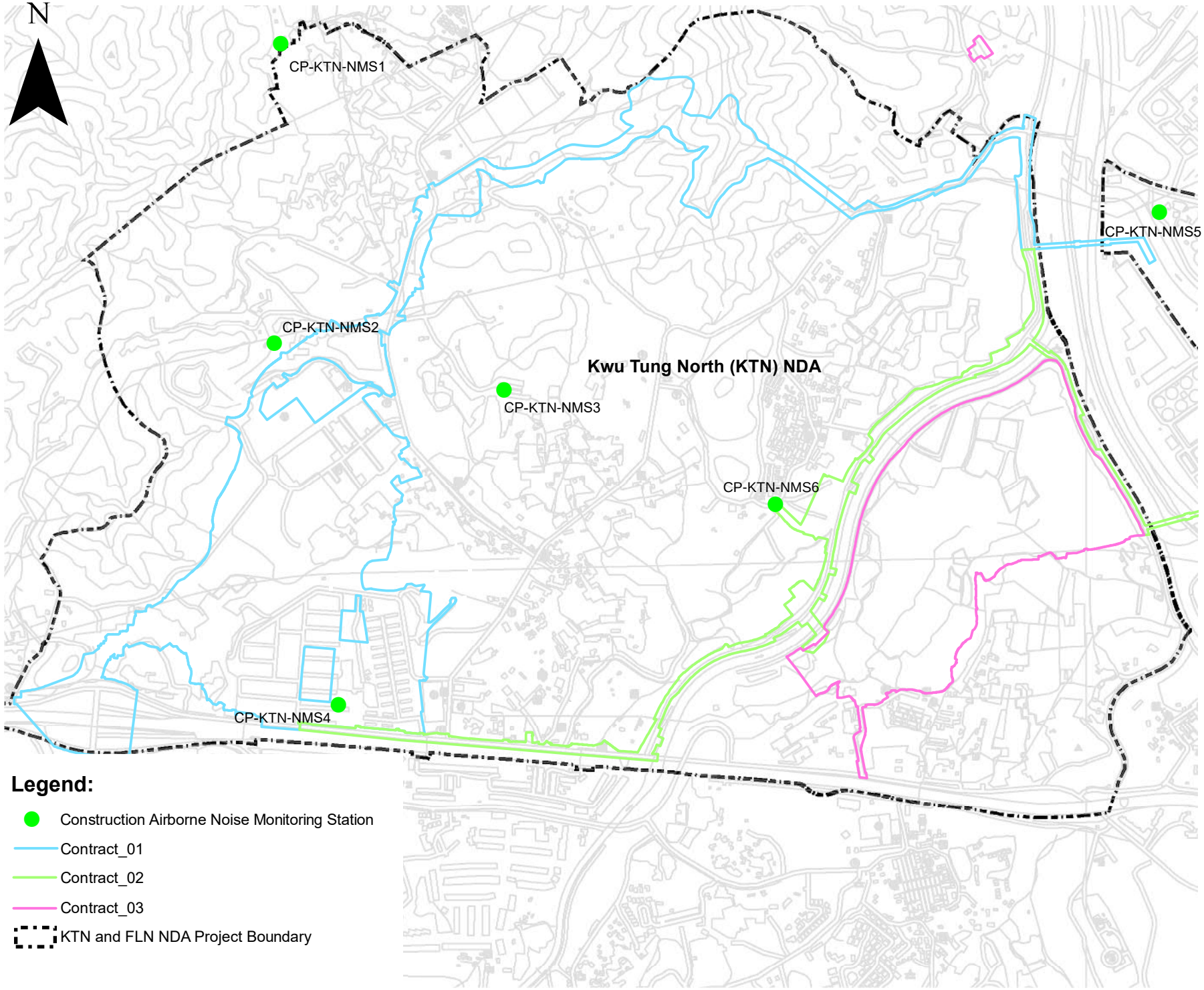


Figure 3.1
Locations of Construction Airborne Noise Monitoring Stations in KTN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

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Kilometers

Contract No: NDO 14/2018

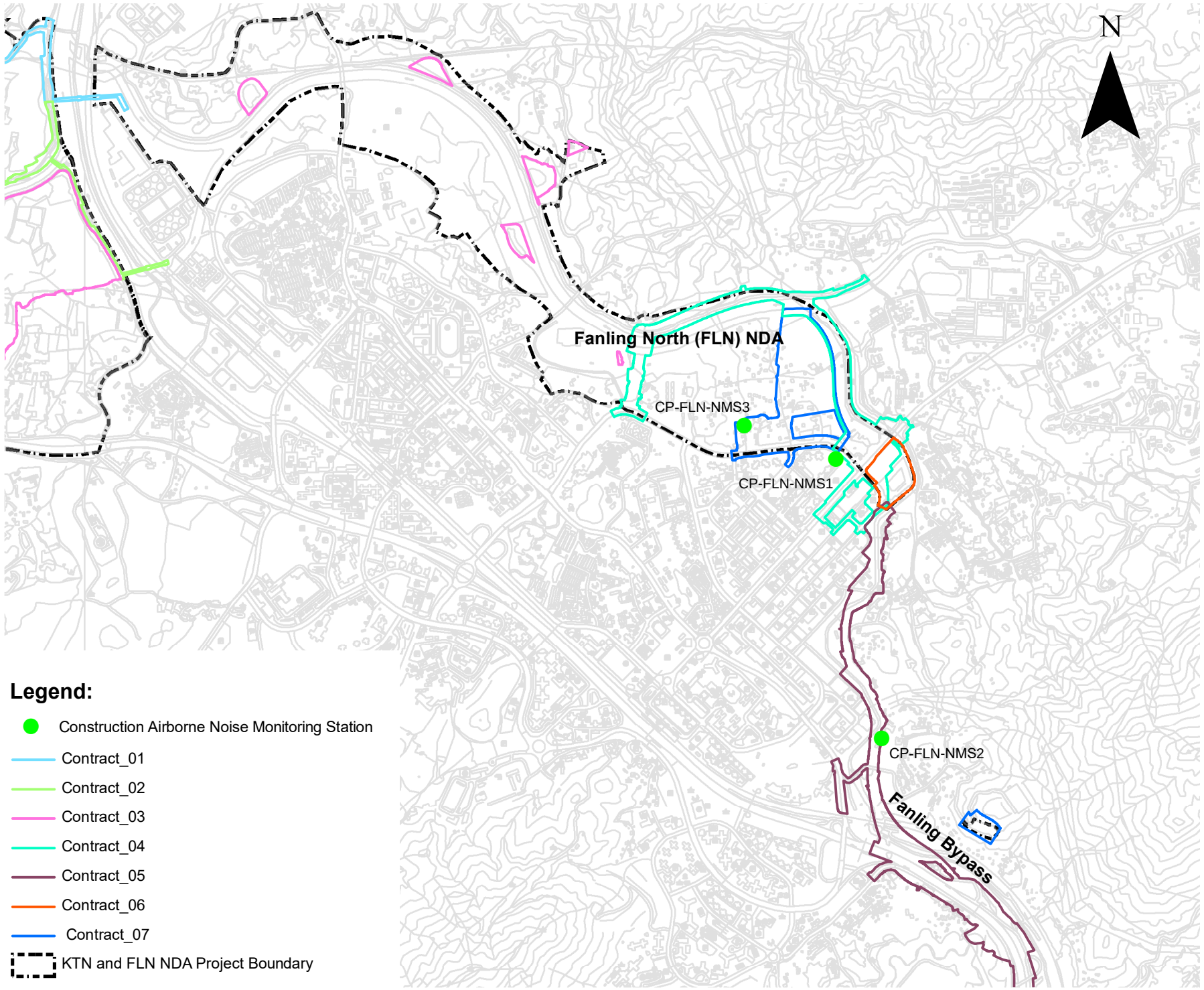


Figure 3.2
Locations of Construction Airborne Noise Monitoring Stations in FLN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

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Kilometers

Contract No: NDO 14/2018

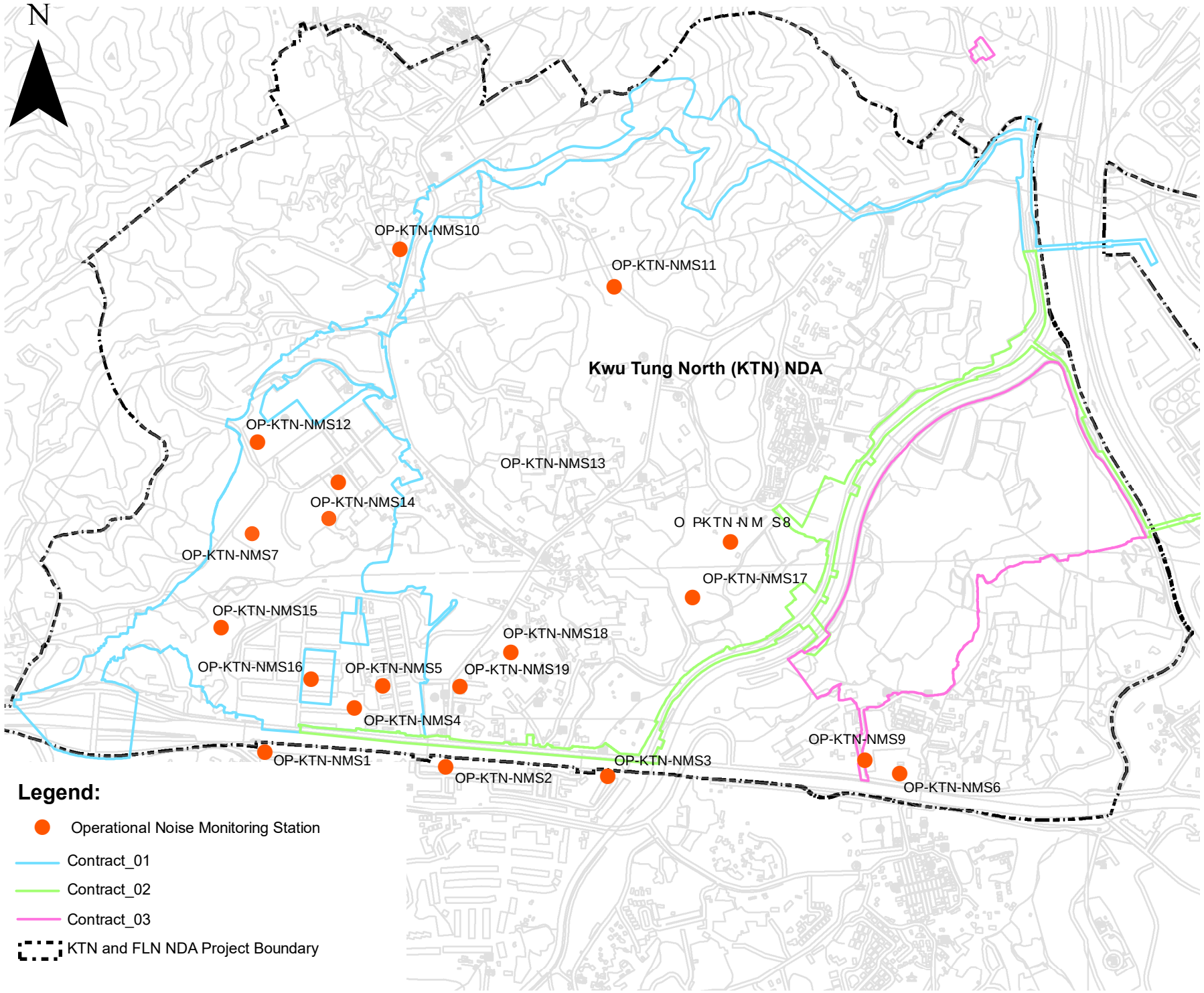


Figure 3.3
Locations of Operational Noise Monitoring Stations in KTN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 9,000 18,000 36,000 54,000
Kilometers

Contract No: NDO 14/2018

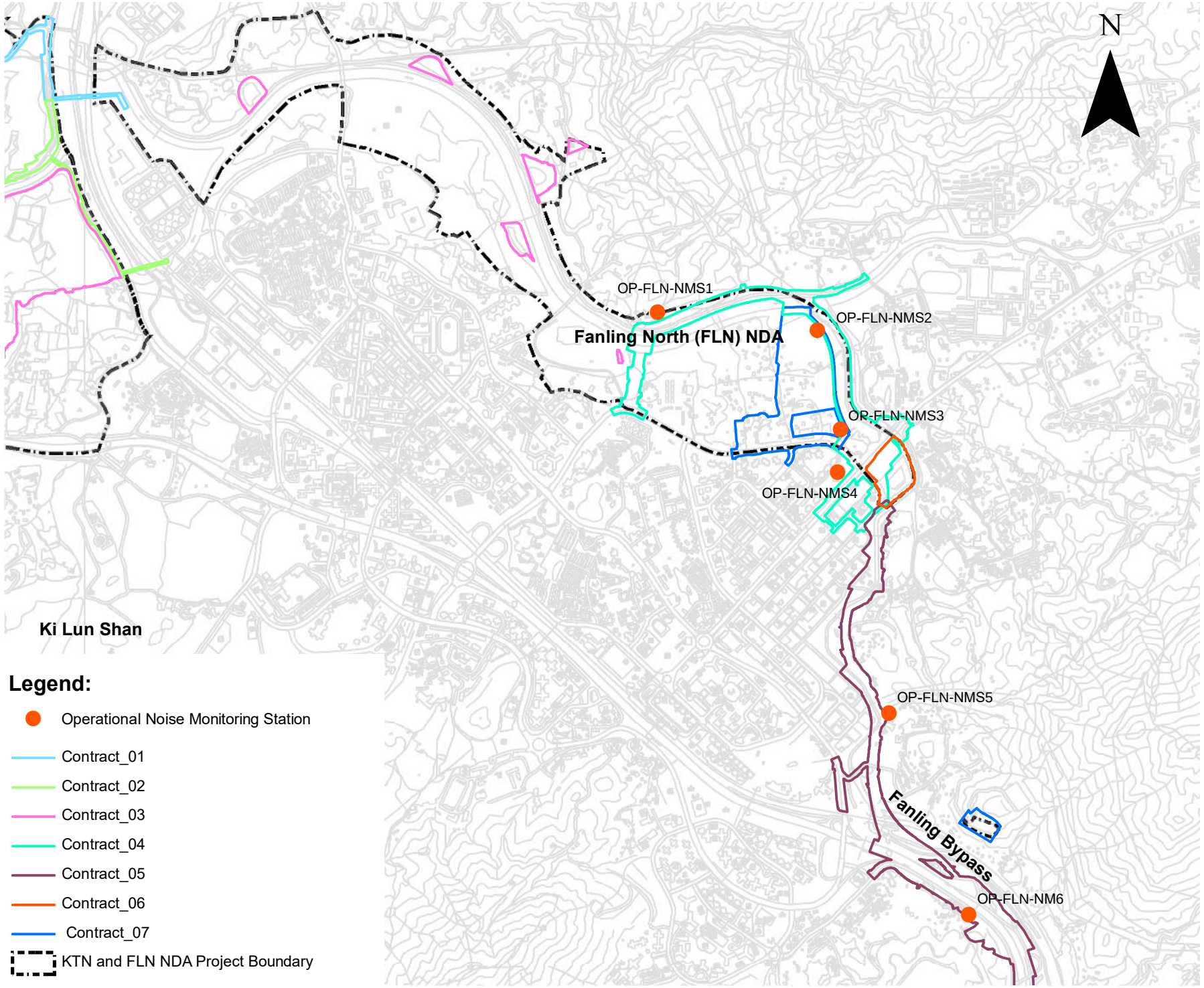


Figure 3.4
Locations of Operational Noise Monitoring Stations in FLN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 15,000 30,000 60,000 90,000
Kilometers

Contract No: NDO 14/2018

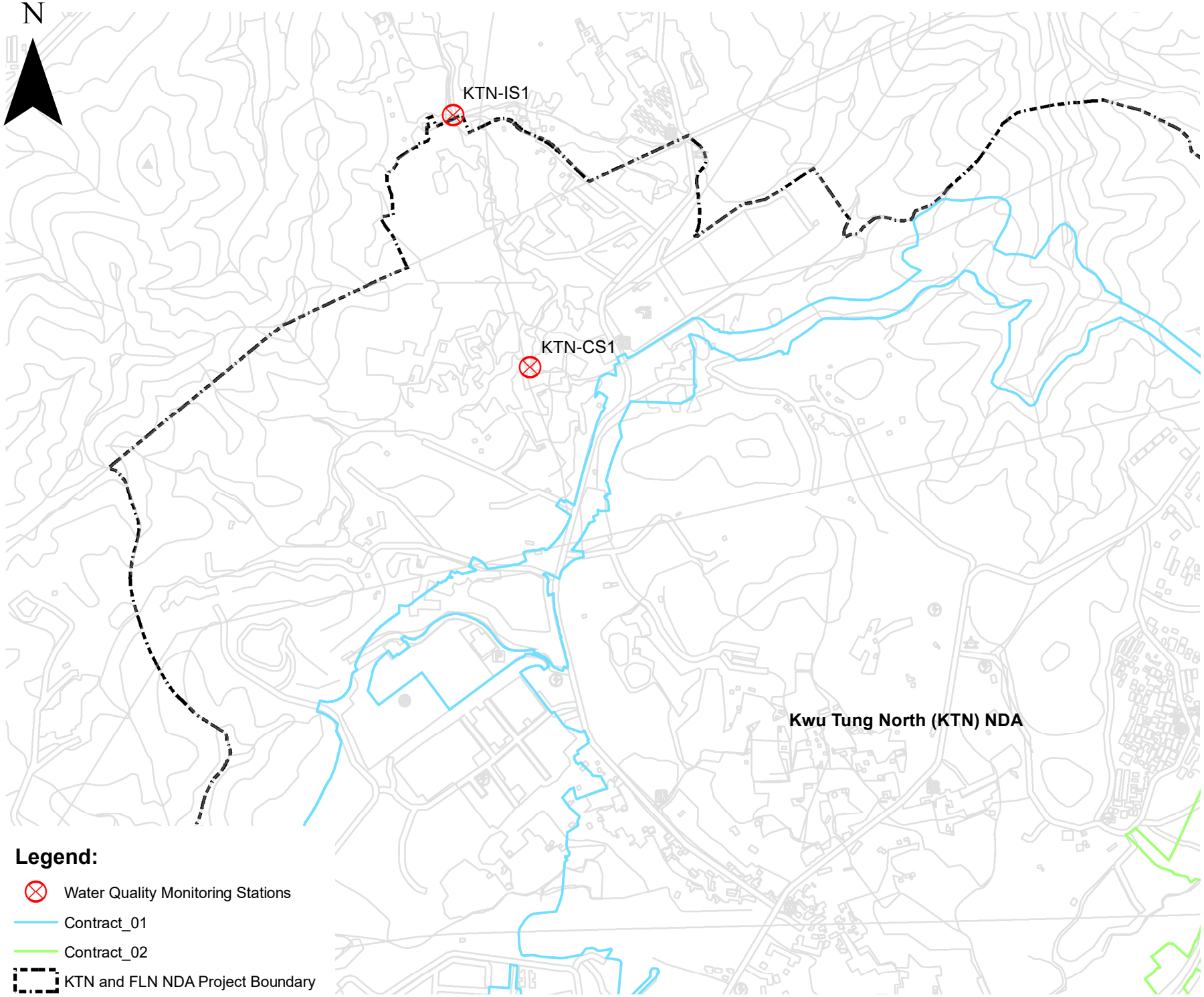


Figure 4.1
Locations of Water Quality Monitoring Stations in KTN NDA

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 6,250 12,500 25,000 37,500
Kilometers

Contract No: NDO 14/2018

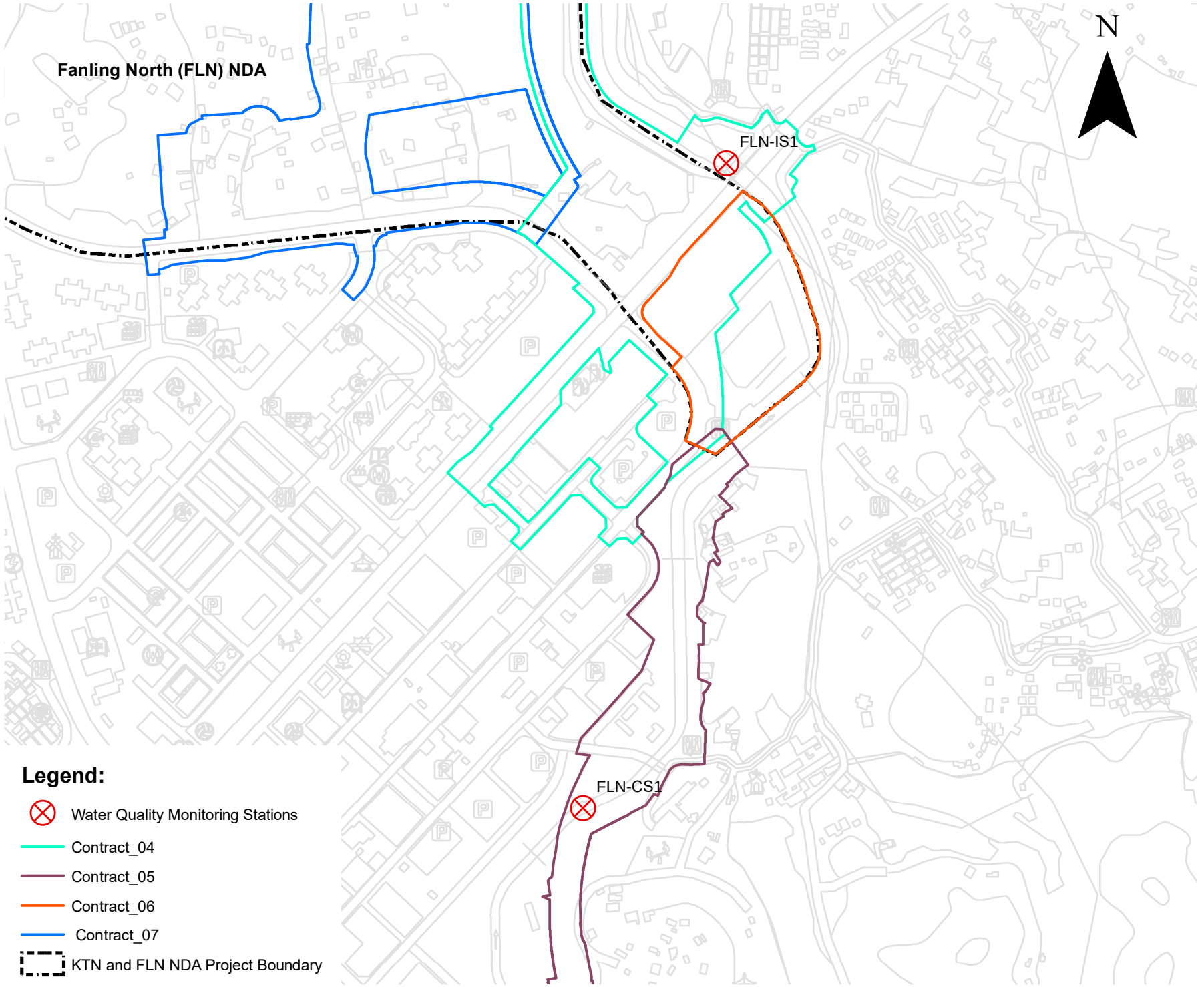


Figure 4.2
Locations of Water Quality Monitoring Stations (FLN NDA)

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 4,100 8,200 16,400 24,600
Kilometers

Contract No: NDO 14/2018

N

Ma Tso Lung Landfill

Lok Ma Chau

250m Landfill Consultation Zone

San Tin

Kwu Tung North (KTN) NDA

Ng Tung River

Kong Nga Po

East Rail Line

Fanling North (FLN) NDA

Sha Tau Kok Road

Fanling Highway

Fanling Bypass

Kl Lun Shan

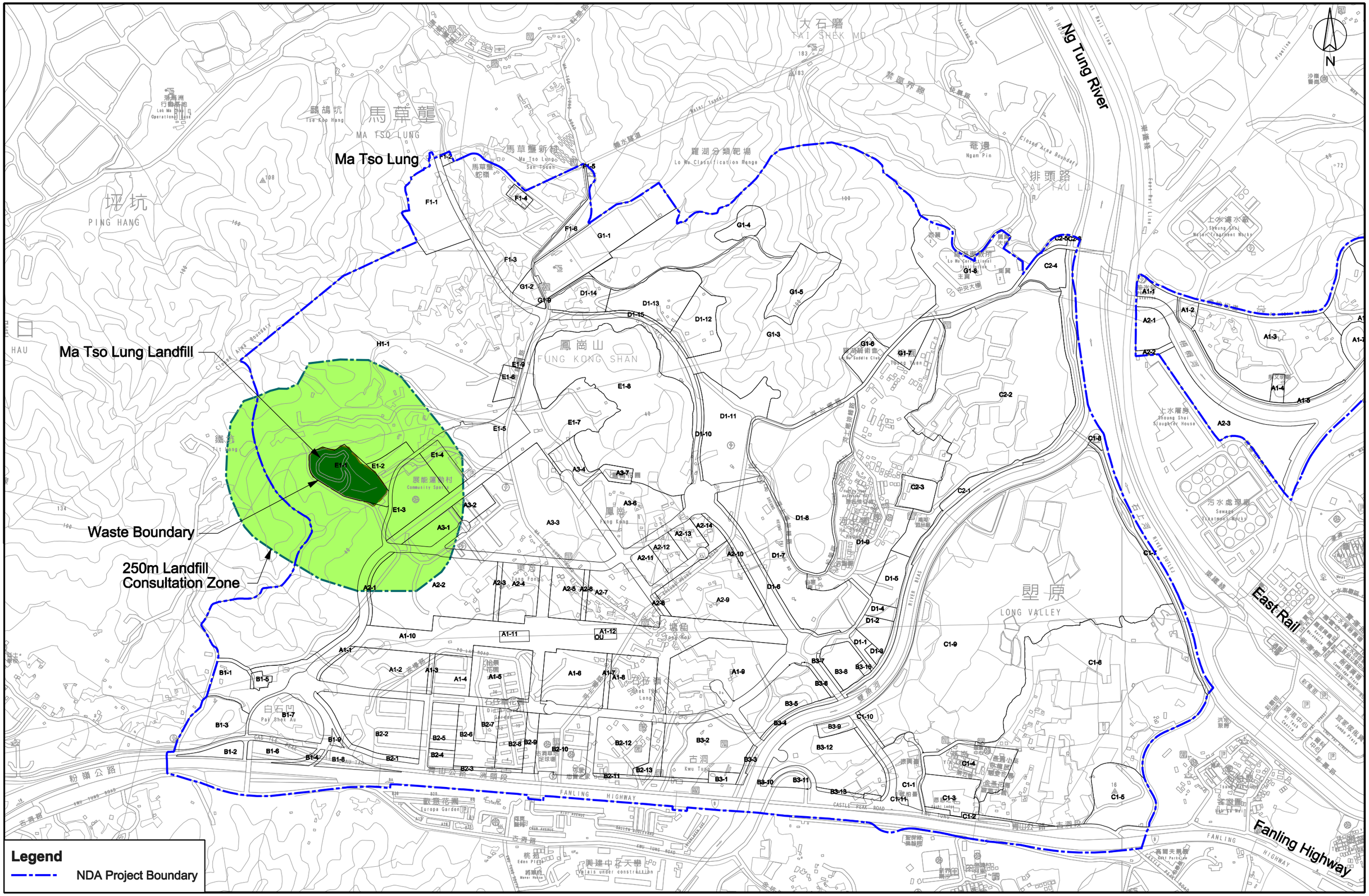
Ngau Tei

Legend:

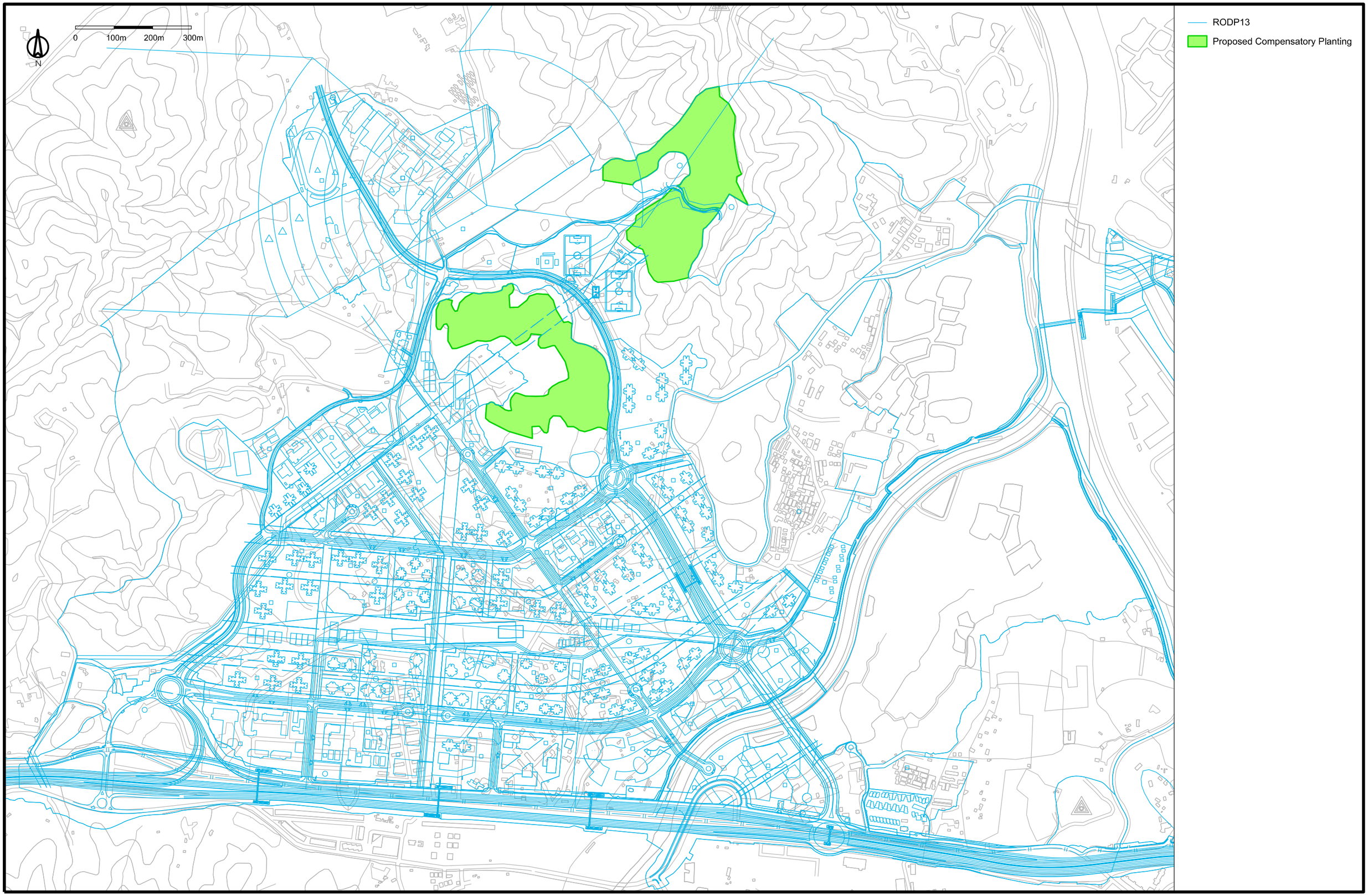
HKBAR Boundary

NDA Project Boundary

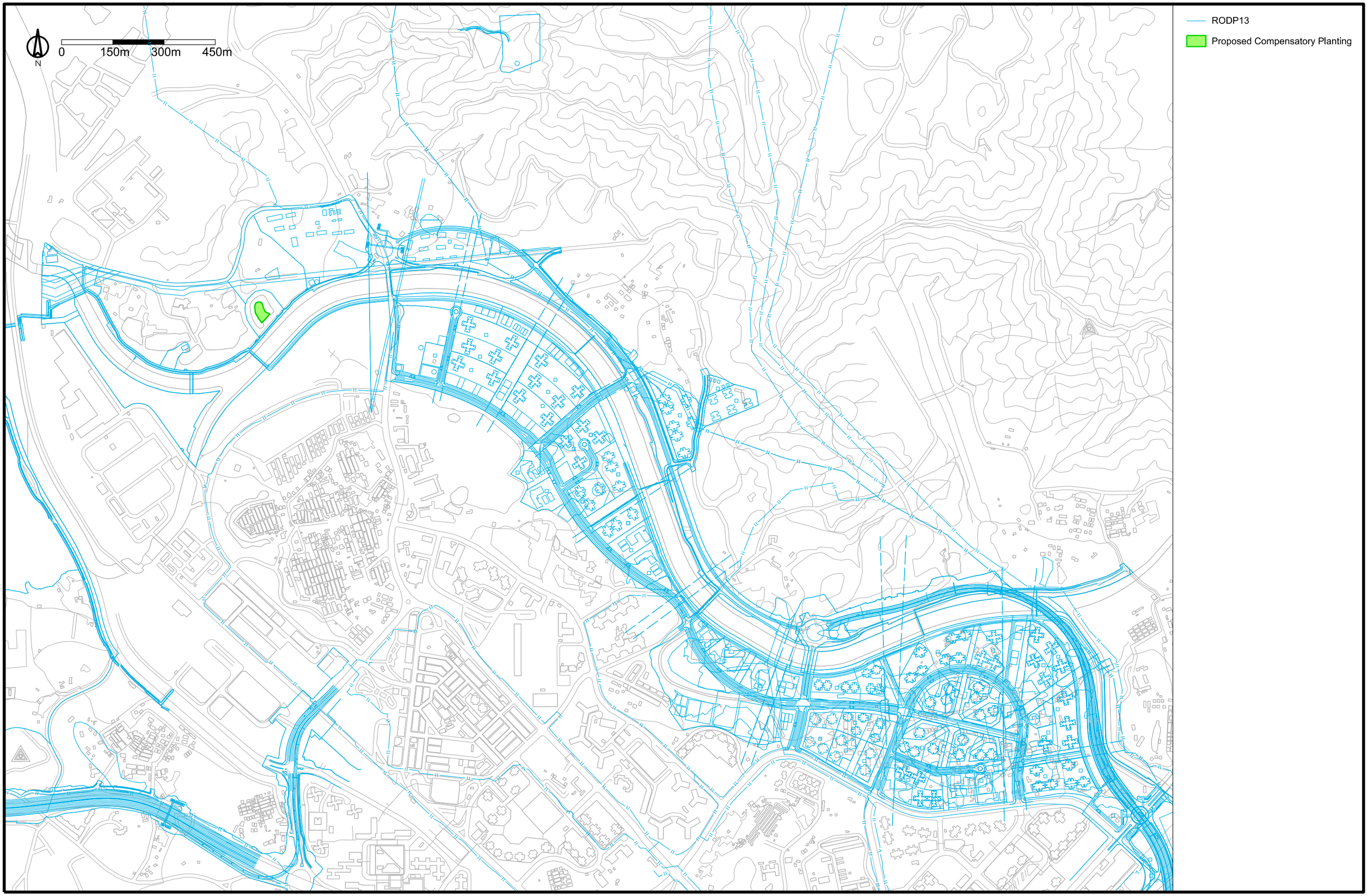
CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	FUGRO	Job Tittle: Environmental Team for Pre-construction Environmental Monitoring and Audit Works for Advance and Frist Stage Works of Kwu Tung North and Fanling North New Development Areas	Drawing Tittle: Location of Landfill Contamination Zone within NENT NDAs	Scale: 1:30000 on A3	Drawing No.: Figure 9.1



土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	FUGRO	Job Tittle: Environmental Team for Pre-construction Environmental Monitoring and Audit Works for Advance and First Stage Works Kwu Tung North and Fanling North New Development Areas	Drawing Tittle: Ma Tso Lung Landfill Site and KTN NDA RODP	Scale: 1:30000 on A3	Drawing No.: Figure 9.2



土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	FUGRO	Job Tittle: Environmental Team for Pre-construction Environmental Monitoring and Audit Works for Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas	Drawing Tittle: Area of Compensatory Planting in KTN NDA	Scale: AS SHOWN	Drawing No.: Figure 12.1

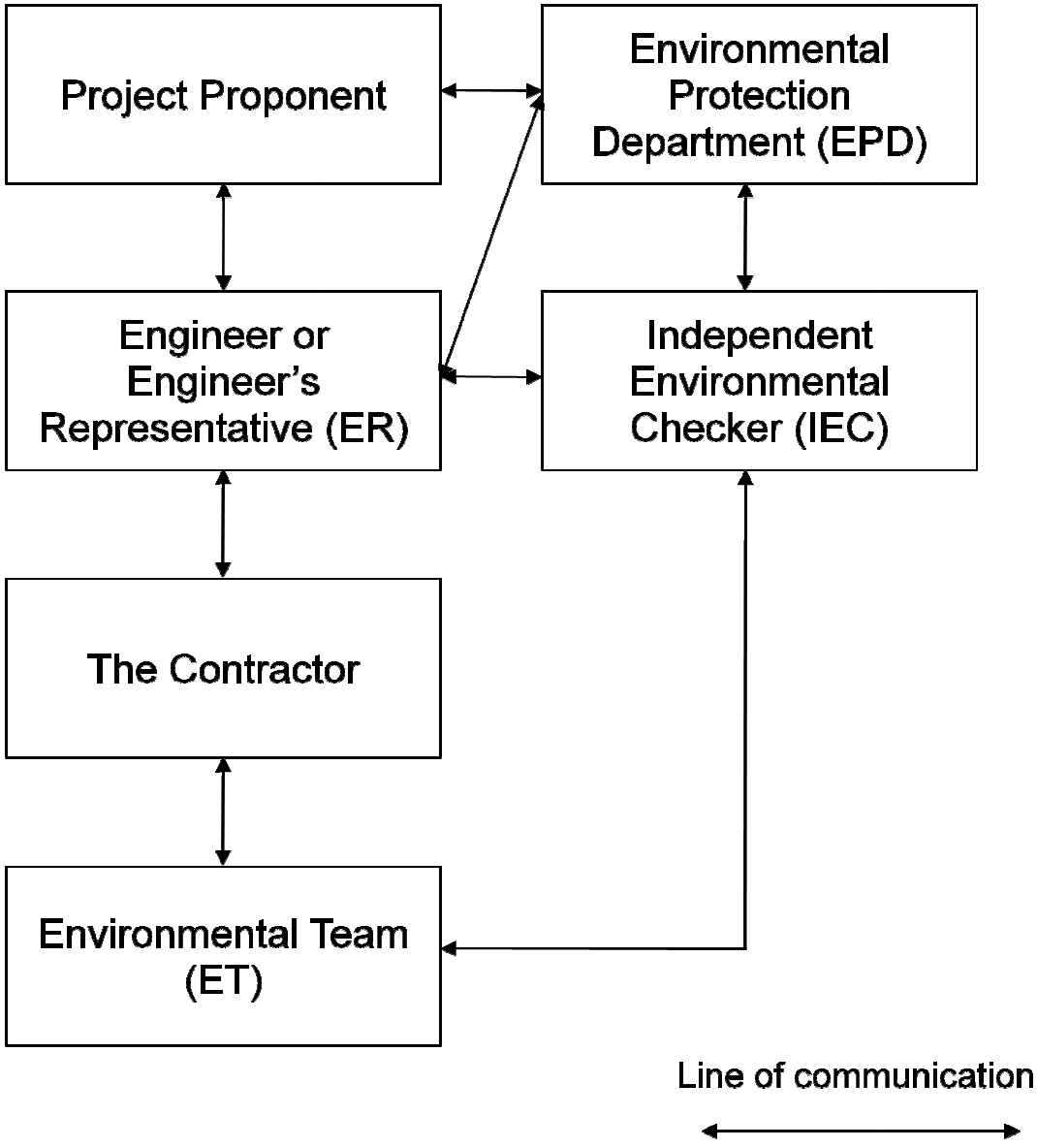


土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	FUGRO	Job Tittle Environmental Team for Pre-construction Environmental Monitoring and Audit Works for Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas	Drawing Tittle Areas of Compensatory Planting in the FLN NDA	Scale AS SHOWN	Drawing No. Figure 12.2

APPENDICES

A. PROJECT ORGANIZATION FOR ENVIRONMENTAL WORKS

Project Organization



B. PROJECT IMPLEMENTATION SCHEDULE

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Common Mitigation Measures (Applicable to ALL Project Components, including DPs and Non-DPs)							
Construction Dust Impact							
S3.8	D1	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road is proposed to achieve dust removal efficiency of 92.1%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.7 L/m^2 to achieve the respective dust removal efficiencies.	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction phase	• APCO To control the dust impact to meet HKAQO and TM-EIAO
S3.8	D2	The Contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation.	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction phase	• APCO To control the dust impact to meet HKAQO and TM-EIAO
S3.8	D3	Following dust suppression measures should also be incorporated by the Contractor to control the dust nuisance throughout the construction phase: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones; • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction phase	• APCO To control the dust impact to meet HKAQO and TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period. • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shortcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.					
S3.8	D4	Implement regular dust monitoring under EM&A programme during the Construction phase.	Monitoring of dust impact	Contractor	Selected representative dust monitoring station	Construction phase	• TM-EIAO
Noise Impact (Construction Phase)							
S4.9	N1	Implement the following good site management practices: • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) 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, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; and	Control construction airborne noise	Contractor	All construction sites where practicable	Construction phase	Annex 5, TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		• material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.					
S4.9	N2	Install temporary site hoarding (approx 2.4m high) located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All construction sites where practicable	Construction phase	Annex 5, TM-EIAO
S4.9	N3	Install movable noise barriers, full enclosure and acoustic mat, screen the noisy plants including air compressor and generator.	Screen the noisy plant items to be used at all construction sites	Contractor	All construction sites where practicable	Construction phase	Annex 5, TM-EIAO
S4.9	N4	Use of "Quiet" Plant and Working Methods	Reduce the noise levels of plant items	Contractor	All construction sites where practicable	Construction phase	Annex 5, TM-EIAO
S4.9	N5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction phase	Annex 5, TM-EIAO
S4.9	N6	Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring stations	Construction phase	TM-EIAO
Noise Impact (Operational Phase)							
S4.9	N7	Provide noise barrier before operation of the proposed project and locations of barriers are stated as following: DP2 • KTN-NB52: Approx. 75m long CNB; • KTN-NB55: Approx. 145m long CNB; • KTN-NB-63 Approx. 380m long CNB; • KTN-SE-09: Approx. 85m long SE with opening to south direction DP3 • KTN-NB30: Approx. 35m long, 3m high NB; • KTN-NB31: Approx. 45m long, 3m high NB;	Control operational airborne noise due to road traffic	Project Proponent/ Contractor	Refer to Traffic Noise Mitigation Plan Figure 2.2a to 2.2e under EP-467/2013/A, EP-468/2013/A & EP-473/2013/A	Prior to operation of the Project	Annex 5, TM-EIAO

		• KTN-NB39: Approx. 65m long, 7m vertical noise barrier with 3m cantilevered arm; • KTN-NB40: Approx. 55m long, 5m vertical noise barrier with 3m cantilevered arm; • KTN-NB48: Approx. 285m long, 7m vertical noise barrier with 3m cantilevered arm; • KTN-NB59: Approx. 115m long, 5m vertical noise barrier with 3m cantilevered arm; • KTN-NB71: Approx. 35m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB77a: Approx. 35m long, 3m high NB; • KTN-NB77b: Approx. 285m long, 3m high NB; • KTN-SE06: Approx. 20m long SE with opening to north-eastern direction; • KTN-FE01: Approx. 155m long FE; • KTN-FE03: Approx. 115m long FE; • KTN-LNS01: Approx. 115m long LNS • KTN-LNS02: Approx. 125m long LNS DP4 • KTN-NB08: Approx. 135m long, 5m high NB; • KTN-NB20: Approx. 70m long, 5m high NB; • KTN-NB23: Approx. 80m long, 5m high NB; • KTN-NB24: Approx. 60m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB25: Approx. 30m long, 5m vertical barrier with 3m cantilevered arm; • KTN-NB35: Approx. 55m long, 5m vertical barrier with 3m cantilevered arm; • KTN-NB37: Approx. 80m long, 3m high NB; • KTN-NB69: Approx. 60m long, 5m high NB; • KTN-NB70: Approx. 30m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB75: Approx. 75m long, 5m high NB; • KTN-NB82: Approx. 95m long, 7m vertical barrier with 3m cantilevered arm;					

		• KTN-NB85: Approx. 230m long, 5m high NB; • KTN-NB86: Approx. 45m long, 3m high NB; • KTN-NB87: Approx. 65m long, 3m high NB; • KTN-NB88: Approx. 65m long, 3m high NB; • KTN-SE05: Approx. 80m long SE with opening to south direction; • KTN-SE07: Approx. 95m long SE with opening to south-eastern direction; • KTN-FE02: Approx. 130m long FE • KTN-LNS11: Approx. 245m long LNS • KTN-LNS12: Approx. 790m long LNS • KTN-LNS13: Approx. 215m long LNS • KTN-LNS14: Approx. 160m long LNS • KTN-LNS15: Approx. 200m long LNS • KTN-LNS16: Approx. 255m long LNS DP10 • FLN-NB21: Approx. 420m long, 2m high NB; • FLN-NB22: Approx. 175m long, 5m high NB; • FLN-NB23: Approx. 345m long CNB; • FLN-NB24: Approx. 155m long CNB; • FLN-NB27: Approx. 45m long, 5m high NB; • FLN-NB28: Approx. 175m long, 5m high NB; • FLN-NB29: Approx. 245m long CNB; • FLN-NB30: Approx. 275m long CNB • FLN-NB31: Approx. 40m long, 5m high NB; • FLN-NB32: Approx. 35m long, 2m high NB; • FLN-NB33a: Approx. 40m long, CNB2; • FLN-NB33b: Approx. 3m long, 5m high NB; • FLN-NB34: Approx. 65m long, CNB2; • FLN-NB35: Approx. 155m long, CNB2; • FLN-NB66: Approx. 80m long, CNB; • FLN-NB68: Approx. 90m long, 5m high NB;					

		• FLN-NB69: Approx. 320m long, 5m high NB; • FLN-NB70: Approx. 280m long, 5m high NB; • FLN-NB77: Approx. 115m long, 5m high NB; • FLN-NB108: Approx. 210m long, 5m high NB; • FLN-NB109: Approx. 230m long, CNB; • FLN-NB110: Approx. 170m long, 3m high NB; • FLN-NB112: Approx. 145m long, 6m high NB; • FLN-NB113: Approx. 105m long, 6m high NB; • FLN-NB114: Approx. 160m long, 4m high NB; • FLN-SE11: Approx. 105m long, SE with opening to the east; • FLN-LNS11: Approx. 105m long, LNS; • FLN-LNS12: Approx. 85m long, LNS; • FLN-LNS13: Approx. 250m long, LNS; • FLN-LNS14: Approx. 260m long, LNS; • FLN-LNS15: Approx. 280m long, LNS;					

Project Implementation Schedule

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S4.8	N8	<u>District Cooling System</u> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level (DCS KTN B1-7) shall not exceed 75 dB(A); <u>KTN F1-3, KTN F1-4, KTN D1-12, KTN D1-13</u> • Provision of acoustic insulation with air conditioning has to be allowed to KTN F1-3, KTN F1-4, KTN D1-12, KTN D1-13; <u>Pumping Station</u> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level for FLN A1-2 shall not exceed 67 dB(A)	Control operational airborne noise due to the operation of fixed plant The noise design requirement/criteria should be incorporated in the design of the relevant facilities during the planning/design stage	Detailed Design Consultant/ Contractor/ Operator	All plant rooms where practicable	Detailed design, construction andoperation phases	Noise Control Ordinance and its TM, TM-EIAO
S4.8	N9	Sports Ground / Sports Complex • Provision of cluster of small power loudspeaker if necessary; • Provision of directional loudspeaker and orientate to point towards the audience if necessary; • Provision of “Limiter” device in the system to set the upper bound of the output sound level if necessary	Control operational airborne noise due to the operation of fixed plant The noise design requirement/criteria should be incorporated in the design of the relevant facilities during the planning/design stage	Organiser	Sports Ground / Sports Complex	Prior to Rehearsal and main event	Noise Control Ordinance and its TM, TM-EIAO

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Water Quality Impact (Construction Phase)							
S5.7	W1	<u>Construction Runoff</u> In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), construction phase mitigation measures should be provided and the Storm Water Pollution Control Plan is given below. **Storm Water Pollution Control Plan** • At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the Contractor prior to the commencement of construction. • Diversion of natural stormwater should be provided as far as possible. The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipments in order to avoid or minimize polluted runoff. Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8m3 capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped. • The dikes or embankments for flood protection should be	Control construction runoff	Contractor	All construction sites	Construction phase	WPCO, EIAO, TM-EIAO

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		implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates. • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the Contractor prior to the commencement of construction. • Construction works should be programmed to minimize surface excavation works during the rainy seasons (April to September). All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means. • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas. • Measures should be taken to minimize the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, it should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities. • All open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m3 should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. • Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into					

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		the drainage system and storm runoff being directed into foul sewers. • Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events. • All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains. • Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain. • Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. • All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby. • Regular environmental audit on the construction site should be carried out in order to prevent any malpractices. Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the					

Project Implementation Schedule

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		meander, wetlands and fish ponds.					
S5.7	W2	<u>Stream Diversion</u> In order to prevent sediment transport during riverbank works, deployment of silt curtain should be implemented, especially when construction works encroach or occur in close distance to water body. It is recommended to carry out all the riverbank works and diversion works within a cofferdam or diaphragm wall and the work areas on riverbed should be kept in dry condition.	Minimize water quality impact due to stream diversion	Contractor	All streams that required diversion	Construction phase	WPCO, EIAO, TM-EIAO
S5.7	W3	<u>Groundwater from Contaminated Area</u> • For other inaccessible sites, site investigation is required when they are resumed and handed over to the Project Proponent to identify if contaminated groundwater is found. • If the investigation results indicated that the groundwater to be generated from construction works would be contaminated, the contaminated groundwater should be either discharged into recharged wells, or properly treated in compliance with the requirements of Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters. • If recharged well method were used, the groundwater quality in the recharged well should not be affected by recharging operation, i.e. the pollution levels of the recharged groundwater should not be higher than that in the recharging wells. • If treatment and discharge method were used, the design of wastewater treatment facilities, such as active carbon and petrol interceptor, should be submitted to the EPD and a discharge license should be obtained under the WPCO through the Regional Offices of EPD.	Minimize water quality impact due to potential groundwater from contaminated areas	Contractor	All identified groundwater-contaminated areas	Construction phase	WPCO, EIAO, TM-EIAO, TM-Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters
S5.7	W4	<u>Sewage from Workforce</u> Portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce. A licensed Contractor should be employed to provide appropriate and adequate portable toilets and be responsible for	Handling of site sewage	Contractor	All construction sites	Construction phase	WPCO, EIAO, TM-EIAO

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		appropriate disposal and maintenance. Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the Project. Regular environmental audit on the construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction phase of the Project would not cause water quality impact after undertaking all required measures.					
Waste Management (Construction Waste)							
S7.6	WM1	<u>Waste Reduction Measures</u> Waste reduction is best achieved at the planning and design phase, as well as by ensuring the implementation of good site practices. The following recommendations are proposed to achieve reduction: • segregate and store different types of waste in different containers, skip or stockpiles to enhance reuse or recycling of materials and their proper disposal; • proper storage and site practices to minimize the potential for damage and contamination of construction materials; • plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste; • sort out demolition debris and excavated materials from demolition works to recover reusable/recyclable portions (i.e. soil, broken concrete, metal etc.); • provide training to workers on the importance of appropriate waste management procedures, including waste reduction, reuse and recycling.	Reduce waste generation	Contractor	All construction sites where practicable	Prior to the commencement of construction	• Waste Disposal Ordinance
S7.6	WM2	Prepare Waste Management Plan and submit to the Engineer for approval	Minimize waste generation during construction	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance

Project Implementation Schedule

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S7.6	WM3	<u>Good Site Practice</u> The following good site practices are recommended throughout the construction activities: • nomination of an approved personnel, such as a site manager, to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site; • training of site personnel in site cleanliness, appropriate waste management procedures and concepts of waste reduction, reuse and recycling; • provision of sufficient waste disposal points and regular collection for disposal; • appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; • regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;	Minimize waste generation during construction	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance
S7.6	WM4	<u>Storage of Waste</u> The following recommendation should be implemented to minimize the impacts: • waste such as soil should be handled and stored well to ensure secure containment; • stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away; • different locations should be designated to stockpile each material to enhance reuse;	Minimize waste impacts from storage	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance
S7.6	WM5	<u>Collection and Transportation of Waste</u> The following recommendation should be implemented to minimize the impacts:	Minimize waste impacts from storage	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance

Project Implementation Schedule

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		• remove waste in timely manner; • employ the trucks with cover or enclosed containers for waste transportation; • obtain relevant waste disposal permits from the appropriate authorities; and • disposal of waste should be done at licensed waste disposal facilities.					
S7.6	WM6	Excavated and C&D Material Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and ensure acceptability at public filling areas or reclamation sites. The following mitigation measures should be implemented in handling the excavated and C&D materials: • maintain temporary stockpiles and reuse excavated fill material for backfilling; • carry out on-site sorting; • deliver surplus artificial hard materials to Tuen Mun Area 38 recycling plant or its successor for recycling into subsequent useful products; • make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • implement a recording system for the amount of waste generated, recycled and disposed of for checking; Standard formwork should be used as far as practicable in order to minimize the arising of C&D waste. The use of more durable formwork (e.g. metal hoarding) or plastic facing should be encouraged in order to enhance the possibility of recycling. The purchasing of construction materials should be carefully planned in order to avoid over ordering and wastage. Wheel wash facilities have to be provided at the site entrance before the trucks leaving the works area.	Minimize waste impacts from excavated and C&D materials	Contractor	All construction sites	Construction phase	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No. 19/2005
S7.6	WM7	Contaminated Soil	Remediate contaminated	Contractor	All construction sites	Construction	• Practice Guide for Investigation and

Project Implementation Schedule

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		As a precaution, it is recommended that standard good site practice should be implemented during the construction phase to minimize any potential exposure to contaminated soils or groundwater. The details of mitigation measures to minimize the potential environmental implications arising from the handling of contaminated materials refer to Land Contamination Section.	soil		where applicable	phase	Remediation of Contaminated Land
S7.6	WM8	Chemical Waste • If chemical wastes are produced at the construction site, the Contractors should register with EPD as chemical waste producers. Chemical wastes should be stored in appropriate containers and collected by a licensed chemical waste Contractor. Chemical wastes (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while the chemical waste that cannot be recycled should be disposed of at either the Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All construction sites	Construction phase	• Waste Disposal (Chemical Waste) General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste
S7.6	WM9	General Waste • General refuse should be stored in enclosed bins separately from construction and chemical wastes. Recycling bins should also be placed to encourage recycling. • Preferably enclosed and covered areas should be provided for general refuse collection and routine cleaning for these areas should also be implemented to keep areas clean. • A reputable waste collector should be employed to remove general refuse on a daily basis.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance
S7.6	WM10	Sewage • The WMP should document the locations and number of portable chemical toilets depending on the number of workers, land availability, site condition and activities. • Regularly collection by licensed collectors should be arranged to minimize potential environmental impacts.	Minimize production of sewage impacts	Contractor	All construction sites	Construction phase	• Waste Disposal Ordinance

Project Implementation Schedule

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S7.6	WM11	Topsoil reuse – Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works, where practical. This is considered a general measure for good site practice.	Good site practice	Contractor/ Project Proponent	Onsite	Construction Phase	• ETWB Technical Circular (Works) No. 29/2004
Waste Management (Operational Waste)							
S7.6	WM1-B	<u>Sewage Sludge</u> Sewage sludge generated from STW is suggested to be treated at the proposed Sludge Treatment Facilities (STF) at Nim Wan or landfill subject to detailed design. Unloading process would be operated in the designated room inside STW which should be enclosed and served by negative pressure by extracting odorous gas to deodorizing unit. The sewage sludge would be delivered by road transport in water tight containers or skips to avoid odour emission during transportation to STF or landfill.	Prevent the odour and health impacts from generated sewage sludge in the STW	Operator of STW	SWHSTW and trucks for sewage sludge transportation	Operation phase	• Waste Disposal Ordinance
Land Contamination							
S 8.4	LC1	Preparation and submission of supplementary Contamination Assessment Plan (CAP) for all inaccessible potentially contaminated sites in 2 NDAs	Verify the land contamination potential before the commencement of construction	Project Proponent / Detailed Design Consultant	All inaccessible potentially contaminated sites in 2 NDAs as listed in the CAP	After the land is resumed and handed over to the Project Proponent and prior to the commencement of SI works	• Annex 19 of the TM-EIAO, Guidelines for Assessment of Impact On Sites of Cultural Heritage and Other Impacts (Section 3 : Potential Contaminated Land Issues); • Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management; • Guidance Notes for Contaminated Land Assessment and

Project Implementation Schedule

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							Remediation; and • Practice Guide for Investigation and Remediation of Contaminated Land • Recommendations in Health Risk Assessment
S 8.4	LC2	Detailed site investigation (SI) for all inaccessible potentially contaminated sites in 2 NDAs	Verify the land contamination potential before the commencement of construction	Project Proponent / Detailed Design Consultant / Contractor	All inaccessible potentially contaminated sites in 2 NDAs as listed in the CAP	After the land is resumed and handed over to the Project Proponent	Ditto
S 8.5	LC3	Preparation and submission of supplementary Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) for all inaccessible potentially contaminated sites in 2 NDAs to EPD for agreement if land contamination is confirmed	Present the findings of SI and evaluate the potential environmental and human health impacts Recommend appropriate mitigation measures for the contaminated soil and groundwater identified in the assessment if remediation is required	Project Proponent / Detailed Design Consultant	All inaccessible potentially contaminated sites in 2 NDAs as listed in the CAP	Prior to the commencement of any proposed construction works if land contamination is confirmed and remediation is required	Ditto
S 8.5	LC4	Preparation and submission of Remediation Report to EPD for agreement	Demonstrate that the decontamination work is adequate and is carried out in accordance with the endorsed supplementary CAR and RAP	Project Proponent / Detailed Design Consultant	All inaccessible potentially contaminated sites in 2 NDAs as listed in the CAP	Prior to the commencement of any proposed construction works if land contamination is confirmed and remediation is required	Ditto

Project Implementation Schedule

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S 8.6	LC5	Re-appraisal of surveyed sites (if they become part of the land requirement for NDA development) that were not identified as potentially contaminated or could not be accessed for visual inspection during the site survey	Verify the land contamination potential due to potential change of land uses before the commencement of construction	Project Proponent / Detailed Design Consultant	All surveyed sites (if they become part of the land requirement for NDA development) that were not identified as potentially contaminated or could not be accessed for visual inspection during the site survey as listed in the CAP	After the land is resumed and handed over to the Project Proponent	Ditto
S 8.7.2 and Appendix 8.4	LC6	Treatment of arsenic-containing soil "Solidification/Stabilization" (S/S) treatment method was proposed for the treatment of arsenic-containing soil. Toxicity Characteristic Leaching Procedure (TCLP) test should be undertaken after S/S in order to ensure that the contaminant will not leach to the environment. Unconfined Compressive Strength (UCS) test should be conducted, and not less than 1MPa should be met prior to the backfilling or stockpiled for future reuse within the study area.	To treat the arsenic-containing soil	Government / Developer/ Contractor	KTN NDA	Prior to commencement of construction works within KTN NDA	• TM-EIAO • Practice Guide (PG) for Investigation and Remediation of Contaminated Land • Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management • Guidance Notes for Contaminated Land Assessment and Remediation • Practice Guide for Investigation and Remediation of Contaminated Land • Recommendations in Health Risk Assessment

Project Implementation Schedule

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S 8.7.2 and Appendix 8.4	LC7	<u>Excavation and Transportation</u> • Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety; • In case the soil to be excavated is situated beneath the groundwater table, it may be necessary to lower the groundwater table; • Excavation should be carried out during dry season as far as possible to minimize runoff from excavated soils; • Stockpiling site(s) should be lined with impermeable sheeting and bunded. Stockpiles should be properly covered by impermeable sheeting to reduce dust emission during dry season or contaminated run-off during rainy season. Watering should be avoided on stockpiles of soil to minimize runoff; • Supply of suitable backfill material after excavation, if require; Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet season; Speed control for the trucks carrying excavated materials should be enforced; and Vehicle wheel washing facilities at the site's exit points should be established and used.	To minimize the potential environmental impacts arising from the handling of contaminated materials	Contractor	KTN NDA	Prior to commencement of construction works within KTN NDA	• TM-EIAO • Practice Guide (PG) for Investigation and Remediation of Contaminated Land • Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management • Guidance Notes for Contaminated Land Assessment and Remediation • Practice Guide for Investigation and Remediation of Contaminated Land • Recommendations in Health Risk Assessment
S 8.7.2 and Appendix 8.4	LC8	<u>Solidification/Stabilization</u> • The loading, unloading, handling, transfer or storage of cement should be carried out in an enclosed system; • Mixing process and other associated material handling activities should be properly scheduled to minimize potential noise impact and dust emission; • The mixing facilities should be sited as far apart as practicable from the nearby noise sensitive receivers; • Mixing of soil and cement / water / other additive(s) should	To minimize the potential environmental impacts arising from the handling of contaminated materials	Contractor	KTN NDA	The course of treatment	Ditto

Project Implementation Schedule

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		be undertaken at a solidification plant to minimize the potential for leaching; • Runoff from the solidification / stabilization area should be prevented by constructing a concrete bund along the perimeter of the solidification / stabilization area; • If stockpile of treated soil is required, the stockpiling site(s) should be lined with impermeable sheeting and bunded. Stockpiles should be properly covered by impermeable sheeting to reduce dust emission during dry season or site run-off during rainy season; and If necessary, there should be clear and separated areas for stockpiling of untreated and treated materials.					
S 8.7.2 and Appendix 8.4	LC9	Safety Measures • Set up a list of safety measures for site workers; • Provide written information and training on safety for site workers; • Keep a log-book and plan showing the zones requiring treatment and clean zones; • Maintain a hygienic working environment; • Avoid dust generation; • Provide face and respiratory protection gear to site workers if necessary; • Provide personal protective clothing (e.g. chemical resistant jackboot, liquid tight gloves) to site workers if necessary; • Provide first aid training and materials to site worker; • Bulk earth moving equipment should be utilized as much as possible to minimize workers' handling and contact of the excavated materials; and Eating, drinking and smoking should not be allowed in the excavation areas and treatment area to avoid inadvertent ingestion of arsenic containing soil.	To minimize the potential adverse effects on health and safety of construction workers	Contractor	KTN NDA	The course of treatment	Occupation Safety and Health Ordinance (OSHO) (Charter 509)

Project Implementation Schedule

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Landfill Gas Hazard							
S10.6	LFG1	• Underground rooms or void should be avoided as far as practicable in the proposed developments within the Consultation Zone and should be avoided totally in the proposed developments within the MTLL. • Buildings or structures within the MTLL should be at ground level with raised floor slabs which are less prone to gas ingress. • For the high risk category, the use of active control of gas, including barriers and detection systems are recommended. These measures include the control of gas by mechanical means e.g. ventilation of spaces with air to dilute gas, or extraction of gas using fans or blowers. • For the low risk category, the provision of barriers to the movement of gas is recommended. Measures recommended include the use of membranes in floors or walls, or in trenches, coupled with high permeability vents such as no- fines gravel in trenches or voids/permeable layers below structures. • The need and practicality of incorporating such measures should be reviewed in the detailed Qualitative LFG Hazards Assessment (QLFGHA) during the detailed design stage for developments within the 250m Consultation Zone and within MTLL. Recommendations on the detailed precautionary and protection measures to be adopted should be given in the QLFGHA. • The design and construction method of the proposed development within MTLL (i.e. the proposed recreational area in site E1-1) should be provided to EPD for agreement in the design stage to ensure compatibility with the landfill restoration facilities and aftercare works within MTLL, such that these facilities and works will not be affected by the construction or operation of the proposed development.	To minimize the risk of LFG hazards to occupants within MTLL and its 250m Consultation Zone	Government / Developer/ Detailed Design Consultant within MTLL and its 250m Consultation Zone	Buildings within MTLL and its 250m Consultation Zone	Detailed design phase	Landfill Gas Hazard Assessment Guidance Note
S10.6	LFG2	• During all works, safety procedures should be implemented to minimize the risks of fires and explosions, asphyxiation of workers (especially in confined space) and toxicity effects	To minimize the risk of LFG hazards to the staff and visitors within MTLL and its	Contractor	Construction sites within MTLL and its 250m Consultation	Construction phase	• Landfill Gas Hazard Assessment Guidance

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		resulting from contact with contaminated soils and groundwater. • Safety officers, specifically trained with regard to LFG and leachate related hazards and the appropriate actions to take in adverse circumstances, should be present on all worksites throughout the works. • All personnel who work on site and all visitors to the site should be made aware of the possibility of ignition of gas in the vicinity of the works, the possible presence of contaminated water and the need to avoid physical contact with it. • Those staff who work in, or have responsibility for "at risk" areas, including bore pilling and excavation works, should receive appropriate training on working in areas susceptible to LFG. • Enhanced personal hygiene practices including washing thoroughly after working and eating only in "clean" areas should be adopted where contact may have been made with any groundwater which is thought to be contaminated with leachate. • Any offices / quarters set up on site should take precautions against LFG ingress, such as being raised off the ground. Other storage premizes, e.g. shipping containers, where this is not possible should be well ventilated prior to entry. • Adequate precautions to prevent the accumulation of LFG under site buildings and within storage shed should be taken by raising buildings off the ground where appropriate and "airing" storage containers prior to entry by personnel and ensuring adequate ventilation at all times. • Smoking and naked flames should be prohibited within confined spaces. "No Smoking" and "No Naked Flame" notices in Chinese and English should be posted prominently around the construction site. Safety notices should be posted warning of the potential hazards. • Welding, flame-cutting or other hot works may only be carried out in confined spaces when controlled by a "permit to work" procedure, properly authorized by the Safety Officer. The permit to work procedure should set down clearly the	250m Consultation Zone		Zone		Note

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		requirements for continuous monitoring of methane, carbon dioxide and oxygen throughout the period during which the hot works are in progress. The procedure should also require the presence of an appropriately qualified person who shall be responsible for reviewing the gas measurements as they are made, and who shall have executive responsibility for suspending the work in the event of unacceptable or hazardous conditions. Only those workers who are appropriately trained and fully aware of the potentially hazardous conditions which may arise should be permitted to carry out hot works in confined areas. • During the construction works, adequate fire extinguishers and breathing apparatus sets should be made available on site and appropriate training given in their use. • Ongoing gas monitoring should be considered for offices, stores etc set up on site.					
S10.6	LFG3	Utility Companies • The developers should make the utility companies aware of the location and features of the site within the Consultation Zone during the respective detailed design stage as part of the QLFGHA. • The utilities companies should have a responsibility to train and ensure their staff to take appropriate precautions at all times when entering enclosed spaces or plant rooms. • Should utility installation be required in site E1-1, the developers should make the utility companies aware of the potential constraints imposed by the landfill restoration facilities and aftercare works to ensure these facilities and works will remain unaffected. Appropriate precautionary measures against landfill gas should also be taken should utility installation be required within the MTLL. Building Management • The management committee of the building estate will hold a special responsibility to ensure that the occupants of the building, its staff and maintenance workers are protected from LFG and that visitors to the site are also made aware as to the	To minimize the risk of LFG hazards to the occupants, maintenance personnel, visitors and other users within MTLL and its 250m Consultation Zone	Government / Developer within MTLL and its 250m Consultation Zone	Buildings within MTLL and its 250m Consultation Zone	Operation phase	Landfill Gas Hazard Assessment Guidance Note

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		dangers and the precautions required to be taken. • Of primary importance to satisfactorily upholding this responsibility will be to ensure that strict procedures for maintaining control over all temporary and /or permanent works proposed at the site are reviewed with regard to the LFG hazard. This needs to be accompanied by a comprehensive contingency plan in case of incidents, including liaison with EPD officers, Fire Services Department, Landfill Restoration Contractors and others, as necessary. • All construction and maintenance (including utilities) personnel working at the site should be made aware of the hazards of LFG and its possible presence on site. This should be achieved through a combination of posting warning signs in prominent places and also by access to detailed information on LFG hazards and the designs and procedural means by which these hazards are being minimized on site. In addition, entry to confined spaces such as refuse/store rooms, drainage manholes etc. should be preceded by a period of "airing" the space by opening the door widely allowing fresh air to enter. Where appropriate, monitoring of gas should also precede entry. • Any proposed modifications or additions to the building structure should be subject to a further assessment of LFG hazard, particularly in areas where a gas membrane has been installed. Any penetrations of the membrane must be repaired as soon as possible after detection or works completion using similar products. • The building management company should also make arrangement with Landfill Restoration Contractor so that they are advised of all situations which may potentially threaten the safety of the building occupants resulting from any accidents or failures at the landfill site. The building management company should also have available suitable gas monitoring equipment for any ad hoc investigations necessary relating to LFG and be in a position to undertake any future routine monitoring of gas which may be considered necessary soloing completion of the defects correction period. • To ensure that all the above protection and precautionary measures and issues pertaining to LFG are properly and					

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		consistently addressed by future users and owners of the site, it is recommended that a comprehensive LFG hazard management system be developed by the owner of the building or its property management agency. The system should be developed by the developers of the sites as part of the QLFGHA before the occupation of the building and implemented during its operational phase.					
Cultural Heritage (Pre-construction Phase)							
S11.6.1	CH1	Undertaking Further Archaeological Survey to Cover the Outstanding Areas Further archaeological surveys to cover the outstanding areas of the not-yet-surveyed-area with medium archaeological potential located in the areas with proposed development as presented in Figure 11.9 should be implemented after land resumption to confirm and verify the findings of the EIA. The survey should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance. It should be noted that the scope of further archaeological survey is based on the current proposed alignment. Any additional works areas which have not been covered by the current archaeological impact assessment should be covered as soon as possible. Subject to the findings of the archaeological survey to be conducted after land resumption, additional mitigation measures would be designed and implemented before the commencement of construction works to mitigate the adverse impact.	To confirm and verify the findings of the EIA	Project Proponent/ Contractor/ Qualified Archaeologist	In the not-yet-surveyed-areas with medium archaeological potential located in the areas within Areas D1-11, A3-5, A3-6, B1-1, and B1-7,	After land resumption but before construction	• EIA recommendation and AMO CHIA Guideline
S11.6.1	CH2	Undertaking Survey-cum-Rescue Excavation A Survey-cum-Rescue Excavation should be conducted after land resumption and before the commencement of construction works to define the precise archaeological deposits extent and to preserve the archaeological resources by record. The excavation should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance.	To define the precise archaeological deposits extent and to preserve the archaeological resources as far as possible.	Project Proponent/ Contractor/ Qualified Archaeologist	In KTN NDA, for Site 3 and In FLN NDA for Site 5.	After land resumption but before construction commencement of the zones	• EIA recommendation and AMO Guidelines for Archaeological Reports; Guideline for Handling of Archaeological Finds and Archives

Project Implementation Schedule

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S11.6.1	CH3	<u>Undertaking Preservation in-situ for Site 7</u> Preservation in-situ of the cultivation deposits in Site 7 is proposed. If disturbance to the site by the design of the Central Park is unavoidable, further archaeological survey should be conducted after land resumption prior to the pre-construction stage to assess the feasibility to incorporate Site 7 into the design of the development plan of the proposed zone. Appropriate follow- up actions, including preservation of the significant archaeological deposits in-situ in the Central Park, would then be considered with the consent of AMO. The recommended mitigation measure of preservation in-situ with further archaeological survey should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance.	To preserve the archaeological resources as far as possible.	Project Proponent/ Contractor/ Qualified Archaeologist	Site 7 in FLN NDA	After land resumption prior to pre-construction stage of the proposed Central Park (Area C2-8, Zoning O)	• EIA recommendation and AMO Guidelines for Archaeological Reports; Guideline for Handling of Archaeological Finds and Archives
S11.6.1	CH4	<u>Undertaking Induction Training</u> Induction training should be provided to the construction Contractor before the commencement of the excavation works in Spots A, D, F to H. An induction will be conducted as part of the environmental health and safety induction programme to all site staff before they are deployed on site. The induction will include an introduction on the historical development of the Site, the possible archaeological remains that may be encountered during ground excavation works as well as the reporting procedures in case suspected archaeological remains are identified. A set of the presentation material (in the form of power point presentation) with content details will be prepared by an archaeologist and submitted to AMO for reference and record purpose. The first induction briefing will be video recorded and it will be used as induction briefing material for new site staff.	To preserve the archaeological resources as far as possible	Project Proponent/ Contractor/ Qualified Archaeologist	Spots A, D, F to H	Before the commencement of the excavation worksand before site staff are deployed on site	
S11.6.1	CH5	<u>Undertaking Archaeological Impact Assessment before Construction at A1</u> It is recommended that an Archaeological Impact Assessment to be conducted in the impacted area in Area B1-8 and B1-9 at A1 (Sheung Shui Wa Shan Site of Archaeological Interest) after land resumption and before construction when detail construction work information is available to determine the need for further	To define the precise archaeological deposits extent and to preserve the archaeological resources as far as possible.	Project Proponent/ Contractor/ Qualified Archaeologist	Area B1-8 and B1-9 zoned as R4 and R3 in A1	After land resumption but before construction	• EIA recommendation and AMO Guidelines for Archaeological Reports; Guideline for Handling of Archaeological Finds and Archives

Project Implementation Schedule

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		archaeological follow up actions.					
S11.6.1	CH6	Undertaking Archaeological Impact Assessment before Construction within A1 but except Area B1-8 and B1-9 Should there be any development work within the Sheung Shui Wa Shan Site of Archaeological Interest, it is recommended that an Archaeological Impact Assessment is required after land resumption and before construction when detail construction work information is available to determine the need for further archaeological follow up actions.	To define the precise archaeological deposits extent and to preserve the archaeological resources as far as possible.	Project Proponent/ Contractor/ Qualified Archaeologist	Area within A1 except Area B1-8 and B1-9 in R4 &R3 zoning	After land resumption but before construction	• EIA recommendation and AMO Guidelines for Archaeological Reports; Guideline for Handling of Archaeological Finds and Archives
S11.6.2	CH7	Undertaking baseline condition survey and baseline vibration impact assessment In case any potential vibration impact on any nearby built heritage features are identified during the pre-construction stage of the Project, prior to commencement of construction works, a baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or a qualified structural engineer to define the vibration limit (a vibration limit at 7.5mm/s could be adopted for graded historic buildings) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase so as to ensure the construction performance meets with the vibration standard stated in the EIA report. The condition survey of graded historic building should be submitted to AMO for information.	To minimize the vibration impacts during pre-construction stage on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	*G303 and G308*	Pre-construction stage before commencement of construction works during Schedule 3 study	• EIAO-TM
S11.6.2	CH8	Undertaking baseline condition survey and baseline vibration impact assessment In case any potential vibration impact on any nearby built heritage features are identified during the pre-construction stage of the Project, prior to commencement of construction works, a baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or a qualified structural engineer to define the vibration limit (a vibration limit at 7.5mm/s and 15mm/s could be adopted for graded historic buildings and historic buildings respectively) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase so as to ensure the construction performance meets with the vibration standard	To minimize the vibration impacts during pre-construction stage on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	*KT57, FL05, FL18,* and *FL22.*	Pre-construction stage before commencement of construction works	• EIAO-TM

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		stated in the EIA report. The condition survey of graded historic building should be submitted to AMO for information.					
S11.6.2	CH9	Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendants of these features will be carried out the Project Proponent.	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	*Ancillary structures of G303, HKT01, HKT02, Entrance Gate of HKT03, HKT04, KT01 to KT10, KT13, KT36, KT39, KT40, KT41, KT43, KT45, KT47, KT50, KT54, KT62 to KT63, KT69, FL01, FL16, and FL35*	Prior to Removal / Relocation of features before commencement of construction works during Schedule 3 study	• EIAO-TM
S11.6.2	CH10	Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendants of these features will be carried out by the Project Proponent.	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	KT12 and KT61	Prior to Removal / Relocation of features before commencement of construction works	• EIAO-TM
S11.6.2	CH11	Relocation of Built Heritages Relocation of built heritages to a reasonable location nearby may be required.	To preserve the directly impacted sites by relocation	Project Proponent/ Contractor	HKT01, HKT02, Entrance Gate of HKT03	After the photographic and cartographic records and before commencement of construction works	• EIAO-TM
S11.6.2	CH12	Drainage System and Access Route Design For the retained built heritage items in developable area, drainage system and access route would be designed to prevent the persevered flooding and maintain the accessibility to the built	To prevent the persevered flooding and maintain the accessibility to the built heritage	Contractor /Detailed Design consultant	*The retained built heritage items*	Pre-construction phase	• EIAO-TM

Project Implementation Schedule

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		heritage.					
Cultural Heritage *(Construction Phase)*							
S11.6.1	CH13	Inform Upon Archaeological Discovery Pursuant to the Antiquities and Monuments Ordinance, the construction Contractor should inform the AMO immediately in case of discovery of antiquities or supposed antiquities in the course of excavation works in construction phase.	Special attention should be given to areas evaluated to have archaeological potential or significance.	Contractor	All soil excavation works	Immediately upon discovery during excavation works	• EIA recommendation and AMO CHIA Guideline
S11.6.2	CH14	Watertable Monitoring Since the construction works and development activities may induce change in the watertable. It is recommended the Contractor should ensure that the change of watertable induced by the construction works and development activities will not result in settlement of built heritage.	To minimize the potential impacts to the built heritage items by the change of watertable induced by the works during the Construction phase	Contractor	Within NDAs	Construction phase	EIAO-TM
S11.6.2	CH15	Conducting Construction Vibration Monitoring and Structural Strengthening Measures Construction vibration monitoring and structural strengthening measures should be conducted during Construction phase based on the assessment result of baseline condition survey and baseline vibration impact assessment, so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	To minimize the potential impacts during Construction phase on any identified potential vibration impacted built heritage features	Contractor	Identified potential vibration impacted built heritage features	Construction phase, with details specified in baseline condition survey and baseline vibration impact assessment,	EIAO-TM
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.9	LV1	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as		Detailed Design Consultant/ Contractor/	Throughout NDAs,	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become	

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		roadside amenity strips, and open space sites.				available, to achieve early establishment	
S.12.9 MM1	LV2	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Developer/ Detailed Design Consultant/ Contractor/	Throughout NDAs, particularly for reservoirs	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes
S.12.9 MM2	LV3	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered for architectural features, and light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design, including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding landscape	Detailed Design Consultant/	Throughout NDAs	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section, Guidelines on Greening of Noise

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		elevated, should follow the guidelines stated. Construction time frame should also be considered and designs seek to keep it to a practical minimum.					Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise Barriers (April 2012)
S12.9 MM14.4	LV4	Avoid affecting Watercourses – In the detailed design, consideration should be made of watercourses, to minimize any impacts e.g. at new bridge crossings, viaducts, road alignment etc. Guidelines stated should be followed. For example, for the stream at Siu Hang San Tsuen in FLN NDA, much of the stream is located underneath the viaduct for the proposed Fanling Bypass. In order to avoid impacts to the stream, the detailed final design of the viaduct should follow guidelines and ensure that no viaduct footings or other structures are placed in the stream. Bridges and box culverts should also be used to minimize the necessity of watercourse modification and protect the watercourses where necessary.	Avoid direct impacts to watercourses	Detailed Design Consultant/ Contractor/	All watercourses, particularly the stream at Siu Hang San Tsuen that will flow under the Fanling Bypass Eastern Section	Prior to Construction and Construction Phase	Guidelines for this include ETWB Technical Circular (Works) No. 5/2005 Protection of natural streams/rivers from adverse impacts arising from construction works; Building Department (BD) Practice Note for Authorized Persons and Registered Structural Engineers 295: Protection of natural streams/rivers from adverse impacts arising from construction works
Landscape and Visual (Construction)							
S.12.9 MM3	LV5	Open Space Provision - the principles adopted in the RODP planning ensure that public open space systems are incorporated. All requirements for open space areas stipulated in the planning documents for the formulation of the Preliminary Layout Plan should be adhered to.	Reprovision of open space. Enhance visual amenity of the area and improve the overall landscape character	Government / Developer/ Detailed Design Consultant/ Contractor/	Onsite as stipulated in the planning documents for the formulation of the Preliminary Layout Plan	Prior to Construction and Construction Phase	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines

Project Implementation Schedule

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S.12.9 MM4	LV6	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Developer/ Detailed Design Consultant/ Contractor	Onsite	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.9 MM5	LV7	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Developer/ Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.9 MM6	LV8	Slope Landscaping – Site formation should be reduced as far as possible. Hydroseeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland	To avoid substantial slope cutting and fill slopes. To prevent erosion and	Government / Developer/ Detailed Design	Onsite	Prior to Construction, Construction Phase &	GEO publication (1999) – Use of Vegetation as Surface

Project Implementation Schedule

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		tree seedlings and/ or shrubs should be planted where slope gradient and site conditions allow. In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Consultant/ Contractor		Maintenance in Operation Phase	Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.9 MM7	LV9	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested*..*	Compensate for trees and shrubs lost due to the Project.	Government / Developer/ Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.9 MM8	LV10	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica, Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii,*	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

Project Implementation Schedule

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		Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii. The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.9 MM9	LV11	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. building edges, piers).	Soften hard surfaces and facilities	Government / Developer/ Detailed Design Consultant/ Contractor	On appropriate structures	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.9 MM10	LV12	Green Roof – Roof greening where appropriate should be established on proposed buildings as per the guidelines stated. These guidelines provide further details including information regarding structural loading, design, maintenance, etc. considerations as well as providing information on what types of plants might be suitable.	Reduce exposure to untreated concrete surfaces and particularly mitigate visual impact to VSRs at high levels. Provide greening.	Government / Developer/ Detailed Design Consultant/ Contractor	On appropriate buildings	Prior to Construction, Construction Phase & Maintenance in Operation Phase	CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011); ArchSD/Urbis Study on Green Roof Application in HK (2007)
S.12.9 MM11	LV13	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the	To screen proposed structures such as roads and buildings. Improve	Government / Developer/ Detailed	Along roads, around suitable built structures, or around	Prior to Construction, Construction	ETWBTC 3/2006

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		compensatory planting.	compatibility with the surrounding environment and create a pleasant pedestrian environment	Design Consultant/ Contractor	VSRs to contain their view out to the NDA structures.	Phase & Maintenance in Operation Phase	
S.12.9 MM12	LV14	Road Greening –For viaducts, soft landscaping should be provided to soften the hard, straight edges (for climbers used to cover the vertical, hard surfaces of the piers – see MM9 Vertical Greening) and shade tolerant plants should be planted, where light is sufficient, to improve aesthetic value of areas under viaducts. Both at grade planting and use of elevated planters should be considered for the soft landscaping of viaducts, taking into account the preference to minimize the overall viaduct bulk and integrate architectural forms and textural finishes which improve aesthetics. For at grade roads, planting should be considered along central dividers and on road islands e.g. in the middle of roundabouts. (Roadside planting i.e. at the road edge and not in the central divider or road island, is considered part of Screen Planting)	To soften the hard, straight edges and provide greening along roads.	Government / Developer/ Detailed Design Consultant/ Contractor	On viaducts or along roads.	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Development Bureau TCW No. 2/2013, Greening on Footbridges and Flyovers; Development Bureau TCW No. 2/2012 – Allocation of Space for Quality Greening on Roads; HQ/GN/15 - Guidelines for Greening Works along Highways
S.12.9 MM13 & EIA Annex 13	LV15	Marsh/Wetland Compensation –The proposed Long Valley Nature Park (LVNP) will be designed and implemented to enhance on-wetland areas within the LVNP. (See E4,E15 and E25 also) Also see LV16, LV17, and LV18 as wetland planting should be provided along the embankments and beds of modified/ reprovisioned watercourses.	Compensate for Marsh/ Wetland lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works.
S.12.9 MM14.1	LV16	Reprovision of Natural Stream – Where natural streams are unavoidably affected along some of their length, they can be diverted to avoid the proposed new developments and retain the integrity of the whole stream. Detailed design of any stream diversion should follow the Guidelines in ETWB Technical Circular (Works) No. 5/2005 (Protection of natural streams/rivers from adverse impacts arising from construction works) and appropriate construction methods should be used. Two short stretches of the Ma Tso Lung Stream will be affected by Project in the KTN NDA; by the LMC Eastern Connection Road on the western border of Site F1-3 and further upstream by Site E-2.	Achieve a natural stream, similar to existing, including wetland planting provision for embankments	Government / Developer/ Detailed Design Consultant/ Contractor	Streams and channelized watercourses e.g. a Ma Tso Lung and Siu Han San Tsuen	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works; DSD Practice Note No.1/2005, Guidelines on Environmental Considerations for

Project Implementation Schedule

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		At both these locations, the stream will be reprovisioned and maintain the flow between unaffected sections of the stream. The reprovisioned stream will be provided with a natural bed and banks, as well as having an area of marsh/ pool next to it and trees and shrubs further from the banks. (See E2, E14 and E24 also)					River Channel Design
S12.9 MM14.2	LV17	Stream Buffer Planting –Providing a minimum 10 m buffer with planting (where there is a general presumption against any development taking place) along streams where they flow close to developments, confers a degree of protection to the stream course and its associated vegetation. For the stream at Ma Tso Lung in KTN NDA, the middle and upper sections will be designated as Green Belt zone where there is a general presumption against development as buffer to the stream. For the stream at Siu Hang San Tsuen in FLN NDA, within the NDA boundary much of the stream would be located underneath the viaduct for the proposed Fanling Bypass. To the south of the viaduct the stream flows through an Open Space area D1-3. In this Open Space zone a 10m buffer is proposed in which natural vegetation will be retained and enhanced and human activities will be limited in order to avoid direct impacts to the stream bed and to minimize potential indirect impacts to the stream and riparian corridor. (See E3 also)	Protect natural streams	Government / Developer/ Detailed Design Consultant/ Contractor	Streams and channelized watercourses e.g. a Ma Tso Lung and Siu Han San Tsuen	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works; DSD Practice Note No.1/2005, Guidelines on Environmental Considerations for River Channel Design
S12.9 MM14.3	LV18	Enhancement Planting along Embankment - For channelized watercourses, if these are modified, the Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design, should be considered and appropriate mitigation measures included ensuring the new watercourses match the existing as far as possible. Measures can include enhancement planting to upgrade the channels as appropriate, including consideration of wetland planting along embankments where appropriate; as well as consideration of the best materials for the channel lining (e.g. gabion). All measures must also ensure any necessary maintenance work can be carried out and that the channel meets all its requirements for water flow, etc. For example, a stretch of the Ma Wat River Channel in the south of FLN NDA will have to be diverted for the construction of the	Minimize the necessity of watercourse modification, protect watercourses where possible and enhance channelized watercourses	Government / Developer/ Detailed Design Consultant/ Contractor	Channelized watercourse, particularly the Ma Wat River Channel Diversion	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design

Project Implementation Schedule

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		Fanling Bypass Eastern Section. This measure will be particularly relevant in this area.					
S12.9 MM15	LV19	Pond Replacement –Principles adopted in the design of the NDAs ensure that they incorporate ponds within the RODPs. All requirements for ponds stipulated in the planning documents for the formulation of the Preliminary Layout Plan (e.g. at Fung Kong Shan Park in E1-7 of KNT ND) should be adhered to.	Reprovision for ponds lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	E1-7 and C1-9 (LVNP) in KNT NDA and generally throughout NDA	Prior to Construction, Construction Phase Maintenance in Operation Phase	
S.12.9 MM16	LV20	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	Throughout NDAs	Construction Phase	
S.12.9 MM17	LV21	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Developer/ Contractor	Throughout NDAs	Construction and Operation Phases	
Ecology (Prior to Construction Phase or throughout the project)							
S. 13.9	E1	Egretry Habitat Creation & Management Plan (EHCMP) and Woodland Planting and Management Plan (WPMP)	Compensate for loss of Man Kam To Road egretry. Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Project Proponent/ Detailed Design Consultant (EHCMP and WPMP).	FLN area A1-7 (egretry compensation). KTN areas E1-8 and G1-3 (woodland compensation).	Detailed design phase.	Establishment of bamboo clump of species, size and number suitable for nesting ardeids. Additional measures to attract ardeids to be detailed in EHCMP. Woodland planting and

Project Implementation Schedule

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							establishment requirements to be detailed in WPMP. EIAO-TM.
S.13.9	E2	Detailed design of development along lower reaches of Ma Tso Lung Stream and Ma Tso Lung San Tsuen Stream in OU zones F1-2 and F1-3 and detailed design of LMC Loop Eastern Connection Road with restoration of diverted stream and riparian corridor, permanent barrier and underpass on the at-grade section Compensation for the loss of seasonally wet grassland at Ma Tso Lung by habitat restoration and enhancement along diverted section of Ma Tso Lung Stream	Minimize impacts on Ma Tso Lung Stream and Ma Tso Lung San Tsuen Stream and riparian corridor of importance to species of conservation significance.	Project Proponent/ Detailed Design Consultant. (design of Ma Tso Lung Stream diversion and buffer zone habitat restoration measures)	KTN areas F1-2 and F1-3 and LMC Loop Eastern Connection Road.	Detailed design and construction phases.	TM-EIAO; ETWBTCW 5/2005.
S13.9	E3	Detailed design, implementation and management of Siu Hang San Tsuen Stream to have 10m wide vegetated buffer in Open Space zone D1-3, Fanling Bypass to cross stream on viaduct.	Minimize impacts on Siu Hang San Tsuen Stream and stream fauna.	PlanD, Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	FLN area D1-3.	Detailed design, construction and operation phases.	TM-EIAO Layout Plan
S.13.9	E4	Long Valley Nature Park (LVNP) designation, design and implementation. Enhancement of non-wetland habitats in LVNP. Planning for the advanced provision of alternative foraging habitat along main river channels for large waterbirds.	Compensate for wetland loss arising from the project and protection of Long Valley from adverse ecological impacts including provision of additional/alternative habitat for large waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels.	Project Proponent/ Detailed Design Consultant (Long Valley Nature Park Habitat Creation & Management Plan)	Long Valley KTN area C1-9 and any suitable areas to be identified during the planning stage.	Detailed design phase.	No net loss in wetland function: design requirements and mitigation targets for habitats and species to be detailed in LVNP HCMP. TM-EIAO

Project Implementation Schedule

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S13.9	E5	Stringent planning control requirements in Long Valley north and west of Sheung Yue River, including Ho Sheung Heung egretry.	Protect these wetland areas from indirect impacts to habitats and fauna especially breeding ardeids foraging in these areas and utilizing flight-lines from Ho Sheung Heung egretry. Avoid habitat loss and disturbance to fauna of conservation significance, especially nesting ardeids Maintenance of ecological linkages with Deep Bay ecosystem and avoidance of severance of these linkages, especially for waterbirds.	PlanD.	KTN areas C2-1 and C2-2 , Ho Sheung Heung egretry and areas north of Long Valley along the Ng Tung River to the Shenzhen River.	Detailed design phase.	Layout Plan
S13.9	E6	Planning for creation of Green Corridors along the Sheung Yue, Ng Tung and Shek Sheung Rivers, retention and provision of screen plantings where feasible; and detailed design of Open Space areas and development areas along river corridors.	Minimize disturbance to large waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels. Maintain ecological linkages within NDA Project Area and between Project Area and Deep Bay ecosystem, especially for Long Valley and waterbirds.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	Areas along Ng Tung, Sheung Yue and Shek Sheung Rivers.	Detailed design, construction and operational phases.	Layout Plan; TM-EIAO.
S.13.9	E7	Building setback and mounding in locations near Long Valley. KTN area B3-12 (30m setback from road D3) and KTN area C1-1 (15m setback and mounding along northern and northeastern boundaries).	Minimization of disturbance impacts to fauna using Long Valley.	PlanD	KTN area B3-12 (30m setback from road D3) and KTN area C1-1 (15m setback and mounding along northern and northeastern boundaries.	Detailed design phase.	Layout Plan

Project Implementation Schedule

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S13.9	E8	Preparation and implementation of Guidelines for building design measures to minimize mortality and light and glare impacts to fauna. Guidelines to address the following measures: Use opaque, non-transparent, non-reflective noise barriers for all developments associated with the Project. Measures to include the following: • Fritting, or the placement of ceramic lines or dots on glass, which creates a visual barrier to birds and reduces air conditioning loads by lowering heat gain, while still allowing light transmission for interior spaces. It is most successful when the frits are applied on the outside surface. Frosted glass has similar effects; • Angled glass to be used only for smaller panes in buildings with a limited amount of glass; • The use of glass that reflects UV light (primarily visible to birds, but not to humans) to reduce collisions; • Film and art treatment allow glass surfaces to be used a medium of expression, often related to the nature and use of the building, as well indicating to birds their impenetrability; • Lightweight external screens can be added to windows or become a façade element of larger buildings, and are suitable where non-operable windows are prevalent, which is often the case in modern buildings in HK.	Minimize mortality and disturbance impacts on fauna, especially mammals and birds.	PlanD/ Project Proponent/ Developer/ Detailed Design Consultant	Near Long Valley	Detailed design phase.	Layout Plan
	E9	Not used					
S13.8	E10	Review development footprint and layout of proposed developments in KTN areas D1-11a and G1-5 to avoid/minimize direct and indirect impacts on secondary woodland at Ho Sheung Heung and shrubland at Crest Hill.	Minimize loss of secondary woodland and shrubland of ecological value.	Project Proponent/ Detailed Design Consultant	KTN areas D1-11a and G1-5 to avoid/minimize direct and indirect impacts on secondary woodland at Ho Sheung Heung and Crest Hill	Detailed design phase	Layout Plan; TM-EIAO.

Project Implementation Schedule

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S13.9	E11	No construction during ardeid breeding season (1 March to 31 July) along Sheung Yue River north or east of KTN D1-5 and east of D1-9 and C2-3, construction hours restricted to 09.00 to 17.30 during 1 March to 31 July on new pedestrian bridge over the Sheung Yue River, new pedestrian bridge over the tidal section of the Ng Tung River and existing bridge between KTN areas C2-2 and C1-8. Review Design and construction methods for all bridges especially those on the Sheung Yue and tidal Ng Tung Rivers and adopt methods which minimize impacts on Long Valley and the rivers, and disturbance and fragmentation impacts on fauna. No overlap in construction of bridges over main river channels. Measures to ensure no hydrological disruption to Long Valley Watercourse and water supply to Long Valley to be designed at the detailed design stage for the rechannelisation of the Long Valley Watercourse and the development of areas through which it passes, including KTN area B3-12. Contingency plan to address any disruption to be included in LVNP HCMP. Avoid removal or interference with screen planting undertaken under the Construction of Cycle Tracks and Associated Supporting Facilities from Sha Po Tsuen to Shek Sheung project.	Minimize disturbance impacts (including cumulative impacts with cycle track project) to flight-lines of breeding ardeids.	Project Proponent/ Detailed Design Consultant/ Contractor	Along and within Sheung Yue and Ng Tung Rivers, Long Valley, Long Valley and watercourse upstream areas including KTN area B3-12	Detailed design/ construction phase.	TM-EIAO.
Ecology (Construction Phase)							
S. 13.9	E12	Compensatory egretry habitat provision and establishment. Review condition and location of egretries before commencement of works. Formulate and implement additional mitigation measures as appropriate. Phasing of works near and within Man Kam To Road Egretry outside breeding season	Compensate for loss of Man Kam To Road egretry habitat. Avoid mortality of breeding egrets	Project Proponent/ Detailed Design Consultant/ Contractor	FLN area A1-7 500m from Man Kam To Road Egretry.	Construction phase.	TM-EIAO; establishment of bamboo clump of species, size and numbers suitable for nesting ardeids; if no occupation initially, utilize decoys (models, vocalisations) to encourage occupation.

Project Implementation Schedule

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S13.9	E13	Review design and construction methods for bridges, especially those on the Sheung Yue and tidal Ng Tung Rivers, and adopt measures which minimize impacts on rivers and disturbance and fragmentation impacts on fauna. No construction during ardeid breeding season (1 March to 31 July) along Sheung Yue River north and east of KTN area D1-5 and east of D1-9 and C2-3 and restriction of working hours on new pedestrian bridges over the Sheung Yue River and tidal Ng Tung River to 09.00 to 17.30 during the ardeid breeding season (1 March to 31 July) Provision of alternative foraging habitat along main river channels for large waterbirds.	Minimize impacts on rivers and disturbance and fragmentation impacts on fauna.	Project Proponent/ Detailed Design Consultant/ Contractor	Along and within the Sheung Yue, Ng Tung and Shek Sheung Rivers	Detailed design and construction phases..	TM-EIAO.
S13.9	E14	Buffer zone of 15-30m as appropriate on both sides (not less than 45m total width) of Ma Tso Lung Stream north of the point where it is crossed by the LMC Loop Eastern Connection Road, and Ma Tso Lung Stream diversion during construction of the LMC Loop Eastern Connection Road; development along lower reaches of Ma Tso Lung Stream and Ma Tso Lung San Tsuen Stream in OU zones in KTN areas F1-2 and F1-3 to be set back beyond buffer. Construction and maintenance of permanent 1.2m high solid faunal barrier at all at-grade sections of LMC Loop eastern connection Road north of junction with road D4 within 15-30m as appropriate of Ma Tso Lung Stream buffer and construction of faunal underpass beneath road. Compensation for the loss of seasonally wet grassland at Ma Tso Lung by habitat restoration and enhancement along diverted section of Ma Tso Lung Stream.	Minimize impacts direct and indirect impacts of habitat loss, disturbance, pollution and fragmentation on Ma Tso Lung Stream and marsh and riparian corridor of importance to species of conservation significance.	PlanD/ Project Proponent/ Developer/ Detailed Design Consultant/ Contractor. (Design of Ma Tso Lung Stream diversion and buffer zone habitat restoration measures)	KTN areas H1-1, F1-2 and F1-3 and Lok Ma Chau Loop Eastern Connection Road.	Detailed design and construction phases.	Layout Plan
S.13.9	E15	Creation and enhancement of proposed Long Valley Nature Park and creation and enhancement of wetland and buffer planting within LVNP.	Compensate for wetland loss arising from the project.	Project Proponent/ Contractor (LVNP Detailed Habitat Creation & Management Plan)	Long Valley, (KTN area C1-9).	Construction phase.	TM-EIAO; no net loss in wetland function: design requirements and mitigation targets for habitats and species to be detailed in LVNP Habitat Creation &

Project Implementation Schedule

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							Management Plan.
S13.9	E16	Creation of Green Corridors along the Sheung Yue, Ng Tung and Shek Sheung Rivers, retention and provision of screen plantings where feasible; provision of Open Space areas and development areas along river corridors; Design and erection of 2m high solid dull green site barrier fence between river channel and any active works area along or adjacent to Ng Tung, Sheung Yue and Shek Sheung Rivers. Ng Tung, Sheung Yue and Shek Sheung Rivers screen planting.	Minimize disturbance to waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels.	Detailed Design Consultant/ Contractor	Ng Tung, Sheung Yue and Shek Sheung Rivers	Detailed design and Construction phases.	TM-EIAO.
S.13.9	E17	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance on edge of development areas, including along any roads adjacent to or penetrating into areas/habitats of ecological importance. Erection of a 2m high dull green site barrier fence at the edge of the works area or 30m from Ma Tso Lung Stream and tributaries, whichever distance is the greater. Prevention of dust impact from active works areas from sites adjacent to Ho Sheung Heung and Crest Hill woodland and shrubland in KTN area D1-7, D1-11 and G1-3.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna. Measures to minimize flight-line impacts to birds, especially breeding ardeids.	Contractor	Interface between areas/habitats/fauna/ flora of ecological importance (e.g. KTN areas B1-3, C1-5, C1-6, C1-9, C2-2, C2-4, C2-5, D1-8, E1-8, G1-3, H1-1, Ma Tso Lung Stream and tributaries; FLN areas A1-3, A1-7 and A1-9) and works areas; and around any works areas north of the Fanling Bypass and north of the Ng Tung River west of the western terminus of the Fanling Bypass. Riparian corridor of Ma Tso Lung Stream and tributaries.	Construction phase.	TM-EIAO.
S13.9	E18	Compensatory woodland planting, management and maintenance.	Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Project Proponent / Contractor	KTN areas E1-8 and G1-3.	Construction phase.	TM-EIAO.

Project Implementation Schedule

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S13.9	E19	Use opaque, non-transparent, non-reflective noise barriers for all construction sites. Unnecessary lighting should be avoided.	Minimize mortality impacts on birds.	Contractor	All construction sites	Construction phase.	TM-EIAO.
S13.9	E20	Pre-site clearance check for presence of flora or fauna of conservation significance and bat roosts. If any are found, measures should be proposed and implemented to avoid, minimize and/or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation. Seek agreement of relevant authorities including AFCD in respect of proposed measures, then implement. Pre-site clearance check on all construction sites and pre –works commencement check on watercourses to be physically and/or hydrologically impacted by construction activities for presence of protected plant species/specimens of conservation significance. If any are found consider adjustments to avoid, minimize and/or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation. Seek agreement of relevant authorities including AFCD in respect of proposed measures, then implement. Pre-site clearance of construction sites in Crest Hill area, KTN areas D1-7, D1-11 and G1-5 (where Eurasian Hobby was recorded) and on Cheung Po Tau, FLN area A3-1 (where Grey Nightjar was recorded) for presence of any breeding birds/breeding sites. If any are found consider adjustments to avoid, minimize and/or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation. Seek agreement of relevant authorities including AFCD in respect of proposed measures, then implement. Pre-site clearance check on all construction sites for presence of Chinese Bullfrog, translocation to suitable areas including LVNP.	Minimize impacts to flora and fauna of conservation significance. Minimize impacts to protected fauna and flora species. Formulate and implement mitigation measures to avoid, minimize and/or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation.	Government/ Developer/ Contractor/ Ecologist	All construction sites.	Prior to clearance of vegetation and structures.	TM-EIAO.
S13.9	E21	Pre-works commencement check on watercourses to be physically and/or hydrologically impacted by construction activities for presence of flora or fauna of conservation significance and bat roosts. If any are found consider adjustments to avoid, minimize	Minimize impacts to flora and fauna of conservation significance. Minimize impacts to protected fauna	Government/ Developer/ Contractor/	All construction sites.	Prior to clearance of vegetation and	TM-EIAO.

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		and/or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation. Seek agreement of relevant authorities including AFCD in respect of proposed measures, then implement. Pre-site clearance check on all construction sites for presence of reptile species of conservation significance, capture and translocate to receptor site; review translocation options in respect to species in Ma Tso Lung area and determine whether release locally or elsewhere is appropriate. Seek agreement of relevant authorities including AFCD in respect of proposed measures then implement. Pre-works commencement check on watercourses to be physically and/or hydrologically impacted by construction activities for presence of Small Snakehead and *Sommaniathelphusa zanklon*. Capture any *Sommaniathelphusa zanklon* found and translocate to Ma Tso Lung Stream/ other suitable areas including LVNP.	and flora species. Consider and implement adjustments to avoid, minimize or compensate for impacts; including adjustments to design, timing of works, transplantation and translocation.	Ecologist		structures.	
S13.9	E22	Prevention of dust, run-off and pollutants impacting Deep Bay catchment area and areas of ecological importance.	Avoid increase to pollution entering ecologically sensitive Deep Bay ecosystem.	Contractor	All construction sites	Construction	TM-EIAO
Ecology (Operational Phase)							
S. 13.9	E23	Compensatory egretry habitat establishment and maintenance.	Compensate for loss of Man Kam To Road egretry habitat.	Project Proponent / Contractor / Maintenance Authority	FLN area A1-7.	Operation phase.	Maintenance of bamboo clump suitable for nesting ardeids; if no occupation initially, utilize decoys (models, vocalisations) to encourage occupation.
S13.9	E24	Buffer zone of 15 - 30m on both sides of Ma Tso Lung Stream, Ma Tso Lung San Tsuen and tributaries. Maintenance of permanent 1.2m high solid fauna barrier at all at-	Minimize impacts on Ma Tso Lung Stream and riparian corridor of importance to species of	Government / Developer	KTN areas H1-1, F1-2 and F1-3 and Lok Ma Chau Loop link	Operation phase.	TM-EIAO.

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		grade sections of LMC Loop Eastern Connection Road north of junction with road DP4 and maintenance of faunal underpass. .	conservation significance.		road.		
S. 13.9	E25	Long Valley Nature Park habitat establishment and maintenance.	Compensate for wetland loss arising from the Project.	Project Proponent / Contractor / AFCD	Long Valley (KTN area C1-9)	Operation phase.	TM-EIAO; no net loss in wetland function: design requirements and mitigation targets for habitats and species detailed in LVNP Habitat Creation & Management Plan.
S13.9	E26	Management and maintenance of Ng Tung, Sheung Yue and Shek Sheung Rivers screen planting and Open Space areas and development areas along river corridors.	Minimize disturbance to waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels.	Maintenance Authority	Ng Tung, Sheung Yue and Shek Sheung Rivers.	Operation phase.	TM-EIAO.
S13.9	E27	Compensatory woodland planting, management and maintenance.	Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Maintenance Authority	KTN areas E1-8 and G1-3.	Operational phase.	TM-EIAO.
S13.9	E28	Use opaque, non-transparent, non-reflective noise barriers for all roads. Unnecessary lighting should be avoided. Potential impacts of nocturnal avian collision with buildings should be minimized by not creating sky glow from the use of night-time lighting at or near the top of buildings or other structures. In addition to avoiding uplighting, light spillage should be minimized, while green and blue lights should be used where possible. As far as possible, lights should be controlled by motion sensors, and operations should be managed in such a way as reduce or eliminate night lighting near windows.	Minimize mortality impacts on birds.	Government / Developer	Permanent.	Operation phase.	TM-EIAO.

Project Implementation Schedule

Note: Specific Mitigation Measures for Designated Projects

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Specific Mitigation Measures for Designated Projects							
DP2- Castle Peak Road Diversion (Major Improvement)							
Noise Impacts (Operational Phase)							
S4.9	N1-DP2	Provide noise barrier before operation of the proposed project and locations of barriers are stated as following: • KTN-NB52: Approx. 75m long CNB; • KTN-NB55: Approx. 145m long CNB; • KTN-NB-63 Approx. 380m long CNB; • KTN-SE-09: Approx. 85m long SE with opening to south direction	Control operational airborne noise due to road traffic	Contractor / Project Proponent	Refer to Appendix 5-1	Prior to operation of the Project	Annex 5, TM-EIAO
Water Quality Impacts (Operational Phase)							

S5.8	W1-DP2	Road runoff In order to ensure the sand/silt traps removal efficiencies, the following measures should be implemented: • The sand/silt traps should be regularly cleaned to prevent the build-up of sediments that could adversely affect the performance of the traps; and • Storm drains and culverts should be cleaned at the end of the dry season, prior to the commencement of the wet season to remove any deposited sediments that could be eroded during the highly turbulent conditions present during first flush. In addition, the following measures should be implemented: • The sewer system should be designed to adequately cater for the projected sewage flows and loads to avoid the necessity for expedient connections to storm drains; and • Oil/grease traps should be installed in areas where such substances could be present in surface run-off, such as along roads, around petrol stations, workshops, food markets and	Control water quality impact	Project Proponent / Detailed Design Consultant, Operator	All road works	Detailed design phase, Operation phase	WPCO, EIAO, TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		restaurants.					
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.A9	LV1-DP2	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.		Detailed Design Consultant/ Contractor	*Throughout NDAs,*	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become available, to achieve early establishment	
S.12.A9 MM1	LV2-DP2	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor	*Throughout NDAs, particularly for reservoirs*	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes
S.12.A9 MM2	LV3-DP2	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered for architectural features, and light earthy tone colours such as	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding landscape	Detailed Design Consultant	*Throughout NDAs*	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines for Green Roof

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design, including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or elevated, should follow the guidelines stated. Construction time frame should also be considered and designs seek to keep it to a practical minimum.					Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section, Guidelines on Greening of Noise Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise Barriers (April 2012)
S.12.A9 MM14.4	LV4-DP2	Avoid affecting Watercourses – In the detailed design, consideration should be made of watercourses, to minimize any impacts e.g. at new bridge crossings, viaducts, road alignment etc. Guidelines stated should be followed. For example, for the stream at Siu Hang San Tsuen in FLN NDA, much of the stream is located underneath the viaduct for the proposed Fanling Bypass. In order to avoid impacts to the stream, the detailed final design of the viaduct should follow guidelines and ensure that no viaduct footings or other structures are placed in the stream. Bridges and box culverts should also be used to minimize the necessity of watercourse modification and protect the watercourses where necessary.	Avoid direct impacts to watercourses	Detailed Design Consultant/ Contractor	*All watercourses, particularly the stream at Siu Hang San Tsuen that will flow under the Fanling Bypass Eastern Section*	Prior to Construction and Construction Phase	Guidelines for this include ETWB Technical Circular (Works) No. 5/2005 Protection of natural streams/rivers from adverse impacts arising from construction works; Building Department (BD) Practice Note for Authorized Persons and Registered Structural Engineers 295: Protection of natural streams/rivers from adverse impacts arising from

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
							construction works
S.12.A9 MM4	LV5-DP2	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	*Onsite*	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.A9 MM5	LV6-DP2	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.A9 MM6	LV7-DP2	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree seedlings and/ or shrubs should be planted where slope gradient	To avoid substantial slope cutting and fill slopes. To prevent erosion and subsequent loss of	Government / Detailed Design Consultant/	*Onsite*	Prior to Construction, Construction Phase & Maintenance	GEO publication (1999) – Use of Vegetation as Surface Protection on Slope;

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		and site conditions allow. In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Contractor		in Operation Phase	GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.A9 MM7	LV8-DP2	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested..	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.A9 MM8	LV9-DP2	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica, Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii, Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus*	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	*In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

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		tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii. The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.A9 MM9	LV10-DP2	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. viaduct piers, noise barriers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	*On appropriate structures*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.A9 MM11	LV11-DP2	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Government / Detailed Design Consultant/ Contractor	*Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWBTC 3/2006
S.12.A9 MM12	LV12-DP2	Road Greening –For viaducts, soft landscaping should be provided to soften the hard, straight edges (for climbers used to cover the vertical, hard surfaces of the piers – see MM9 Vertical Greening) and shade tolerant plants should be planted, where light is sufficient, to improve aesthetic value of areas under viaducts. Both at grade planting and use of elevated planters should be considered for the soft landscaping of viaducts, taking into account	To soften the hard, straight edges and provide greening along roads.	Government / Detailed Design Consultant/ Contractor	*On viaducts or along roads.*	Prior to Construction, Construction Phase & Maintenance in Operation	Development Bureau TCW No. 2/2013, Greening on Footbridges and Flyovers; Development Bureau

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		the preference to minimize the overall viaduct bulk and integrate architectural forms and textural finishes which improve aesthetics. For at grade roads, planting should be considered along central dividers and on road islands e.g. in the middle of roundabouts. (Roadside planting i.e. at the road edge and not in the central divider or road island, is considered part of Screen Planting)				Phase	TCW No. 2/2012 – Allocation of Space for Quality Greening on Roads; HQ/GN/15 - Guidelines for Greening Works along Highways
S.12.A9 MM13 & EIA Annex 13	LV13-DP2	Marsh/Wetland Compensation –The proposed Long Valley Nature Park (LVNP) will be designed and implemented to enhance on-wetland areas within the LVNP. (See E4,E15 and E25 also) Also see LV16, LV17, and LV18 as wetland planting should be provided along the embankments and beds of modified/ re-provisioned watercourses.	Compensate for Marsh/ Wetland lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works.
S.12.A9 MM14.3	LV14-DP2	Enhancement Planting along Embankment - For channelized watercourses, if these are modified, the Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design, should be considered and appropriate mitigation measures included ensuring the new watercourses match the existing as far as possible. Measures can include enhancement planting to upgrade the channels as appropriate, including consideration of wetland planting along embankments where appropriate; as well as consideration of the best materials for the channel lining (e.g. gabion). All measures must also ensure any necessary maintenance work can be carried out and that the channel meets all its requirements for water flow, etc. For example, a stretch of the Ma Wat River Channel in the south of FLN NDA will have to be diverted for the construction of the Fanling Bypass Eastern Section. This measure will be particularly relevant in this area.	Minimize the necessity of watercourse modification, protect watercourses where possible and enhance channelized watercourses	Government / Detailed Design Consultant/ Contractor	*Channelized watercourse, particularly the Ma Wat River Channel Diversion*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design
S.12.A9 MM15	LV15-DP2	Pond Replacement –Principles adopted in the design of the NDAs ensure that they incorporate ponds within the RODPs. All requirements for ponds stipulated in the planning documents for the formulation of the Preliminary Layout Plan (e.g. at Fung	Reprovision for ponds lost due to the Project.	Project Proponent/ Detailed Design	*E1-7 and C1-9 (LVNP) in KNT NDA and generally throughout NDA*	Prior to Construction, Construction Phase	

Project Implementation Schedule

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		Kong Shan Park in E1-7 of KNT ND) should be adhered to.		Consultant/ Contractor/ Maintenance Authority		Maintenance in Operation Phase	
Landscape and Visual (Construction)							
S.12.A9 MM16	LV16-DP2	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	*Throughout NDAs*	Construction Phase	
S.12.A9 MM17	LV17-DP2	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Contractor	*Throughout NDAs*	Construction and Operation Phases	
Ecology (Prior to Construction Phase)							
S. 13.9	E1-DP2	Egretry Habitat Creation & Management Plan (EHCMP) and Woodland Planting and Management Plan (WPMP)	Compensate for loss of Man Kam To Road egretry. Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Project Proponent/ Detailed Design Consultant (EHCMP and WPMP).	FLN area A1-7 (egretry compensation). KTN areas E1-8 and G1-3 (woodland compensation).	Detailed design phase.	Establishment of bamboo clump of species, size and number suitable for nesting ardeids. Additional measures to attract ardeids to be detailed in EHCMP. Woodland planting and establishment requirements to be detailed in WPMP.

Project Implementation Schedule

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							EIAO-TM.
Ecology (Detailed Design, Construction and Operational Phases)							
S13.9	E2-DP2	Use opaque, non-transparent, non-reflective noise barriers. Unnecessary lighting should be avoided.	Minimize mortality impacts on birds.	Detailed Design Consultant/ Contractor/ Maintenance Authority	Within NDA.	Detailed design phase, Construction phase and Operation phase.	TM-EIAO.
Ecology (Construction Phase)							
S.13.9	E3-DP2	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna.	Contractor.	Interface between areas/habitats of ecological importance (KTN area B1-3) and works areas.	Construction phase.	TM-EIAO.
S13.9	E4-DP2	Compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Project Proponent / Contractor	KTN NDA areas E1-8 and G1-3.	Construction phase.	TM-EIAO.
Ecology (Operational Phase)							
S13.9	E5-DP2	Maintenance of compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Maintenance Authority	KTN areas E1-8 and G1-3.	Operational phase	TM-EIAO.
Cultural Heritage (Pre-construction Phase)							
S11.6.1	CH1-DP2	<u>Undertaking Induction Training</u> Induction training should be provided to the construction contractor before the commencement of the excavation works in Site 4. An induction will be conducted as part of the environmental health and safety induction programme to all site staff before they are deployed on site. The induction will include	To preserve the archaeological resources as far as possible	Project Proponent/ Contractor/ Qualified Archaeologist	Site 4	Before the commencement of the excavation works and before site staff are	

Project Implementation Schedule

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		an introduction on the historical development of the Site, the possible archaeological remains that may be encountered during ground excavation works as well as the reporting procedures in case suspected archaeological remains are identified. A set of the presentation material (in the form of power point presentation) with content details will be prepared by an archaeologist and submitted to AMO for reference and record purpose. The first induction briefing will be video recorded and it will be used as induction briefing material for new site staff.				deployed on site	
S11.6.2	CH2-DP2	Undertaking baseline condition survey and baseline vibration impact assessment In case any potential vibration impact on any nearby built heritage features are identified during the pre-construction stage of the Project, prior to commencement of construction works, a baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or a qualified structural engineer to define the vibration limit (a vibration limit at 7.5mm/s and 15mm/s could be adopted for graded historic buildings and historic buildings respectively) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase so as to ensure the construction performance meets with the vibration standard stated in the EIA report. The condition survey of graded historic building should be submitted to AMO for information.	To minimize the vibration impacts during pre-construction stage on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	G202, G203, HKT03 (Main Building)	Pre-construction stage before commencement of construction works	EIAO-TM
S11.6.2	CH3-DP2	Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendents of these features will be carried out the Project	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	*HKT08 and Entrance Gate of HKT03*	Prior to Removal / Relocation of features before commencement of construction	EIAO-TM

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		Proponent.				works	
S11.6.2	CH4-DP2	Relocation of Built Heritages Relocation of built heritages to a reasonable location nearby may be required.	To preserve the directly impacted sites by relocation	Project Proponent/ Contractor	Entrance Gate of HKT03	After the photographic and cartographic records and before commencement of construction works	EIAO-TM
Cultural Heritage (Construction Phase)							
S11.6.2	CH5-DP2	Conducting Construction Vibration Monitoring and Structural Strengthening Measures Construction vibration monitoring and structural strengthening measures should be conducted during Construction phase based on the assessment result of baseline condition survey and baseline vibration impact assessment, so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	To minimize the potential impacts during Construction phase on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	Identified potential vibration impacted built heritage features	Construction phase, with details specified in baseline condition survey and baseline vibration impact assessment,	EIAO-TM
DP3- KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement)							
Noise Impacts (Operational Phase)							
S4.9	N1-DP3	Provide noise barrier before operation of the proposed project and locations of barriers are stated as following: • KTN-NB30: Approx. 35m long, 3m high NB; • KTN-NB31: Approx. 45m long, 3m high NB; • KTN-NB39: Approx. 65m long, 7m vertical noise barrier with 3m cantilevered arm; • KTN-NB40: Approx. 55m long, 5m vertical noise barrier with 3m cantilevered arm; • KTN-NB48: Approx. 285m long, 7m vertical noise barrier with	Control operational airborne noise due to road traffic	Project Proponent/ Contractor	Refer to Traffic Noise Mitigation Plan Figure 2.2a to 2.2e under EP-467/2013/A	Prior to operation of the Project	Annex 5, TM-EIAO

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		3m cantilevered arm; • KTN-NB59: Approx. 115m long, 5m vertical noise barrier with 3m cantilevered arm; • KTN-NB71: Approx. 35m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB77a: Approx. 35m long, 3m high NB; • KTN-NB77b: Approx. 285m long, 3m high NB; • KTN-SE06: Approx. 20m long SE with opening to north-eastern direction; • KTN-FE01: Approx. 155m long FE; • KTN-FE03: Approx. 115m long FE; • KTN-LNS01: Approx. 115m long LNS • KTN-LNS02: Approx. 125m long LNS					
Water Quality Impacts (Operational Phase)							
S5.7	W1-DP3	<u>Road runoff</u> In order to ensure the sand/silt traps removal efficiencies, the following measures should be implemented: • Vehicle dust, tyre scraps and oils might be washed away from the road surface / open areas to the nearby water courses by surface runoff or road surface cleaning. • Subject to detailed design and requirement of relevant government departments, the capacities of road drainage system shall cater the runoff from 50 year-return-period rainstorm. Proper drainage systems with silt traps and oil interceptors should be installed	Control water quality impact	Project Proponent / Detailed Design Consultant, Operator / Maintenance Authority	All road works	Detailed design phase, Operation phase	WPCO, EIAO, TM-EIAO

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.A9	LV1-DP3	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.		Detailed Design Consultant/ Contractor	*Throughout NDAs,*	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become available, to achieve early establishment	
S.12.A9 MM1	LV2-DP3	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor	*Throughout NDAs, particularly for reservoirs*	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes
S.12.A9 MM2	LV3-DP3	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding landscape	Detailed Design Consultant	*Throughout NDAs*	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		for architectural features, and light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design, including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or elevated, should follow the guidelines stated. Construction time frame should also be considered and designs seek to keep it to a practical minimum.					for Green Roof Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section, Guidelines on Greening of Noise Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise Barriers (April 2012)
S.12.A9 MM14.4	LV4-DP3	Avoid affecting Watercourses – In the detailed design, consideration should be made of watercourses, to minimize any impacts e.g. at new bridge crossings, viaducts, road alignment etc. Guidelines stated should be followed. For example, for the stream at Siu Hang San Tsuen in FLN NDA, much of the stream is located underneath the viaduct for the proposed Fanling Bypass. In order to avoid impacts to the stream, the detailed final design of the viaduct should follow guidelines and ensure that no viaduct footings or other structures are placed in the stream. Bridges and box culverts should also be used to minimize the necessity of watercourse modification and protect the watercourses where necessary.	Avoid direct impacts to watercourses	Detailed Design Consultant/ Contractor	*All watercourses, particularly the stream at Siu Hang San Tsuen that will flow under the Fanling Bypass Eastern Section*	Prior to Construction and Construction Phase	Guidelines for this include ETWB Technical Circular (Works) No. 5/2005 Protection of natural streams/rivers from adverse impacts arising from construction works; Building Department (BD) Practice Note for Authorized Persons and Registered Structural Engineers 295: Protection of natural streams/rivers from adverse impacts

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
							arising from construction works
S.12.A9 MM4	LV5-DP3	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	*Onsite*	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.A9 MM5	LV6-DP3	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.A9 MM6	LV7-DP3	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree	To avoid substantial slope cutting and fill slopes. To prevent erosion and	Government / Detailed Design Consultant/	*Onsite*	Prior to Construction, Construction Phase &	GEO publication (1999) – Use of Vegetation as Surface

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		seedlings and/ or shrubs should be planted where slope gradient and site conditions allow. In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Contractor		Maintenance in Operation Phase	Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.A9 MM7	LV8-DP3	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested..	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.A9 MM8	LV9-DP3	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica, Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii,*	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	*In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii. The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.A9 MM9	LV10-DP3	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. viaduct piers, noise barriers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	*On appropriate structures*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.A9 MM11	LV11-DP3	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Government / Detailed Design Consultant/ Contractor	*Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWBTC 3/2006
S.12.A9 MM12	LV12-DP3	Road Greening –For viaducts, soft landscaping should be provided to soften the hard, straight edges (for climbers used to cover the vertical, hard surfaces of the piers – see MM9 Vertical Greening) and shade tolerant plants should be planted, where light is sufficient, to improve aesthetic value of areas under viaducts. Both at grade planting and use of elevated planters should be	To soften the hard, straight edges and provide greening along roads.	Government / Detailed Design Consultant/ Contractor	*On viaducts or along roads.*	Prior to Construction, Construction Phase & Maintenance in Operation	Development Bureau TCW No. 2/2013, Greening on Footbridges and Flyovers;

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		considered for the soft landscaping of viaducts, taking into account the preference to minimize the overall viaduct bulk and integrate architectural forms and textural finishes which improve aesthetics. For at grade roads, planting should be considered along central dividers and on road islands e.g. in the middle of roundabouts. (Roadside planting i.e. at the road edge and not in the central divider or road island, is considered part of Screen Planting)				Phase	Development Bureau TCW No. 2/2012 – Allocation of Space for Quality Greening on Roads; HQ/GN/15 - Guidelines for Greening Works along Highways
S.12.A9 MM13 EIA Annex 13	LV13-DP3	Marsh/Wetland Compensation –The proposed Long Valley Nature Park (LVNP) will be designed and implemented to enhance on-wetland areas within the LVNP. (See E4,E15 and E25 also) Also see LV16, LV17, and LV18 as wetland planting should be provided along the embankments and beds of modified/ re-provisioned watercourses.	Compensate for Marsh/ Wetland lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works.
S.12.A9 MM14.3	LV14-DP3	Enhancement Planting along Embankment - For channelized watercourses, if these are modified, the Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design, should be considered and appropriate mitigation measures included ensuring the new watercourses match the existing as far as possible. Measures can include enhancement planting to upgrade the channels as appropriate, including consideration of wetland planting along embankments where appropriate; as well as consideration of the best materials for the channel lining (e.g. gabion). All measures must also ensure any necessary maintenance work can be carried out and that the channel meets all its requirements for water flow, etc. For example, a stretch of the Ma Wat River Channel in the south of FLN NDA will have to be diverted for the construction of the Fanling Bypass Eastern Section. This measure will be particularly relevant in this area.	Minimize the necessity of watercourse modification, protect watercourses where possible and enhance channelized watercourses	Government / Detailed Design Consultant/ Contractor	*Channelized watercourse, particularly the Ma Wat River Channel/ Diversion*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design
S.12.A9 MM15	LV15-DP3	Pond Replacement –Principles adopted in the design of the NDAs ensure that they incorporate ponds within the RODPs. All requirements for ponds stipulated in the planning documents for	Reprovision for ponds lost due to the Project.	Project Proponent/ Detailed	*E1-7 and C1-9 (LVNP) in KNT NDA and generally*	Prior to Construction, Construction	

Project Implementation Schedule

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		the formulation of the Preliminary Layout Plan (e.g. at Fung Kong Shan Park in E1-7 of KNT ND) should be adhered to.		Design Consultant/ Contractor/ Maintenance Authority	*throughout NDA*	Phase Maintenance in Operation Phase	
Landscape and Visual (Construction)							
S.12.A9 MM16	LV16-DP3	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	*Throughout NDAs*	Construction Phase	
S.12.A9 MM17	LV17-DP3	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Contractor	*Throughout NDAs*	Construction and Operation Phases	
Ecology (Prior to Construction Phase)							
S. 13.9	E1-DP3	Egretry Habitat Creation & Management Plan (EHCMP) and Woodland Planting and Management Plan (WPMP)	Compensate for loss of Man Kam To Road egretry. Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Project Proponent/ Detailed Design Consultant (EHCMP and WPMP).	FLN area A1-7 (egretry compensation). *KTN areas E1-8 and G1-3 (woodland compensation).*	Detailed design phase/ Advance works.	Establishment of bamboo clump of species, size and numbers suitable for nesting ardeids. Additional measures to attract ardeids to be detailed in EHCMP. Woodland planting and establishment requirements to be detailed in WPMP.

Project Implementation Schedule

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							EIAO-TM.
S.13.9	E2-DP3	Habitat Creation & Management Plan (HCMP) for Long Valley Nature Park (LVNP).	Compensate for wetland loss arising from the project and protection of Long Valley from adverse ecological impacts including provision of additional habitat for large waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels.	Project Proponent/ Detailed Design Consultant (LVNP HCMP).	Long Valley	Detailed design phase.	No net loss in wetland function: design requirements and mitigation targets for habitats and species to be detailed in LVNP HCMP.
Ecology (Detailed Design, Construction and Operational Phases)							
S13.9	E3-DP3	Use opaque, non-transparent, non-reflective noise barriers. Unnecessary lighting should be avoided.	Minimize mortality impacts on birds.	Detailed Design Consultant/ Contractor Maintenance Authority.	Throughout.	Detailed design, Construction and Operation phases.	TM-EIAO.
Ecology (Construction Phase)							
S.13.9	E4-DP3	Creation of proposed Long Valley Nature Park and creation and enhancement of wetland and woodland areas and buffer planting within LVNP.	Compensate for wetland loss arising from the project.	Project Proponent/ Contractor (LVNP Detailed Habitat Creation & Management Plan).	Long Valley	Construction phase.	TM-EIAO; no net loss in wetland function: design requirements and mitigation targets for habitats and species to be detailed in LVNP Detailed Habitat Creation & Management Plan.
S.13.9	E5-DP3	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance on edge of development areas, including along any roads adjacent to or penetrating into areas/habitats of ecological importance.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna. Measures to minimize flight-line impacts to birds,	Contractor.	Interface between areas/habitats of ecological importance (KTN areas B1-3, H1-1) and works areas.	Construction phase.	TM-EIAO.

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
			especially breeding ardeids.				
S13.9	E6-DP3	Compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Project Proponent / Contractor	KTN areas E1-8 and G1-3.	Construction phase.	TM-EIAO.
Ecology (Operational Phase)							
S.13.9	E7-DP3	Operation, management and maintenance of proposed Long Valley Nature Park.	Compensate for wetland loss arising from the project and protection of Long Valley from adverse impact including provision of additional habitat for large waterbirds using Ng Tung, Sheung Yue and Shek Sheung River channels.	Project Proponent / Contractor/ AFCD	*Long Valley, KTN area C1-9.*	Operation phase.	No net loss in wetland function: design requirements and mitigation targets for habitats and species to be detailed in LVNP Detailed Management Plan.
S13.9	E8-DP3	Maintenance of compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Maintenance Authority	*KTN areas E1-8 and G1-3.*	Operation phase	TM-EIAO.
Cultural Heritage (Pre-construction Phase)							
S11.6.1	CH1-DP3	Undertaking Survey-cum-Rescue Excavation A Survey-cum-Rescue Excavation should be conducted after land resumption and before the commencement of construction works to define the precise archaeological deposits extent and to preserve the archaeological resources by record. The excavation should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance.	To define the precise archaeological deposits extent and to preserve the archaeological resources as far as possible.	Project Proponent/ Contractor/ Qualified Archaeologist	In KTN NDA, for Site 2 and Spots C and I.	After land resumption but before construction commencement of the zones	EIA recommendation and AMO Guidelines for Archaeological Reports; Guideline for Handling of Archaeological Finds and Archives
S11.6.1	CH2-DP3	Undertaking Further Archaeological Survey to Cover the Outstanding Areas Further archaeological surveys to cover the outstanding areas of the not-yet-surveyed-area with medium archaeological potential located with areas with proposed development as presented in	To confirm and verify the findings of the EIA	Project Proponent/ Contractor/ Qualified Archaeologist	In the not-yet-surveyed-areas with medium archaeological potential located within the work	After land resumption but before construction	EIA recommendation and AMO CHIA Guideline

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		Figure 11.9 should be implemented after land resumption to confirm and verify the findings of the EIA. The survey should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance. It should be noted that the scope of further archaeological survey is based on the current proposed alignment. Any additional works areas which have not been covered by the current archaeological impact assessment should be covered as soon as possible. Subject to the findings of the archaeological survey to be conducted after land resumption, additional mitigation measures would be designed and implemented before the commencement of construction works to mitigate the adverse impact.			extent of DP3		
S11.6.2	CH2-DP3	Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendents of these features will be carried out by the Project Proponent.	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	*KT38, KT44,* and *KT52*	Prior to Removal / Relocation of features before commencement of construction works	EIAO-TM
DP4- KTN NDA Road D1 to D5 (New Road)							
Noise Impacts (Operational Phase)							
S4.9	N1-DP4	Provide noise barrier before operation of the proposed project and locations of barriers are stated as following: • KTN-NB08: Approx. 135m long, 5m high NB; • KTN-NB20: Approx. 70m long, 5m high NB; • KTN-NB23: Approx. 80m long, 5m high NB; • KTN-NB24: Approx. 60m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB25: Approx. 30m long, 5m vertical barrier with 3m cantilevered arm; • KTN-NB35: Approx. 55m long, 5m vertical barrier with 3m cantilevered arm;	Control operational airborne noise due to road traffic	Project Proponent /Contractor	Refer to Traffic Noise Mitigation Plan Figure 2.2a to 2.2e under EP-468/2013/A	Prior to operation of the Project	Annex 5, TM-EIAO

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		• KTN-NB37: Approx. 80m long, 3m high NB; • KTN-NB69: Approx. 60m long, 5m high NB; • KTN-NB70: Approx. 30m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB75: Approx. 75m long, 5m high NB; • KTN-NB82: Approx. 95m long, 7m vertical barrier with 3m cantilevered arm; • KTN-NB85: Approx. 230m long, 5m high NB; • KTN-NB86: Approx. 45m long, 3m high NB; • KTN-NB87: Approx. 65m long, 3m high NB; • KTN-NB88: Approx. 65m long, 3m high NB; • KTN-SE05: Approx. 80m long SE with opening to south direction; • KTN-SE07: Approx. 95m long SE with opening to south-eastern direction; • KTN-FE02: Approx. 130m long FE • KTN-LNS11: Approx. 245m long LNS • KTN-LNS12: Approx. 790m long LNS • KTN-LNS13: Approx. 215m long LNS • KTN-LNS14: Approx. 160m long LNS • KTN-LNS15: Approx. 200m long LNS • KTN-LNS16: Approx. 255m long LNS					
Water Quality Impacts (Operational Phase)							
S5.7	W1-DP4	<u>Road runoff</u> In order to ensure the sand/silt traps removal efficiencies, the following measures should be implemented:	Control water quality impact	Project Proponent / Detailed Design	All road works	Detailed design stage, Operation	WPCO, EIAO, TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		• Vehicle dust, tyre scraps and oils might be washed away from the road surface / open areas to the nearby water courses by surface runoff or road surface cleaning. Subject to detailed design and requirement of relevant government departments, the capacities of road drainage system shall cater the runoff from 50 year-return-period rainstorm. Proper drainage systems with silt traps and oil interceptors should be installed		Consultant,/ Maintenance Authority		phase	
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.A9	LV1-DP4	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.		Detailed Design Consultant/ Contractor	*Throughout NDAs,*	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become available, to achieve early establishment	
S.12.A9 MM1	LV2-DP4	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor/	*Throughout NDAs, particularly for reservoirs*	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes
S.12.A9 MM2	LV3-DP4	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding	Detailed Design Consultant/	Throughout NDAs	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered for architectural features, and light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design, including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or elevated, should follow the guidelines stated. Construction time frame should also be considered and designs seek to keep it to a practical minimum.	landscape				(As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section, Guidelines on Greening of Noise Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise Barriers (April 2012)
S.12.A9 MM4	LV4-DP4	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	Onsite	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.					
S.12.A9 MM5	LV5-DP4	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.A9 MM6	LV6-DP4	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree seedlings and/ or shrubs should be planted where slope gradient and site conditions allow. In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	To avoid substantial slope cutting and fill slopes. To prevent erosion and subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Government / Detailed Design Consultant/ Contractor	Onsite	Prior to Construction, Construction Phase & Maintenance in Operation Phase	GEO publication (1999) – Use of Vegetation as Surface Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.A9 MM7	LV7-DP4	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006.	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation	ETWB TCW 3/2006 and 2/2004

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested..				Phase	
S.12.A9 MM8	LV8-DP4	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica, Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii, Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii.* The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

Project Implementation Schedule

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		inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.A9 MM9	LV9-DP4	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. viaduct piers, noise barriers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	On appropriate structures	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.A9 MM11	LV10-DP4	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Government / Detailed Design Consultant/ Contractor	Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWBTC 3/2006
S.12.A9 MM12	LV11-DP4	Road Greening –For viaducts, soft landscaping should be provided to soften the hard, straight edges (for climbers used to cover the vertical, hard surfaces of the piers – see MM9 Vertical Greening) and shade tolerant plants should be planted, where light is sufficient, to improve aesthetic value of areas under viaducts. Both at grade planting and use of elevated planters should be considered for the soft landscaping of viaducts, taking into account the preference to minimize the overall viaduct bulk and integrate architectural forms and textural finishes which improve aesthetics. For at grade roads, planting should be considered along central dividers and on road islands e.g. in the middle of roundabouts. (Roadside planting i.e. at the road edge and not in the central divider or road island, is considered part of Screen Planting)	To soften the hard, straight edges and provide greening along roads.	Government / Detailed Design Consultant/ Contractor	On viaducts or along roads.	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Development Bureau TCW No. 2/2013, Greening on Footbridges and Flyovers; Development Bureau TCW No. 2/2012 – Allocation of Space for Quality Greening on Roads; HQ/GN/15 - Guidelines for Greening Works along Highways
S.12.A9 MM13 & EIA Annex 13	LV12-DP4	Marsh/Wetland Compensation –The proposed Long Valley Nature Park (LVNP) will be designed and implemented to enhance on-wetland areas within the LVNP. (See E4,E15 and E25 also) Also see LV16, LV17, and LV18 as wetland planting should be provided along the embankments and beds of modified/ re-	Compensate for Marsh/ Wetland lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation	ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works.

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		provisioned watercourses.		Maintenance Authority		Phase	
S.12.A9 MM15	LV13-DP4	Pond Replacement –Principles adopted in the design of the NDAs ensure that they incorporate ponds within the RODPs. All requirements for ponds stipulated in the planning documents for the formulation of the Preliminary Layout Plan (e.g. at Fung Kong Shan Park in E1-7 of KNT ND) should be adhered to.	Reprovision for ponds lost due to the Project.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	E1-7 and C1-9 (LVNP) in KNT NDA and generally throughout NDA	Prior to Construction, Construction Phase Maintenance in Operation Phase	
Landscape and Visual (Construction)							
S.12.A9 MM16	LV14-DP4	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor			
S.12.A9 MM17	LV15-DP4	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Contractor	*Throughout NDAs*	Construction and Operation Phases	
Ecology (Prior to Detailed Design Prior to Construction Phase)							
S. 13.9	E1-DP4	Egretry Habitat Creation & Management Plan (EHCMP) and Woodland Planting and Management Plan (WPMP)	Compensate for loss of Man Kam To Road egretry. Compensate for loss of secondary woodland and hillside plantation of ecological significance.	Project Proponent/ Detailed Design Consultant (EHCMP and	FLN area A1-7 (egretry compensation). KTN areas E1-8 and G1-3 (woodland compensation).	Detailed design phase.	Establishment of bamboo clump suitable for nesting ardeids. Additional measures to attract ardeids to be detailed in EHCMP.

Project Implementation Schedule

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				WPMP).			Woodland planting and establishment requirements to be detailed in WPMP. EIAO-TM.
Ecology (Detailed Design, Construction and Operational Phases)							
S13.9	E2-DP4	Use opaque, non-transparent, non-reflective noise barriers. Unnecessary lighting should be avoided.	Minimize mortality impacts on birds.	Detailed Design Consultant/ Contractor Maintenance Authority.	Throughout.	Throughout.	TM-EIAO.
Ecology (Construction Phase)							
S.13.9	E3-DP4	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna.	Contractor.	Interface between areas/habitats of ecological importance (KTN areas B1-3, E1-8, G1-3 and H1-1) and works areas	Construction phase.	TM-EIAO.
S13.9	E4-DP4	Compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Project Proponent / Contractor	KTN areas E1-8 and G1-3.	Construction phase.	TM-EIAO.
S13.8	E5-DP4	Maintenance of compensatory native woodland planting.	Compensate for loss of plantation of ecological significance.	Maintenance Authority.	KTN areas E1-8 and G1-3.	Operation phase	TM-EIAO.
Cultural Heritage (Pre-construction Phase)							
S11.6.1	CH1-DP4	<u>Undertaking Survey-cum-Rescue Excavation</u> A Survey-cum-Rescue Excavation should be conducted after land resumption and before the commencement of construction works	To define the precise archaeological deposits extent and to preserve the	Project Proponent / Contractor/	In KTN NDA, for Site 1	After land resumption but before	EIA recommendation and AMO Guidelines for Archaeological

Project Implementation Schedule

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		to define the precise archaeological deposits extent and to preserve the archaeological resources by record. The excavation should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance.	archaeological resources as far as possible.	Qualified Archaeologist		construction commencement of the zones	Reports; Guideline for Handling of Archaeological Finds and Archives
S11.6.1	CH2-DP4	Undertaking Further Archaeological Survey to Cover the Outstanding Areas Further archaeological surveys to cover the outstanding areas of the not-yet-surveyed-area with medium archaeological potential located with areas with proposed development as presented in **Figure 11.9** should be implemented after land resumption to confirm and verify the findings of the EIA. The survey should be conducted by a professional archaeologist and prior to fieldwork commencement, the archaeologist should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance. It should be noted that the scope of further archaeological survey is based on the current proposed alignment. Any additional works areas which have not been covered by the current archaeological impact assessment should be covered as soon as possible. Subject to the findings of the archaeological survey to be conducted after land resumption, additional mitigation measures would be designed and implemented before the commencement of construction works to mitigate the adverse impact.	To confirm and verify the findings of the EIA	Project Proponent/ Contractor/ Qualified Archaeologist	In the not-yet-surveyed-areas with medium archaeological potential located within the work extent of DP4	After land resumption but before construction	EIA recommendation and AMO CHIA Guideline
S11.6.1	CH3-DP4	Undertaking Induction Training Induction training should be provided to the construction Contractor before the commencement of the excavation works in Spot E. An induction will be conducted as part of the environmental health and safety induction programme to all site staff before they are deployed on site. The induction will include an introduction on the historical development of the Site, the possible archaeological remains that may be encountered during ground excavation works as well as the reporting procedures in case suspected archaeological remains are identified. A set of the presentation material (in the form of power point presentation) with content details will be prepared by an archaeologist and submitted to AMO for reference and record purpose. The first induction briefing will be video recorded and it will be used as induction briefing material for	To preserve the archaeological resources as far as possible	Project Proponent/ Contractor/ Qualified Archaeologist	Spot E	Before the commencement of the excavation works and before site staff are deployed on site	

Project Implementation Schedule

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		new site staff.					
S11.6.2	CH4-DP4	Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendents of these features will be carried out by the Project Proponent.	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	Entrance Gate of HKT03, KT16, KT17 and KT18	Prior to Removal / Relocation of features before commencement of construction works	EIAO-TM
S11.6.2	CH5-DP4	Undertaking baseline condition survey and baseline vibration impact assessment In case any potential vibration impact on any nearby built heritage features are identified during the pre-construction stage of the Project, prior to commencement of construction works, a baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or a qualified structural engineer to define the vibration limit (a vibration limit at 15mm/s could be adopted for historic buildings) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	To minimize the vibration impacts during pre-construction stage on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	HKT03 (Main Building) and G308	Pre-construction stage before commencement of construction works	EIAO-TM
S11.6.2	CH6-DP4	Relocation of Built Heritages Relocation of built heritages to a reasonable location nearby may be required.	To preserve the directly impacted sites by relocation	Project Proponent/ Contractor	Entrance Gate of HKT03	After the photographic and cartographic records and before commencement of construction works	EIAO-TM
Cultural Heritage (Construction Phase)							
S11.6.2	CH7-DP4	Conducting Construction Vibration Monitoring and Structural	To minimize the potential impacts during Construction	Contractor	Identified potential vibration impacted	Construction phase, with	EIAO-TM

Project Implementation Schedule

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		Strengthening Measures Construction vibration monitoring and structural strengthening measures should be conducted during Construction phase based on the assessment result of baseline condition survey and baseline vibration impact assessment, so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	phase on any identified potential vibration impacted built heritage features		built heritage features	details specified in baseline condition survey and baseline vibration impact assessment,	
DP5- New sewage pumping stations (SPSs) in KTN NDA							
Noise Impacts (Operational Phase)							
S4.8	N1-DP5	• Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level for KTN D1-3 and KTN F1-2 shall not exceed 89 and 76 dB(A) respectively.	Control operational airborne noise due to the operation of fixed plant	Contractor	All plant rooms where practicable	Prior to operation of the Project	Noise Control Ordinance and its TM, TM-EIAO
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.B9	LV1-DP5	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.		Detailed Design Consultant/ Contractor/	Throughout NDAs,	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become available, to achieve early establishment	
S.12.B9 MM1	LV2-DP5	• Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor/	Throughout NDAs, particularly for reservoirs	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes

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		landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.					
S.12.B9 MM2	LV3-DP5	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered for architectural features, and light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. • All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design, including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or elevated, should follow the guidelines stated. • Construction time frame should also be considered and designs seek to keep it to a practical minimum.	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding landscape	Detailed Design Consultant/	Throughout NDAs	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section, Guidelines on Greening of Noise Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise

Project Implementation Schedule

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							Barriers (April 2012)
S.12.B9 MM4	LV4-DP5	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. • A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	Onsite	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.B9 MM5	LV5-DP5	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. • A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.B9 MM6	LV6-DP5	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree	To avoid substantial slope cutting and fill slopes. To prevent erosion and	Government / Detailed Design Consultant/	Onsite	Prior to Construction, Construction Phase &	GEO publication (1999) – Use of Vegetation as Surface

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		seedlings and/ or shrubs should be planted where slope gradient and site conditions allow. • In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Contractor		Maintenance in Operation Phase	Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.B9 MM7	LV7-DP5	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. • Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested..	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.B9 MM8	LV8-DP5	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica,*	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii, Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii. • The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.B9 MM9	LV9-DP5	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. viaduct piers, noise barriers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	*On appropriate structures*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.B9 MM10	LV10-DP5	• Green Roof – Roof greening where appropriate should be established on proposed buildings as per the guidelines stated. These guidelines provide further details including information regarding structural loading, design, maintenance, etc. considerations as well as providing information on what types of plants might be suitable.	Reduce exposure to untreated concrete surfaces and particularly mitigate visual impact to VSRs at high levels. Provide greening.	Government / Detailed Design Consultant/ Contractor	*On appropriate buildings*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011); ArchSD/Urbis Study on Green Roof Application in HK (2007)

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S.12.B9 MM11	LV11-DP5	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Government / Detailed Design Consultant/ Contractor	*Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWBTC 3/2006
S.12.B9 MM14.3	LV12-DP5	Enhancement Planting along Embankment - For channelized watercourses, if these are modified, the Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design, should be considered and appropriate mitigation measures included ensuring the new watercourses match the existing as far as possible. Measures can include enhancement planting to upgrade the channels as appropriate, including consideration of wetland planting along embankments where appropriate; as well as consideration of the best materials for the channel lining (e.g. gabion). All measures must also ensure any necessary maintenance work can be carried out and that the channel meets all its requirements for water flow, etc. • For example, a stretch of the Ma Wat River Channel in the south of FLN NDA will have to be diverted for the construction of the Fanling Bypass Eastern Section. This measure will be particularly relevant in this area.	Minimize the necessity of watercourse modification, protect watercourses where possible and enhance channelized watercourses	Government / Detailed Design Consultant/ Contractor	*Channelized watercourse, particularly the Ma Wat River Channel Diversion*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design
Landscape and Visual (Construction)							
S.12.B9 MM16	LV13-DP5	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. • Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	*Throughout NDAs*	Construction Phase	

Project Implementation Schedule

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S.12.B9 MM17	LV14-DP5	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. • Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Contractor	*Throughout NDAs*	Construction and Operation Phases	
Ecology (Construction Phase)							
S.13.9	E1-DP5	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna.	Contractor.	*Interface between areas/habitats of ecological importance and works areas (all sides of KTN area F1-2).*	Construction phase.	TM-EIAO.
DP7- Utilization of Treated Sewage Effluent from SWHSTW							
Water (Operational Phase)							
S5.7	W1-DP7	Emergency discharge Emergency discharge may be required due to the failure of on-site STW. In order to prevent and minimize the impact due to the emergency discharge, the following precautionary measures shall be included in the STW design: • To facilitate maintenance and repairing of equipment, standby unit should be provided; • Dual power supply, or back-up power, should be provided, perfectly in the format of ring main or automatic-operated emergency generator with sufficient capacity to cope with the demand loading of the essential plant equipment; • Telemetry system should be provided to the closet manned plant for unmanned facilities, such that swift actions could be	Control water quality impact	Operator	*SWHSTW*	Operation phase	WPCO, EIAO, TM-EIAO

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		taken in case of malfunction of unmanned facilities; and To prevent the discharge of floating solids, manually cleaned screens should be provided at the overflow bypass.					
Landscape and Visual (Construction Phase and Operational Phase)							
S.12.9 MM4	LV1-DP7	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	*Onsite*	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.9 MM9	LV2-DP7	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. building edges, piers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	*On appropriate structures*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.9 MM10	LV3-DP7	Green Roof – Roof greening where appropriate should be established on proposed buildings as per the guidelines stated. These guidelines provide further details including information regarding structural loading, design, maintenance, etc. considerations as well as providing information on what types of plants might be suitable.	Reduce exposure to untreated concrete surfaces and particularly mitigate visual impact to VSRs at high levels. Provide greening.	Government / Detailed Design Consultant/ Contractor	*On appropriate buildings*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011); ArchSD/Urbis Study on Green Roof Application in HK (2007)

Project Implementation Schedule

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DP10- Fanling Bypass Eastern Section (New Road)							
Noise Impacts (Operational Phase)							
S4.9	N1-DP10	Provide noise barrier before operation of the proposed project and locations of barriers are stated as following: • FLN-NB21: Approx. 420m long, 2m high NB; • FLN-NB22: Approx. 175m long, 5m high NB; • FLN-NB23: Approx. 345m long CNB; • FLN-NB24: Approx. 155m long CNB; • FLN-NB27: Approx. 45m long, 5m high NB; • FLN-NB28: Approx. 175m long, 5m high NB; • FLN-NB29: Approx. 245m long CNB; • FLN-NB30: Approx. 275m long CNB • FLN-NB31: Approx. 40m long, 5m high NB; • FLN-NB32: Approx. 35m long, 2m high NB; • FLN-NB33a: Approx. 40m long, CNB2; • FLN-NB33b: Approx. 3m long, 5m high NB; • FLN-NB34: Approx. 65m long, CNB2; • FLN-NB35: Approx. 155m long, CNB2; • FLN-NB66: Approx. 80m long, CNB; • FLN-NB68: Approx. 90m long, 5m high NB; • FLN-NB69: Approx. 320m long, 5m high NB; • FLN-NB70: Approx. 280m long, 5m high NB; • FLN-NB77: Approx. 115m long, 5m high NB; • FLN-NB108: Approx. 210m long, 5m high NB; • FLN-NB109: Approx. 230m long, CNB; • FLN-NB110: Approx. 170m long, 3m high NB; • FLN-NB112: Approx. 145m long, 6m high NB;	Control operational airborne noise due to road traffic	Contractor	Refer to Traffic Noise Mitigation Plan Figure 2.2a to 2.2e under EP-473/2013/A	Prior to operation of the Project	Annex 5, TM-EIAO

		• FLN-NB113: Approx. 105m long, 6m high NB; • FLN-NB114: Approx. 160m long, 4m high NB; • FLN-SE11: Approx. 105m long, SE with opening to the east; • FLN-LNS11: Approx. 105m long, LNS; • FLN-LNS12: Approx. 85m long, LNS; • FLN-LNS13: Approx. 250m long, LNS; • FLN-LNS14: Approx. 260m long, LNS; • FLN-LNS15: Approx. 280m long, LNS;					
Water Quality Impacts (Operational Phase)							
S5.7	W1-DP10	<u>Road runoff</u> In order to ensure the sand/silt traps removal efficiencies, the following measures should be implemented: • Vehicle dust, tyre scraps and oils might be washed away from the road surface / open areas to the nearby water courses by surface runoff or road surface cleaning. • Subject to detailed design and requirement of relevant government departments, the capacities of road drainage system shall cater the runoff from 50 year-return-period rainstorm. Proper drainage systems with silt traps and oil interceptors should be installed	Control water quality impact	Project Proponent / Detailed Design Consultant, Maintenance Authority	All road works	Detailed design phase, Operation phase.	WPCO, EIAO, TM-EIAO

Project Implementation Schedule

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Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.D9	LV1-DP10	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.		Detailed Design Consultant/ Contractor	*Throughout NDAs,*	Prior to Construction, Construction & for all planting, this should be installed as soon as the areas become available, to achieve early establishment	
S.12.D9 MM1	LV2-DP10	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor	*Throughout NDAs, particularly for reservoirs*	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes

Project Implementation Schedule

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S.12.D9 MM4	LV3-DP10	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	*Onsite*	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.D9 MM5	LV4-DP10	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S.12.D9 MM6	LV5-DP10	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree seedlings and/ or shrubs should be planted where slope gradient and site conditions allow.	To avoid substantial slope cutting and fill slopes. To prevent erosion and subsequent loss of landscape resources and	Government / Detailed Design Consultant/ Contractor	*Onsite*	Prior to Construction, Construction Phase & Maintenance in Operation	GEO publication (1999) – Use of Vegetation as Surface Protection on Slope; GEO Publication No. 1/2011-Technical

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		In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	character. To ensure man-made slopes are as visually amenable as possible.			Phase	Guidelines on Landscape Treatment for Slopes
S.12.D9 MM7	LV6-DP10	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested*.*.	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	*Onsite where possible. Otherwise consider offsite locations*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.D9 MM8	LV7-DP10	Woodland Compensatory Planting –Specific Woodland compensatory planting is proposed for any areas of quality woodland that are unavoidably affected by the Project. The location and design of the woodland compensatory planting will principally be within habitats of lower value such as upland grassland. The proposed locations are identified, for example, on the foothills of Tai Shek Mo, and on the higher ground of Fung Kong Shan in KTN NDA; along Fanling Bypass; and a small area in the northern FLN NDA. The intention of the compensatory woodland will be to recreate areas of quality woodland, not necessarily to compensate for loss of trees on a like for like basis (See E18 & E27 also). Native tree species are suggested for planting in the appropriate locations, including *Ailanthus fordii, Bischofia javanica, Castanopsis fissa, Celtis sinensis, Cinnamomum burmannii, Cinnamomum camphora, Xanthoxlyum avicennaeHibiscus tiliaceus, Liquidambar formosana, Sapium discolor, Schefflera heptaphylla and Ilex rotunda. In addition some understory*	Reprovide areas of woodland to compensate for those areas of quality woodland lost.	Project Proponent/ Detailed Design Consultant/ Contractor/ Maintenance Authority	*In areas identified in the EIA Landscape Mitigation Plans and as agreed with AFCD*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004

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		vegetation may be planted including shrubs such as Atalantia buxifolia, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma malabathricum, Melastoma dodecandrum, Rhodomyrtus tomentosa, Rhaphiolepis indica, and Rhododendron simsii. The area allocated for compensatory woodland planting allows in part for the fact that it will take some time for the compensatory planting to achieve the landscape and ecological function and value of the area to be lost. In addition, it allows for the fact that not all of the areas identified for planting will prove to be plantable, by virtue of topography and ground conditions and, especially, because though the areas identified are largely grassland it is inevitable that these areas will already support some patches of trees and shrubs which would be inappropriate for further planting.					
S.12.D9 MM9	LV8-DP10	Vertical Greening – Planting of climbers to grow up vertical surfaces were appropriate (e.g. viaduct piers, noise barriers).	Soften hard surfaces and facilities	Government / Detailed Design Consultant/ Contractor	*On appropriate structures*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW No. 11/2004 – Cyber Manual for Greening
S.12.D9 MM11	LV9-DP10	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Government / Detailed Design Consultant/ Contractor	*Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWBTC 3/2006
S.12.D9 MM12	LV10-DP10	Road Greening –For viaducts, soft landscaping should be provided to soften the hard, straight edges (for climbers used to cover the vertical, hard surfaces of the piers – see MM9 Vertical Greening) and shade tolerant plants should be planted, where light is sufficient, to improve aesthetic value of areas under viaducts. Both at grade planting and use of elevated planters should be considered for the soft landscaping of viaducts, taking into account the preference to minimize the overall viaduct bulk and integrate	To soften the hard, straight edges and provide greening along roads.	Government / Detailed Design Consultant/ Contractor	*On viaducts or along roads.*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Development Bureau TCW No. 2/2013, Greening on Footbridges and Flyovers; Development Bureau TCW No. 2/2012 – Allocation of Space

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		architectural forms and textural finishes which improve aesthetics. For at grade roads, planting should be considered along central dividers and on road islands e.g. in the middle of roundabouts. (Roadside planting i.e. at the road edge and not in the central divider or road island, is considered part of Screen Planting)					for Quality Greening on Roads; HQ/GN/15 - Guidelines for Greening Works along Highways
S.12.D9 MM14.3	LV11-DP10	Enhancement Planting along Embankment - For channelized watercourses, if these are modified, the Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design, should be considered and appropriate mitigation measures included ensuring the new watercourses match the existing as far as possible. Measures can include enhancement planting to upgrade the channels as appropriate, including consideration of wetland planting along embankments where appropriate; as well as consideration of the best materials for the channel lining (e.g. gabion). All measures must also ensure any necessary maintenance work can be carried out and that the channel meets all its requirements for water flow, etc. For example, a stretch of the Ma Wat River Channel in the south of FLN NDA will have to be diverted for the construction of the Fanling Bypass Eastern Section. This measure will be particularly relevant in this area.	Minimize the necessity of watercourse modification, protect watercourses where possible and enhance channelized watercourses	Government / Detailed Design Consultant/ Contractor	*Channelized watercourse, particularly the Ma Wat River Channel Diversion*	Prior to Construction, Construction Phase & Maintenance in Operation Phase	Drainage Services Department Practice Note No.1/2005 – Guidelines on Environmental Considerations for River Channel Design
Landscape and Visual (Construction)							
S.12.D9 MM16	LV12-DP10	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	*Throughout NDAs*	Construction Phase	
S.12.D9	LV13-DP10	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the	To minimize glare impact to adjacent VSRs	Government / Contractor	*Throughout NDAs*	Construction and Operation	

Project Implementation Schedule

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MM17		Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.				Phases	
Ecology (Detailed Design, Construction and Operational Phases)							
S13.8	E1-DP10	Use opaque, non-transparent, non-reflective noise barriers. Unnecessary lighting should be avoided.	Minimize mortality impacts on birds.	Detailed Design Consultant/ Contractor Maintenance Authority.	Throughout.	Detailed design, construction and Operation phases.	TM-EIAO.
Ecology (Prior to Construction Phase)							
S13.9	E2-DP10	Detailed design of Siu Hang San Tsuen Stream to have 10m wide vegetated buffer in Open Space zone D1-3, Fanling Bypass to cross stream on viaduct, all stream (including upstream sections not impacted by the Project) to have permanent buffer of 10m on either side stream.	Minimize impacts on Siu Hang San Tsuen Stream and stream fauna.	PlanD/ Project Proponent/ Detailed Design Consultant.	FLN area D1-3.	Detailed design phase.	Layout Plan.
Ecology (Construction Phase)							
S13.9	E3-DP10	Lower reaches of Siu Hang San Tsuen Stream to have 10m wide vegetated buffer in Open Space Zone D1-3 and Fanling Bypass to cross stream on viaduct.	Minimize impacts on Siu Hang San Tsuen Stream and stream fauna.	Contractor.	FLN area D1-3.	Construction phase.	TM-EIAO; ETWBTCW 5/2005.
S.13.9	E4-DP10	Design and erection of 2m high solid dull green site barrier fence between active works areas and all areas/habitats of ecological importance.	Minimize dust, disturbance, mortality and other adverse ecological impacts on habitats, flora and fauna. Measures to minimize flight-line impacts to birds, especially breeding ardeids.	Contractor.	Interface between areas/habitats of ecological importance and works areas (all of the north side of the Bypass works areas west of interchange with Sha Tau Kok Road).	Construction phase.	TM-EIAO.

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Ecology (Operational Phase)							
S13.9	E5-DP10	Lower reaches of Siu Hang San Tsuen Stream to have 10m wide vegetated buffer in Open Space zone D1-3. Any channelization works to upstream section not recommended.	Minimize impacts on Siu Hang San Tsuen Stream and stream fauna.	PlanD / Government / Maintenance Authority.	FLN area D1-3.	Operation phase.	TM-EIAO.
Cultural Heritage (Pre-construction Phase)							
S11.6.2	CH1-DP10	<u>Undertaking baseline condition survey and baseline vibration impact assessment</u> In case any potential vibration impact on any nearby built heritage features are identified during the pre-construction stage of the Project, prior to commencement of construction works, a baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or a qualified structural engineer to define the vibration limit (a vibration limit at 15mm/s could be adopted for historic buildings) and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	To minimize the vibration impacts during pre-construction stage on any identified potential vibration impacted built heritage features	Project Proponent/ Contractor	HFL05, FL02, FL04, FL24, FL27, FL31, and FL36.	Pre-construction stage before commencement of construction works	EIAO-TM
S11.6.2	CH2-DP10	<u>Conducting Photographic and Cartographic Records Prior to Removal/Relocation of Impacted Built Heritages</u> Prior to removal/relocation of the directly impacted historical buildings and cultural/historical landscape features, photographic and cartographic records should be conducted to preserve them by record. Liaison with and obtaining agreement from the descendents of these features will be carried out by the Project Proponent.	To preserve the directly impacted sites by record prior to their removal / relocation	Project Proponent/ Contractor	FL19	Prior to Removal / Relocation of features before commencement of construction works	EIAO-TM
S11.6.2	CH3-DP10	<u>Relocation of Built Heritages</u> Relocation of built heritages to a reasonable location nearby may be required.	To preserve the directly impacted sites by relocation	Project Proponent/ Contractor	FL19	After the photographic and cartographic records and before commenceme	EIAO-TM

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
						nt of construction works	
Cultural Heritage (Construction Phase)							
S11.6.2	CH4-DP10	<u>Conducting Construction Vibration Monitoring and Structural Strengthening Measures</u> Construction vibration monitoring and structural strengthening measures should be conducted during Construction phase based on the assessment result of baseline condition survey and baseline vibration impact assessment, so as to ensure the construction performance meets with the vibration standard stated in the EIA report.	To minimize the potential impacts during Construction phase on any identified potential vibration impacted built heritage features	Contractor	Identified potential vibration impacted built heritage features	Construction phase, with details specified in baseline condition survey and baseline vibration impact assessment,	EIAO-TM
DP12-Reprovision of temporary wholesale market in FLN NDA							
Landscape and Visual (Detailed Design, Prior to Construction, Construction and Operational Phases)							
S.12.D9	LV1-DP12	General Good Practice Measures - For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for		Detailed Design Consultant/ Contractor	Throughout NDAs,	Prior to Construction, Construction & for all planting, this should be installed as	

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.				soon as the areas become available, to achieve early establishment	
S.12.D9 MM1	LV2-DP12	Minimum Topographical Change –To minimize landscape and visual impacts, the footprint and elevation of such elements should be optimized to reduce topographical/ landform changes, as well as reduce land take and interference with natural terrain. Where there is a need to significantly cut into the existing landform, retaining walls should be considered as well as cut slopes, to minimize landform changes and land resumption, while also considering visual amenity. Earthworks and engineered slopes should be designed to be a visually interesting landform, compatible with the surrounding landscape and to mimic the natural contouring and terrain e.g. introduction and continuation of natural features such as spurs and ridges where appropriate, to support assimilation with the hillside setting.	Reduce topographical changes and minimize land resumption	Government / Detailed Design Consultant/ Contractor	Throughout NDAs, particularly for reservoirs	Prior to Construction	GEO Publication No. 1/2011, Technical Guidelines on Landscape Treatment on Slopes
S.12.D9 MM2	LV3-DP12	Detailed Design (Visual) –The footprint and massing of development components and the works area should also be kept to a practical minimum and the detailed design of development components for Construction phase should follow the Sustainable Building Design Guidelines. The form, textures, finishes and colours of the proposed development components should aim to be compatible with the existing surroundings. To improve visual amenity designs should be aesthetically pleasing and treatment of structures also improve visual amenity. For example, natural building materials such as stone and timber, should be considered for architectural features, and light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white should also be considered to reduce the visibility of the development components, including all roadwork, buildings and noise barriers. In addition, the design of structures should consider green roofs were feasible, following stated guidelines. All Noise barriers, particularly noise barriers but also any barriers proposed for ecological impact mitigation, should be kept to a practical minimum, and be of such a designed as to integrate as well as possible into the surrounding visual context and be as low as practical to minimize blocking views. Noise barrier design,	Improve visual amenity of the new buildings, NDAs in general and integrate as best possible into the surrounding landscape	Detailed Design Consultant	Throughout NDAs	Prior to Construction	Hong Kong Planning Standards and Guidelines (HKPSG) issued by the Planning Department (As at Aug 2011); Sustainable Building Design Guidelines CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011) and ArchSD/Urbis Study on Green Roof Application in HK (2007). Dev. Bureau, Greening, Landscaping & Tree Management Section,

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		including vertical, cantilever or curved, and noise enclosures including semi-enclosure and full enclosure, at grade and/ or elevated, should follow the guidelines stated. Construction time frame should also be considered and designs seek to keep it to a practical minimum.					Guidelines on Greening of Noise Barriers (Apr12) Greening, Landscape and Tree Management Section (GLTM) of the Development Bureau's Guidelines on Greening of Noise Barriers (April 2012)
S.12.D9 MM4	LV4-DP12	Tree Protection & Preservation – Exiting trees to be retained within the Project Site should be carefully protected during construction. In particular OVTs will be preserved according to ETWB Technical Circular (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Government / Detailed Design Consultant/ Contractor	Onsite	Prior to Construction and Construction Phase	ETWB Technical Circular Works (TCW) No. 29/2004 and 3/2006
S.12.D9 MM5	LV5-DP12	Tree Transplantation – Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC 2/2004 and 3/2006 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along	Transplant Trees where suitable for transplantation	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.					
S.12.D9 MM6	LV6-DP12	Slope Landscaping – Site formation should be reduced as far as possible. Seeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character. Woodland tree seedlings and/ or shrubs should be planted where slope gradient and site conditions allow. In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping works should comply with GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	To avoid substantial slope cutting and fill slopes. To prevent erosion and subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable as possible.	Government / Detailed Design Consultant/ Contractor	Onsite	Prior to Construction, Construction Phase & Maintenance in Operation Phase	GEO publication (1999) – Use of Vegetation as Surface Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes
S.12.D9 MM7	LV7-DP12	Compensatory Planting – Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under ETWBTC 3/2006. Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested..	Compensate for trees and shrubs lost due to the Project.	Government / Detailed Design Consultant/ Contractor	Onsite where possible. Otherwise consider offsite locations	Prior to Construction, Construction Phase & Maintenance in Operation Phase	ETWB TCW 3/2006 and 2/2004
S.12.D9 MM11	LV8-DP12	Screen Planting – Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant	Government / Detailed Design Consultant/ Contractor	Along roads, around suitable built structures, or around VSRs to contain their view out to the NDA structures.	Prior to Construction, Construction Phase & Maintenance in Operation	ETWBTC 3/2006

Project Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
			pedestrian environment			Phase	
Landscape and Visual (Construction)							
S.12.D9 MM16	LV9-DP12	Screen Hoarding –Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment (Chapter 13 of the EIA report).	To screen undesirable views of the works site.	Contractor	Throughout NDAs	Construction Phase	
S.12.D9 MM17	LV10-DP12	Light Control – Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs	Government / Contractor	Throughout NDAs	Construction and Operation Phases	

C. SAMPLE DATA SHEET FOR TSP MONITORING AND NOISE MONITORING

Data Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (C)	
	Hi (in.)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (C)	
	Hf (in.)	
	Qsf (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (μg/m^3)		

	Name & Designation	Signature	Date
Field Operator :			
Laboratory Staff :			
Checked by :			

Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length(min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L_{90} (dB(A))	
	L_{10} (dB(A))	
	Leq (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

Name & Designation Signature Date

Recorded By :

Checked By :

D. SAMPLE INCIDENT REPORT ON ACTION LEVEL OR LIMIT LEVEL NON-COMPLIANCE

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by :

Designation :

Signature :

Date :

E. BASELINE ECOLOGICAL MONITORING PLAN

Baseline Ecological Monitoring Plan Pre-construction Phase of the Advance and First Stage Works for Kwu Tung North and Fanling North New Development Areas

Hong Kong

Fugro Document No.: 0032/19/ED/0036
29 June 2019

Civil Engineering and Development Department

土木工程拓展署
Civil Engineering and Development Department

Volume 1 of 1

Final



Baseline Ecological Monitoring Plan Pre-construction Phase of the Advance and First Stage Works for Kwu Tung North and Fanling North New Development Areas

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Volume 1 of 1

Final

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04	Final	Various	Calvin Leung	IEC/ER	29 June 2019
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02	Draft	Addressed AFCD comments	Address AFCD Comments sent last 21 June 2019	27 June 2019
03	Draft	Addressed AFCD comments	Address AFCD Comments sent last 28 June 2019	28 June 2019
04	Final	Addressed AFCD comments	Revised Appendix A3.b	29 June 2019

CONTENTS

1.	**INTRODUCTION**	**5**
1.1	Background	5
1.1.1	Scope of Works under the Contract	5
1.1.2	Environmental Permits	7
1.1.3	Potential Impacts to Ecological Sensitive Receivers	7
1.2	Purpose and Scope of the Baseline Ecological Monitoring and Plan	8
1.3	Relevant Legislations, Standards, Guidelines and Criteria	9
1.4	Structure of the Plan	10
2.	**METHODOLOGY**	**11**
2.1	Monitoring of Measures to Minimise Disturbance to Water Birds in Ng Tung River, Sheung Yue River, Shek Sheung River, and Long Valley	11
2.1.1	Location of Transect Routes	11
2.1.2	Survey Period and Frequency	11
2.1.3	Monitoring Parameters	11
2.1.4	Survey Requirements and Protocol	12
2.2	Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley	12
2.2.1	Location of Monitoring Stations	12
2.2.2	Survey Period and Frequency	12
2.2.3	Monitoring Parameters	12
2.2.4	Survey Requirements and Protocol	13
2.3	Monitoring of Measures to Minimise Impacts on Ecological Sensitive Habitats from Disturbance and Pollution	13
2.3.1	Location of Transect Routes	13
2.3.2	Survey Period and Frequency	13
2.3.3	Monitoring Parameters	14
2.3.4	Survey Requirements and Protocol	14
3.	**MONITORING PROGRAMME**	**16**
4.	**REPORTING**	**20**
4.1	Baseline Monitoring Report	20
4.2	Monitoring Improvement Procedure	21
5.	**REFERENCES**	**22**

APPENDICES

A. FIGURES

A.1 PROJECT BOUNDARY

A.2A TRANSECT ROUTES FOR WATER BIRDS MONITORING – SHEUNG YUE RIVER, SHEK SHEUNG RIVER, AND LONG VALLEY

A.2B TRANSECT ROUTES FOR WATER BIRDS MONITORING – NG TUNG RIVER

A.3A STREAMS MONITORING STATIONS - MA TSO LUNG STREAM

A.3B STREAMS MONITORING STATIONS – LONG VALLEY

A.3C STREAMS MONITORING STATION – SIU HANG SAN TSUEN STREAM

A4.A TRANSECT ROUTES FOR ECOLOGICAL SENSITIVE HABITAT MONITORING – KTN NDA

A4.B TRANSECT ROUTES FOR ECOLOGICAL SENSITIVE HABITAT MONITORING – FLN NDA

A5. TRANSECT ROUTES FOR LONG VALLEY

B. CURRICULUM VITAE – QUALIFIED ECOLOGIST

1. INTRODUCTION

Fugro Technical Services Limited (FTS) was commissioned by Civil Engineering and Development Department (CEDD) as the Environmental Team (ET) of the pre-construction environmental monitoring and audit works for the Advance and First Stage Works of Kwu Tong North (KTN) and Fanling North (FLN) New Development Areas (NDAs) ("the Project"). The Engineer of this Project is AECOM Asia Company Limited (AECOM) and the Independent Environmental Checker (IEC) is ANewR Consulting Limited.

As the ET, part of the scope of work of FTS, is conduct the baseline ecological monitoring at the ecologically sensitive areas related to the Project. Prior to the pre-construction ecological monitoring, a Baseline Ecological Monitoring Plan (BEMP) shall be prepared by the ET to be approved by the Engineer and IEC and agreed upon with Environmental Protection Department (EPD), and Agriculture, Fisheries, and Conservation Department (AFCD).

1.1 Background

The KTN and FLN NDAs are one of the important sources of medium and long term land and housing supply. The development of these areas will be implemented in phases for full completion by 2031. The Phase 1 of the NDAs development, comprising the Advance Works and First Stage Works, is targeted to commence in stages starting from the second half of 2019. The Advance and First Stage Works would include site formation, engineering infrastructure works (including roads, drainage, sewerage, waterworks, landscaping works, pumping stations, and fresh water and flushing water service reservoirs), soil remediation, re-provisioning of North District Temporary Wholesale Market, development of a nature park at Long Valley and implementation of environmental mitigation measures.

1.1.1 Scope of Works under the Contract

The scope of works under the Advance and First Stage Works comprises the following:

a) The Advance Works (PWP item No. 7747CL-2) consist of:

i. site formation of land (including soil remediation) in KTN and FLN NDAs for housing, community facilities and engineering infrastructure;

ii. construction of roads including the eastern section of Fanling Bypass connecting the FLN NDA to Fanling Highway and other roads with footpaths and cycle tracks, and associated junction/ road improvements;

iii. engineering infrastructure works including drainage. Sewerage (including two sewage pumping stations), waterworks (including a fresh water service reservoir and a flushing water service reservoir in the KTN NDA), landscape works and slope works;

iv. part expansion and upgrading of Shek Wu Hui Sewage Treatment Works (SWHSTW);

v. re-provisioning works; and

vi. implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (v) above.

b) The First Stage Works (PWP item No. 7759CL) consist of:

i. development of a nature park at Long Valley including provision of a visitor centre and a footbridge spanning across Sheung Yue River for connection between these two facilities;

ii. re-provisioning of two egretry sites in the FLN NDA and enhancement works to an existing egretry site in the KTN NDA;

iii. site formation of land for a village re-site area and a district police station in the KTN NDA;

iv. engineering infrastructure works including roads, drainage, sewerage, waterbirds, and landscape works; and

v. implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (iv) above.

The Project is subdivided into seven contracts for construction as detailed in **Table 1.1** and as shown in **Appendix A.1.** As aforementioned the Advance and the First Stage Works will be undertaken by stages. The tentative commencement dates of the works are also indicated below:

Table 1.1: Contract Details of the Advance Works and First Stage Works (Phase 1)

Contract No.	Details	Location	Tentative Commencement Date	Relevant EP
ND/2019/01 (Contract 1)	Site Formation and Infrastructure Works	KTN NDA	October 2019	EP – 466/2013 EP – 467/2013/A EP – 468/2013/A EP – 470/2013
ND/2019/02 (Contract 2)	Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui	KTN NDA	December 2019	EP – 469/2013
ND/2019/03 (Contract 3)	Development of Long Valley Nature Park	KTN NDA	October 2019	EP – 468/2013/A EP – 473/2013/A
ND/2019/04 (Contract 5A)	Fanling Bypass Eastern Section between Shek Wu San Tsuen North and Lung Yeuk Tau	FLN NDA	January 2020	EP – 473/2013/A
ND/2019/05 (Contract 5B)	Fanling Bypass Eastern Section between Shung Him Tong and Kau Lung Hang	FLN NDA	February 2020 October 2019	EP – 473/2013/A
ND/2019/06 (Contract 6)	Re-provisioning of North District Temporary Wholesale Market for Agricultural Products	FLN NDA	October 2019	EP – 475/2013/A
ND/2019/07 (Contract 7)	Site Formation and Infrastructure Works	FLN NDA	August 2020	-

1.1.2 Environmental Permits

The Environmental Impact Assessment (EIA) Report for the North East New Territories (NENT) NDAs Planning and Engineering Study – Investigation, which included the Advance Works and First Stage Works of KTN and FLN NDAs, has been submitted to EPD in mid-2013. The report was subsequently approved with conditions by EPD on 18 October 2013 under Register No. AEIAR-175/2013. Under this EIA submission, seven (7) Environmental Permits (EPs) cover the Advance Works and First Stage Works as described in **Table 1.2**.

Table 1.2: Environmental Permits for the Advance and First Stage Works

Environmental Permit Number	Title of Designated Project	Location
EP – 466/2013	Castle Peak Road Diversion	KTN NDA
EP – 467/2013/A	Kwu Tung North New Development Area Road P1 and P2 and Associated New Kwu Tung Interchange and Pak Shek Au Interchange Improvement	KTN NDA
EP – 468/2013/A	Kwu Tung North New Development Area Road D1 to D5	KTN NDA
EP – 469/2013	Sewage Pumping Stations in Kwu Tung North New Development Area	KTN NDA
EP – 470/2013	Utilization of Treated Sewage Effluent (TSE) from Shek Wu Hui Sewage Treatment Works	FLN NDA
EP – 473/2013/A	Fanling Bypass Eastern Section	FLN NDA
EP – 475/2013/A	Re-provision of Temporary Wholesale Market in Fanling North New Development Area	FLN NDA

1.1.3 Potential Impacts to Ecological Sensitive Receivers

The environmental conditions within and in the vicinity of the works areas have been characterized and evaluated in the EIA Report of the NENT NDAs. As part of the EIA, an ecological impact assessment (EcoIA) was conducted in June 2008 to June 2009 (which extended until April 2013) to evaluate and predict the potential ecological impacts of the Works. The identified potential ecological impacts included but not limited to the following:

- Unavoidable loss of 9.0 ha of wetland across the KTN and FLN NDAs and the associated impacts from the habitat loss such as disturbance and fragmentation;
- Indirect impacts and fragmentation on the Long Valley and the Ng Tung, Sheung Yue, and Shek Sheung River habitats and on the fauna of conservation significance, primarily large water birds, foraging in these areas;
- The unavoidable loss of 8.88 ha of secondary woodland and plantation of ecological significance;
- Habitat loss and indirect impacts (i.e. pollution and habitat loss) in Ma Tso Lung Stream and its tributaries such habitat loss, pollution and run-off; and

- Indirect and fragmentation impacts on ecologically sensitive habitats and areas, and
- Indirect, fragmentation and mortality impacts on fauna and flora of conservation significance.

The aforementioned potential ecological impacts can be avoided or minimized to a low and acceptable level with implementation of appropriate mitigation measures such as:

- creation of Long Valley Nature Park (LVNP);
- in-situ mitigation measures to address direct, indirect, and fragmentation impacts on habitats of ecological importance;
- in-situ mitigation measures to address mortality, indirect, and fragmentation impacts on fauna and flora of conservation significance;
- provision of egretry habitat; and
- woodland habitat creation.

These ecological mitigation measures shall be checked as an element of the updated EM&A manual.

1.2 Purpose and Scope of the Baseline Ecological Monitoring and Plan

The BEMP is prepared in compliance with the requirements of **Section 14.3.2** of the EM&A Manual and **Section 13.11.3** of the EIA Report, which specifies the monitoring and audit requirements for ecological sensitive receivers to be potentially impacted by the Project. Specifically, the BEMP was prepared to provide the details of the methodologies and approaches to be employed during the baseline ecological monitoring. The ecological monitoring shall focus on the habitats of ecological importance which include, but are not limited to: Long Valley, the Ng Tung, Sheung Yue and Shek Sheung Rivers, Ma Tso Lung Stream and its tributaries, Siu Hang San Tsuen Stream and Ho Sheung Heung Fung Shui, and secondary woodland and scrubland on Crest Hill.

This BEMP includes the baseline monitoring for LVNP. Pre-construction monitoring shall be undertaken in this area to provide an updated baseline for construction phase impact monitoring; and also to provide a baseline against which ecological enhancement measures introduced under the long term LVNP management can be assessed. LVNP monitoring activities are aligned with the EM&A monitoring requirements in this BEMP so that the data that will be generated under LVNP monitoring may be used for other EM&A works required under the Project.

ET shall undertake the ecological monitoring in accordance with the agreed BEMP, LVNP HCMP, **Section 14 Ecology** of the EM&A Manual, and **Section 14 Ecological Impact Assessment** of the EIA Report for the NENT NDAs. Ecological monitoring activities shall be supervised by a qualified ecologist. The curriculum vitae of the qualified ecologist for this baseline ecological monitoring is provided in **Appendix B**.

1.3 Relevant Legislations, Standards, Guidelines and Criteria

This BEMP was prepared and will be implemented in accordance with the guidelines, standards, documents and government ordinances and regulations as described below:

- *Environmental Impact Assessment Ordinance (EIAO) (Cap. 499)*. An ordinance for assessing the impact on the environment of certain projects and proposals, for protecting the environment and for incidental matters.

- *EIAO Technical Memorandum Annexes 8 and 16*. Ecological assessment specific annexes which provide the criteria for evaluating ecological impact and guidelines for ecological assessment, respectively.

- *EIAO Guidance Notes No.7/2010 and 10/2010*. Guidance notes on the general guidelines for conducting an ecological baseline survey for ecological assessment and on some methodologies in conducting terrestrial and freshwater ecological baseline surveys, respectively,

- *Forests and Countryside Ordinance (Cap. 96*) *and its subsidiary legislation, the Forestry Regulations*. An ordinance that prohibits felling, cutting, burning, or destroying of trees and growing plants in forests and plantations on Government land. The Forestry Regulations protects the listed restricted and protected plant species from selling, offering for sale, or possession illegally.

- *Wild Animals Protection Ordinance (Cap. 170)*. Ordinance to protect wild animals listed under the second schedule from being hunted, possession, sale or export, disturbance of their nest or egg without permission by authorised officer.

- *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation*. Ordinance to regulate the import, introduction from the sea, export, re-export, and possession of specimens of a scheduled species, including live, dead, parts or derivatives. The Ordinance applies to all activities involving endangered species which include the parties of traders, tourists and individuals.

- *Town Planning Ordinance (Cap. 131)*. Ordinance which designates country parks, conservation area, green belts, sites of special scientific interest, coastal protection area and other specified uses to promote conservation, protection and education of the valuable environment.

- *Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10 "Conservation"*. Provides landscape and conservation guidelines to achieve a balance between the need for development and the need to minimise disruption of the landscape and natural resources.

- *Site of Special Scientific Interest (SSSI) Register*. Lists the designated sites under the Town Planning Ordinance with special faunal, floral, ecological or geographical features.

- *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)*. An international agreement between Governments which aim to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

- *The IUCN Red List of Threatened Species*. Widely recognised as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species. The goal of the IUCN Red List is to provide information and analyses on the status, trends and threats to species in order to inform and catalyse action for biodiversity conservation.

- *United Nations Convention on Biodiversity (1992)*. An international legally binding treaty which aims to develop national strategies for the conservation and sustainable use of biological diversity.

- *Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention')*. An intergovernmental treaty concluded under the aegis of the United Nations Environment Programme concerned with the conservation of wildlife and habitats on a global scale. Its aim is to conserve terrestrial, marine and avian migratory species throughout their range.

- *Wild Animal Protection Law of the Peoples' Republic of China (PRC)*. Formulated for the purpose of protecting and saving the species of wildlife which are rare or near extinction, protecting, developing and rationally utilising wildlife resources and maintaining ecological

1.4 Structure of the Plan

Succeeding Section 1 Introduction, the remainder of this BEMP is presented as follows:

- Section 2 details the methodology of the baseline ecological monitoring;

- Section 3 presents the summary of the monitoring programme; and

- Section 4 details the reporting requirements of the monitoring.

2. METHODOLOGY

This section presents the methodology and approach in undertaking the pre-construction ecological monitoring for the Project. The monitoring shall be carried out in all areas where impacts on habitats and fauna may arise as a consequence of the Project which include, but are not limited to Long Valley, the Ng Tung, Sheung Yue and Shek Sheung Rivers, Ma Tso Lung Stream and its tributaries and Siu Hang San Tsuen Stream. As aforementioned this BEMP integrates the monitoring protocol for the baseline monitoring in LVNP.

2.1 Monitoring of Measures to Minimise Disturbance to Water Birds in Ng Tung River, Sheung Yue River, Shek Sheung River, and Long Valley

2.1.1 Location of Transect Routes

Where development will be undertaken within 200m (the maximum distance at which it is predicted there may be some disturbance, and hence a reduction in numbers, of large water birds) of the Ng Tung, Sheung Yue and Shek Sheung Rivers, avifaunal communities will be surveyed quantitatively by transect count. Avifaunal monitoring will be also carried in Long Valley. The transect routes are as follows:

- T1. Ng Tung River
- T2. Ng Tung River
- T3. Sheung Yue River
- T4. Shek Sheung River
- T5. Long Valley

The transect routes are shown in **Appendix A.2a** to **Appendix A.2b.** Details of the transect route for Long Valley is shown in **Appendix A5**.

As the sensitive receivers (large waterbirds) are easily visible, the transect route will only need to follow one bank of the rivers.

2.1.2 Survey Period and Frequency

Monitoring surveys will be undertaken for duration of 12 months on a weekly basis. The survey time of each week will be conducted at the highest and lowest possible tidal conditions (i.e. during day time when surveys will be conducted).

For Long Valley survey, additional twice-monthly night surveys will be conducted from September to April to cover migration and wintering periods.

2.1.3 Monitoring Parameters

Abundance and location of all birds encountered (including seen and heard through birdcalls) will be recorded. Habitat type where the bird is encountered will be also recorded. Birds flying over the survey area shall be recorded but not allocated to any specific location. Bird calls heard which could not be exactly located to a specific habitat type or location should be marked as “heard”. Species of conservation significance if recorded will be specified. Notable behaviours such as nesting, presence of recently fledged juveniles, roosting, feeding activities, etc. will be recorded.

Ornithological nomenclature will follow The Avifauna of Hong Kong (Carey et al. 2001), The birds of Hong Kong and South China (Viney et al. 2005), and the most recent updated list from other sources (e.g. Hong Kong Bird Watching Society).

Weather condition, tidal information at the time of the survey and other noticeable activities (natural or anthropogenic) occurring within or in the vicinity of the survey areas will be recorded.

2.1.4 Survey Requirements and Protocol

Monitoring surveys will be conducted at both high and low tides (it is considered high tide when tidal levels are above 1.5m and low tide when tidal levels is below 1.5m at Tsim Bei Tsui Station, the reference tidal station). The magnitude of how much above or below 1.5m would be subject to the tidal conditions of that week as it varies throughout different times of the year. Nonetheless, the high and low tide relative to the tidal condition of the week will be taken into consideration.

Avifauna monitoring in Long Valley shall follow the same methodology adopted by the regular HKBWS bird monitoring programme in order to obtain comparable results and complete coverage of the area in the shortest time possible.

2.2 Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley

2.2.1 Location of Monitoring Stations

Aquatic fauna along the streams in Ma Tso Lung, Siu Hang San Tsuen, and Long Valley will be quantitatively surveyed. The monitoring stations for the streams will follow as far as practicable the sampling locations studied in the EcoIA as shown in **Appendices A.3a to A.3c.**

Sampling stations in Long Valley shall cover different habitat types such as reed beds, permanent water features, and other major habitats including shallow water habitats, wet agricultural land, and fishponds as detailed below:

- MS 16. Stream
- MS 17. Reed beds
- MS 18. Wet agricultural land
- MS 19. Fishpond
- MS 20. Shallow water habitat

2.2.2 Survey Period and Frequency

Monthly quantitative replicate surveys will be carried out during the wet season only. In each sampling station, there will be three sampling replicates for invertebrates and three replicates for observation points for direct counting of fish fauna.

2.2.3 Monitoring Parameters

Species composition, abundance, and distribution of invertebrates and fish will be recorded. Species of conservation significance if recorded during the monitoring activities will be specified.

Weather condition and other noticeable activities (natural or anthropogenic) occurring within or in the vicinity of the survey areas will be recorded.

2.2.4 Survey Requirements and Protocol

Direct count will be used for the larger organisms such as fish while kick-netting will be used for invertebrates sampling. Three replicates will be collected for invertebrates at each sampling point. The net will be placed in the water in which the mouth of the net will face to the water current. The substrate will be disturbed by kicking and the organisms dislodged from the stream bed will be trapped in the net. Smaller organisms that cannot be identified with the naked eye will be brought to the laboratory for identification under the dissecting microscope. Abundance of different taxa identified will be recorded.

For freshwater macroinvertebrates survey in Long Valley, as the habitats in this area are dynamic depending on the agricultural practices, sampling stations shall cover different habitat types such as reed beds, permanent water features, and other major habitats including shallow water habitats, wet agricultural land, and fishponds. After the construction and establishment stages, management and monitoring of the habitats and species will be undertaken by AFCD.

2.3 Monitoring of Measures to Minimise Impacts on Ecological Sensitive Habitats from Disturbance and Pollution

2.3.1 Location of Transect Routes

Ecological sensitive receivers such as mammals, insects (butterflies and dragonflies), and herpetofauna will be surveyed quantitatively along the seven transect routes established within the Project boundary as detailed below:

- T1. Ma Tso Lung riparian zone and associated wetland habitats;
- T1. Green belt areas E1-8,D1-8 and G1-3 in KTN NDA;
- T1. AGR one C2-4 and C2-2 in KTN NDA;
- T1. Areas north of Ng Tung River;
- T2. Fanling North Freshwater Service Reservoir;
- T3. Area west Siu Hang San Tsuen Stream;
- T4. South side of Fanling Highway and Castle Peak Road in the vicinity of Pak Shek Au;
- T5. Areas west and east of the southern limit of the FLN NDA work area;
- T6. Areas in the western part of KTN; and
- T7. Long Valley

The transect routes are shown in **Appendix A.4a** to **Appendix A.4b**. Details of the transect route for Long Valley is shown in **Appendix A5**.

2.3.2 Survey Period and Frequency

Monitoring surveys will be undertaken for duration of at least 12 months on a monthly basis. Additional requirements in the frequency of monitoring activities in Long Valley is detailed in the **Section 2.3.4** of this BEMP.

2.3.3 Monitoring Parameters

Species composition, abundance, and distribution of fauna observed will be recorded. Species of conservation significance if recorded during the monitoring activities will be specified.

2.3.4 Survey Requirements and Protocol

2.3.4.1 Mammal Survey

Mammal surveys covering day and night times will be conducted in areas along the transect routes which may potentially be utilised by terrestrial mammals. The surveys focused on searching for field signs such as droppings, footprints, diggings or burrows left by larger terrestrial mammals. Mammal identification will be made as accurate as possible from the field signs encountered. In addition, any mammal directly observed will be identified. The bat surveys will be conducted along the transect routes. The surveys will start shortly after sunset using bat detector to record the echolocation calls of foraging bats (using frequency division). The structure of the echolocation calls will be analysed to identify species as far as possible. The relative abundance of each species in the habitat will be estimated from the field and from recording using a scale from one (single individual recorded) to five (very abundant). Nomenclature of mammal will be based on Shek (2006).

For mammal survey in Long Valley, infra-red camera “traps” will be used to monitor secretive and crepuscular/nocturnal species. Use of camera traps will ensure effective assessment of composition and abundance of mammal species occurring in this area. A set of 10-15 cameras with high sensitivity, large detection zone, and fast trigger speed will be deployed covering in all major zones and habitats in Long Valley.

2.3.4.2 Herpetofauna Survey (Amphibians and Reptiles)

Amphibian surveys will be conducted whenever possible on evenings following or during periods of rainfall, focusing on areas suitable for amphibians (e.g. forest, shrublands, grasslands, streams, catch waters, fishponds, marshes, etc.). Records of calling amphibians will form the bulk of the data collected, but this will also be supplemented whenever possible by visual observation of eggs, tadpoles, adult frogs, and toads. Reptile surveys will be mainly conducted by actively searching appropriate microhabitats and refugia such as stones, pond bunds, crevices, and leaf litter/debris. In addition to active searching, observations and noting down of exposed, basking, and foraging reptiles will be conducted. Nomenclature of amphibian and reptile will be based on Chan et al. (2005) and Karsen et al. (1998), respectively.

For herpetofauna survey in Long Valley, additional monthly night time surveys from March to July (early wet season) will be conducted and will concentrate on recording the distinctive vocalizations of advertising males, for which the peak activity occurs during this season, especially after dusk and during or after rain.

2.3.4.3 Insect Survey (Butterfly and Dragonfly)

All butterflies and dragonflies observed during the transect survey will be identified and counted. Special attention will be given to any preferable habitats of these fauna groups, including watercourses, fishponds, and vegetated areas. Nomenclature and protection status of the species will be based on Lo et al. (2005) for butterflies and Tam et al. (2011) for dragonflies.

For dragonflies survey in Long Valley, additional surveys of exuviae will be conducted in habitats that are intended to provide mitigation and/or enhanced habitat for odonates. Surveys will be conducted from March to May, when the majority of emergence occurs in Hong Kong (Reels 2010).

2.3.4.4 Vegetation

No plant species or communities are targeted for ecological mitigation in the EM&A Manual. However, it is recommended in the HCMP that a vegetation survey will be conducted in Long Valley to record the baseline habitats, plant species, and agricultural practices prior to the construction and establishment of LVNP. The distribution (across different habitat types) and relative frequency of plant species will be recorded. Vegetation surveys should be conducted once during the wet and once during the dry season.

3. MONITORING PROGRAMME

The summary of the baseline monitoring requirements is shown in **Table 3.1** and the implementation programme in **Table 3.2**.

Table 3.1: Summary of the Baseline Monitoring Programme

Activity	Relevant EP No.	Relevant Contract	Location of Transect Routes and Monitoring Stations	Figure Reference	Survey Period/ Frequency	Monitoring Parameters[1][2]
Monitoring of Measures to Minimise Disturbance to Water Birds on Ng Tung, Sheung Yue, and Shek Sheung Rivers and Long Valley	EP – 472/2013/A[3]	ND/2019/03 (Contract 3)	T1. Ng Tung River	**Appendix A.2a to Appendix A.2b**	Avifauna: 12 months on a weekly basis during both high and low tides	Abundance, location, and habitat type
	EP – 472/2013/A[3] EP – 473/2013/A	ND/2019/04 (Contract 5A)	T2. Ng Tung River			
	EP – 468/2013/A EP – 469/2013	ND/2019/03 (Contract 3)	T3. Sheung Yue River			
	EP – 470/2013/A[3] EP – 474/2013/A[3]	ND/2019/02 (Contract 2)	T4. Shek Sheung River			
	EP – 468/2013/A	ND/2019/03 (Contract 3)	T5. Long Valley	**Appendix A5**	Avifauna: 12 months on a weekly basis (daytime surveys) Additional night-time avifauna surveys: twice monthly from September to April	
Monitoring of Measures to Minimise Impacts to Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley	EP – 467/2013/A EP – 473/2013/A EP – 468/2013/A	ND/2019/01 (Contract 1) ND/2019/03 (Contract 3) ND/2019/04 (Contract 5A)	Monitoring stations will follow the sampling locations studied in the EcoIA as far as practicable	**Appendices A.3a to A.3c**	Aquatic fauna: wet season only	Species composition, abundance, and distribution

Activity	Relevant EP No.	Relevant Contract	Location of Transect Routes and Monitoring Stations	Figure Reference	Survey Period/ Frequency	Monitoring Parameters[1][2]
Monitoring of Measures to Minimise Impacts on Ecological Sensitive Habitats from Disturbance and Pollution	EP – 468/2013/A	ND/2019/01 (Contract 1)	T1. Ma Tso Lung riparian zone and associated wetland habitats	**Appendix A4a to Appendix A4b**	Mammals (including bats), herpetofauna, dragonflies and butterflies : 12 months on monthly basis	Species composition, abundance, and distribution
	EP – 468/2013/A	ND/2019/01 (Contract 1)	T1. Green belt areas E1-8,D1-8 and G1-3 in KTN NDA			
	EP – 468/2013/A	ND/2019/02 (Contract 2)	T1. AGR one C2-4 and C2-2 in KTN NDA			
	EP – 468/2013/A	-	T1. Areas north of Ng Tung River			
	-	-	T2. Fanling North Freshwater Service Reservoir			
	EP – 472/2013/A[3] EP – 473/2013/A	ND/2019/03 (Contract 3) ND/2019/04 (Contract 5A)	T3. Area west of Siu Hang San Tsuen Stream			
	EP – 465/2013/A[3] EP – 466/2013	ND/2019/01 (Contract 1) ND/2019/02 (Contract 2)	T4. South side of Fanling Highway and Castle Peak Road in the vicinity of Pak Shek Au			
	EP – 470/2013 EP – 473/2013/A	ND/2019/05 (Contract 5B)	T5. Areas west and east of the southern limit of the FLN NDA work area			
	EP – 467/2013/A EP – 468/2013/A	ND/2019/01 (Contract 1)	T6. Areas in the western part of KTN			

Activity	Relevant EP No.	Relevant Contract	Location of Transect Routes and Monitoring Stations	Figure Reference	Survey Period/ Frequency	Monitoring Parameters[1][2]
Monitoring of Measures to Minimise Impacts of Construction and Operation of LVNP (including creation of compensatory wetland habitat) on the ecological sensitive receivers in Long Valley	EP – 468/2013/A	ND/2019/03 (Contract 3)	T7. Long Valley	**Appendix A5**	Mammals: monthly daytime and night-time surveys Herpetofauna: monthly night-time surveys with additional surveys from March to July Butterflies and Dragonflies: monthly daytime survey with additional exuviae surveys from March to May Vegetation: once in wet season and once in dry season	
Notes: 1 Species of conservation significance recorded (if any) during the monitoring activities will be specified. 2 Noticeable behaviours (e.g. breeding behaviours such as nesting and presence if recently fledged juveniles, roosting and feeding activities, etc.) will also be recorded. 3 There would be no works for the Designated Project (DP) under Advance and First Stage works, the monitoring area would however also cover concerned area near the respective DP.						

Table 3.2 Tentative Programme for the Baseline Ecological Monitoring

Activity	Monitoring Period and Frequency												
	Jul 19	Aug 19	Sept 19	Oct 19	Nov 19	Dec 19	Jan 20	Feb 20	Mar 20	Apr 20	May 20	Jun 20	Jul 20
Monitoring of measures to minimise disturbance to water birds on Ng Tung, Sheung Yue and Shek Sheung Rivers					**Weekly Avifauna Monitoring**								
Monitoring of measures to minimise impacts to Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley	**Monthly Aquatic Fauna Monitoring**									**Monthly Aquatic Fauna Monitoring**			
Monitoring of measures to minimise impacts on ecological sensitive habitats from disturbance and pollution	**Monthly Mammals, Herpetofauna, and Dragonflies and Butterflies Monitoring**												
Monitoring of measures to minimise impacts of construction and operation of LVNP (including creation of compensatory wetland habitat) on the ecological sensitive receivers in Long Valley			**Monthly Monitoring for Mammals, Herpetofauna, and Dragonflies and Butterflies**										
									Additional exuviae surveys for odonates				
	Additional night-time surveys for herpetofauna								Additional night-time surveys for herpetofauna				
	Vegetation Survey						Vegetation survey						
					Weekly Avifauna Monitoring								
			Additional twice-monthly night surveys for avifauna										

4. REPORTING

4.1 Baseline Monitoring Report

The results of the monitoring activities will be reported monthly with the following information:

- Detailed records of species and their abundances and distribution along the transect routes and monitoring stations;
- Information about the site condition at the time of the survey including tidal information, weather condition, presence of disturbances (anthropogenic or natural), and noticeable behaviours of fauna observed in the study area;
- Presentation of representative coloured photos and/or drawings of species of conservation importance, and monitoring area photos with observed activities that could affect the survey data (e.g. anthropogenic activities within/near the rivers that would disturb sensitive habitats and fauna, construction works, etc.); and
- Locations of species of conservation interest observed during the monitoring activities.

All reports shall follow the below reporting format as specified in **Section 17.2** of the NENT EM&A Manual. Monthly monitoring report shall be certified by the ET Leader, verified by the IEC, and approved by the Engineer.

I. Executive summary

II. Brief Project Background Information

III. Monitoring Methodology, to include

- o name of laboratory and types of sampling equipment used;
- o type of ecological sensitive receivers monitored;
- o transect routes and monitoring stations; and
- o monitoring date, time, frequency, and duration

IV. Details of Influencing Factors

- o major activities, if any, being carried out on the site during the period;
- o weather conditions during the period; and
- o other factors which might affect monitoring results

V. Determination of the Action and Limit Levels for each ecological sensitive receivers and statistical analysis of the baseline data;

VI. Revisions for inclusion in the EM&A Manual; and

VII. Comments, recommendations, and conclusions.

4.2 Monitoring Improvement Procedure

A review of this BEMP to identify reasonable additional, reduction, or alternative monitoring procedures/stations/routes shall be conducted, if necessary. Following the identification of the alternative protocol that is considered to improve the monitoring plan, the BEMP shall be updated and submitted for consideration and approval.

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Figure: "Non-bird Fauna Survey Coverage in the Study Area"
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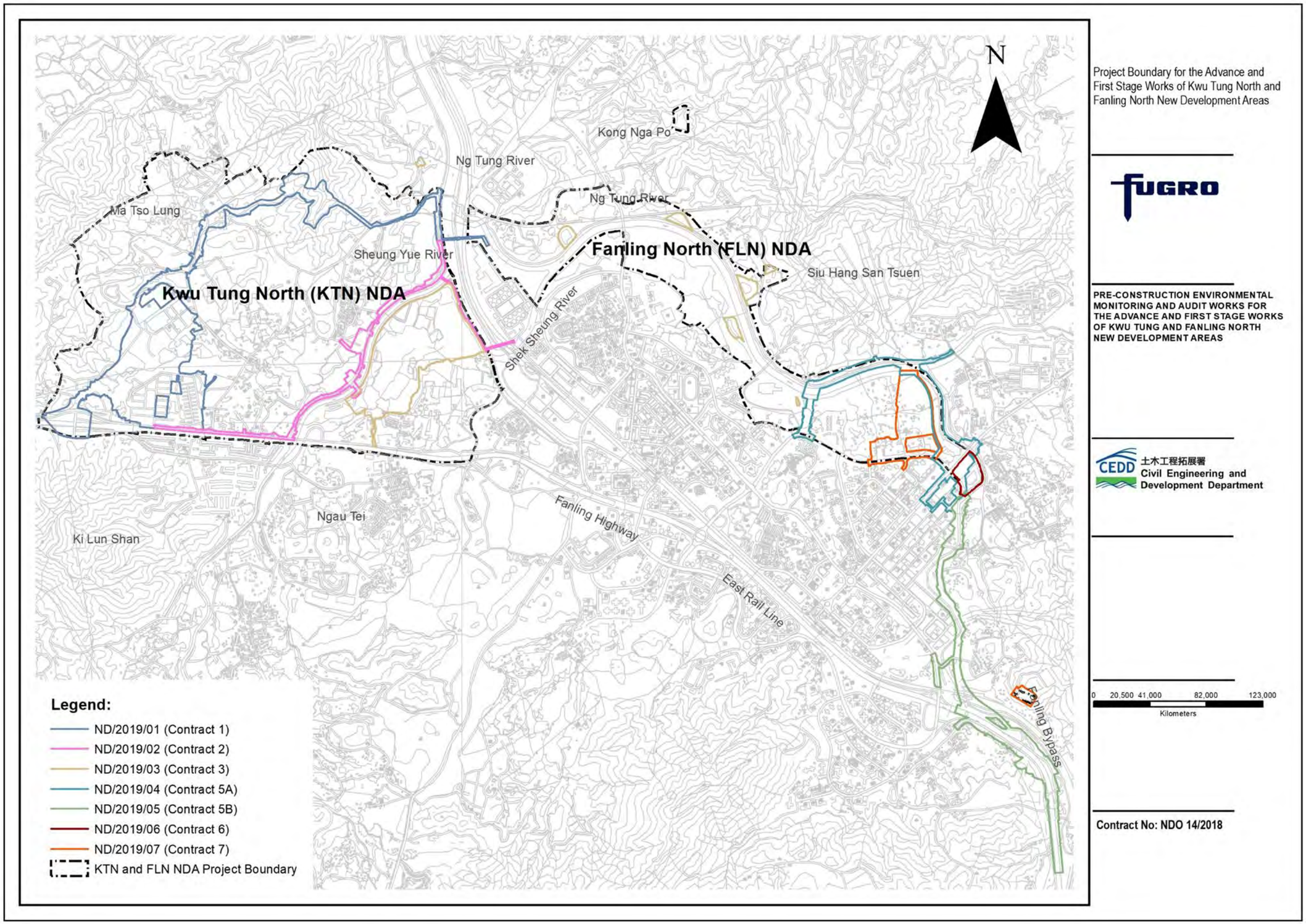
Tam, T.W., Leung, K.K., Kwan, B.P. S., Wu, K. K. Y., Tang, S. S. H., So, I.W.Y., Cheng, J.C.Y., Yuen, E.F.M., Tsang, Y.M and Leung, H.W. (2011) *The Dragonflies of Hong Kong.* Agriculture, Fisheries and Conservation Department, Friends of the Country Parks and Cosmos Books Ltd., Hong Kong.

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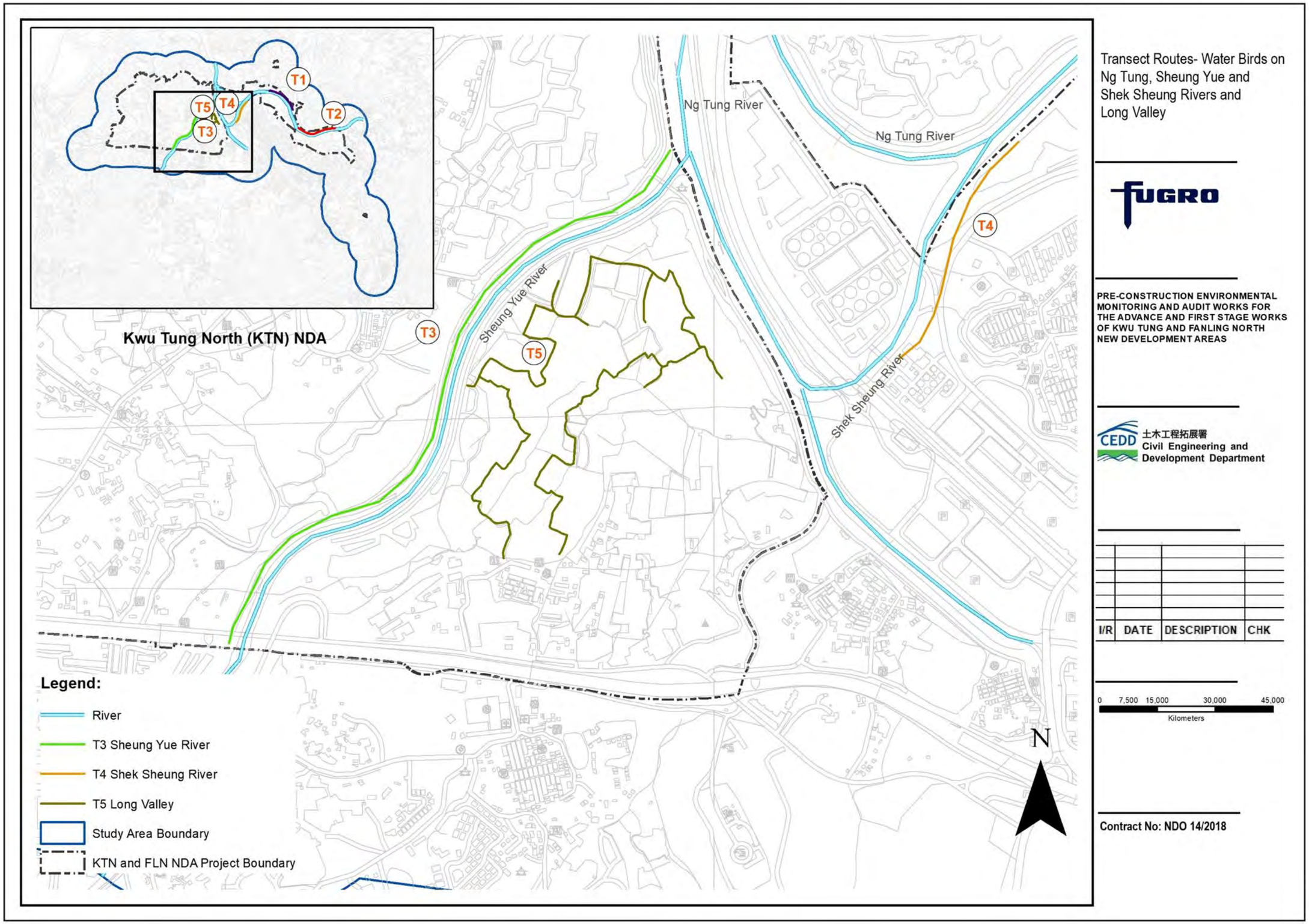
APPENDICES

A. FIGURES

A.1 PROJECT BOUNDARY



A.2a TRANSECT ROUTES FOR WATER BIRDS MONITORING – SHEUNG YUE RIVER, SHEK SHEUNG RIVER, AND LONG VALLEY



Transect Routes- Water Birds on Ng Tung, Sheung Yue and Shek Sheung Rivers and Long Valley

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

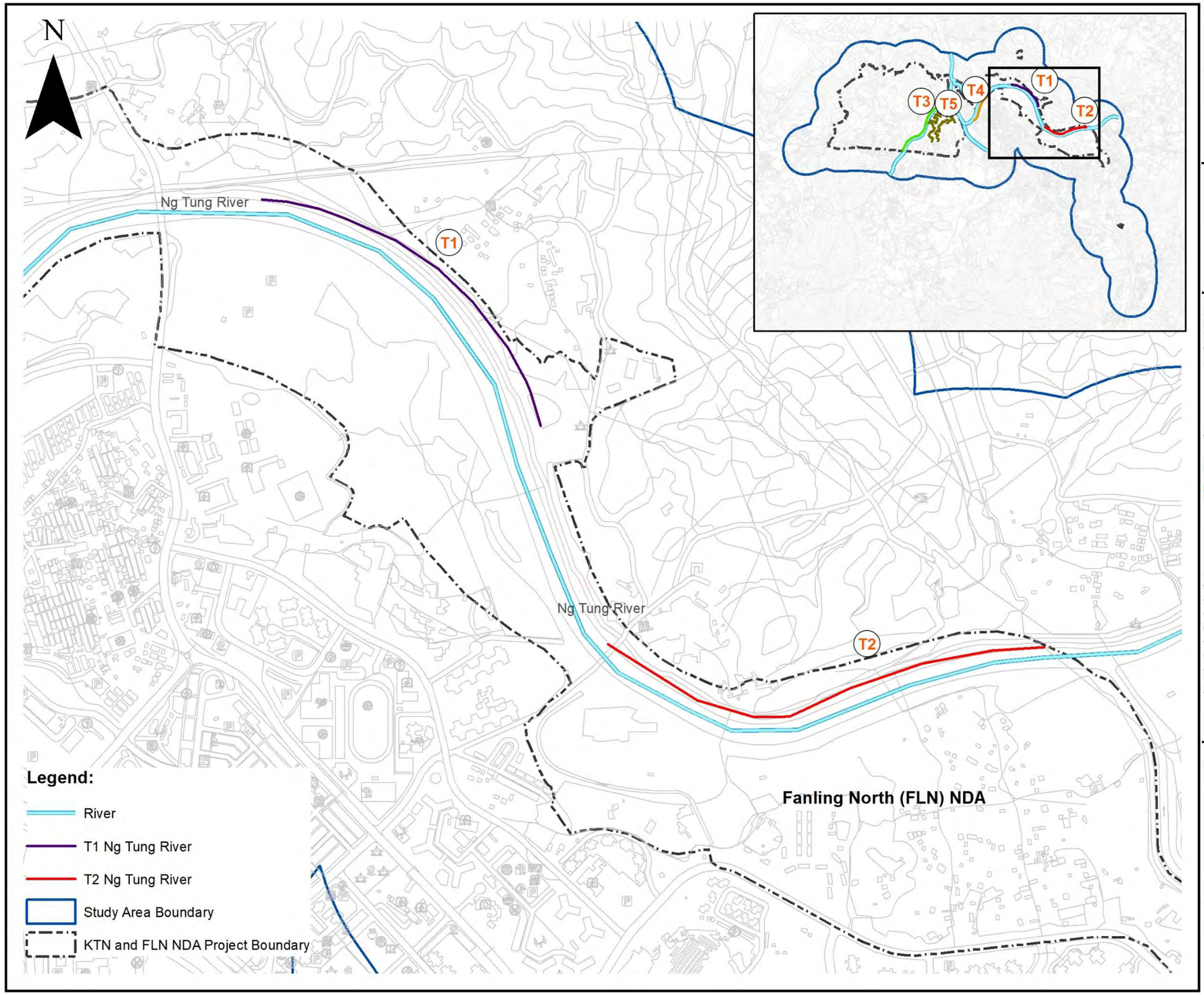
CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 7,500 15,000 30,000 45,000
Kilometers

Contract No: NDO 14/2018

A.2b TRANSECT ROUTES FOR WATER BIRDS MONITORING – NG TUNG RIVER



Transect Routes- Water Birds on Ng Tung, Sheung Yue and Shek Sheung Rivers and Long Valley

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

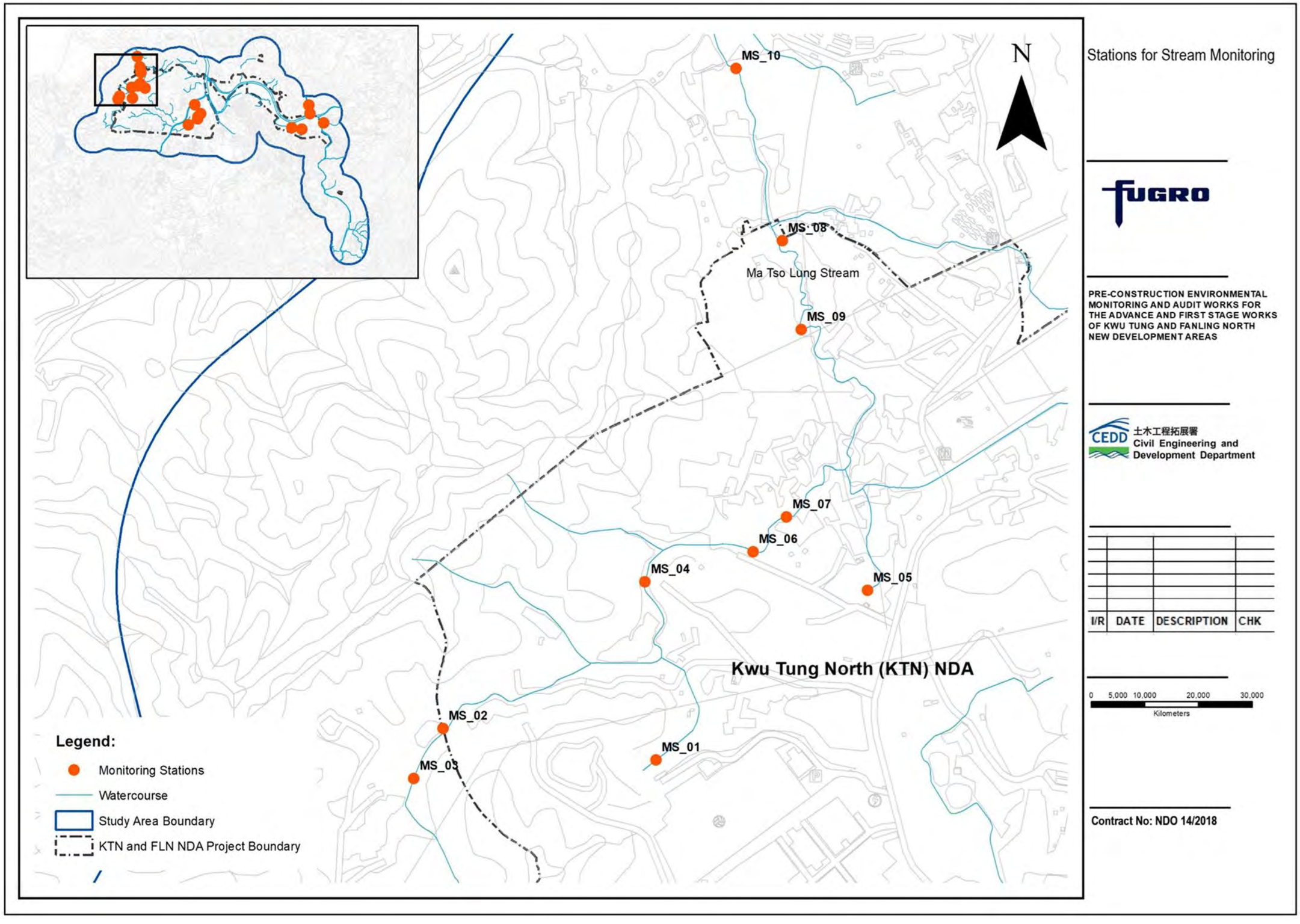
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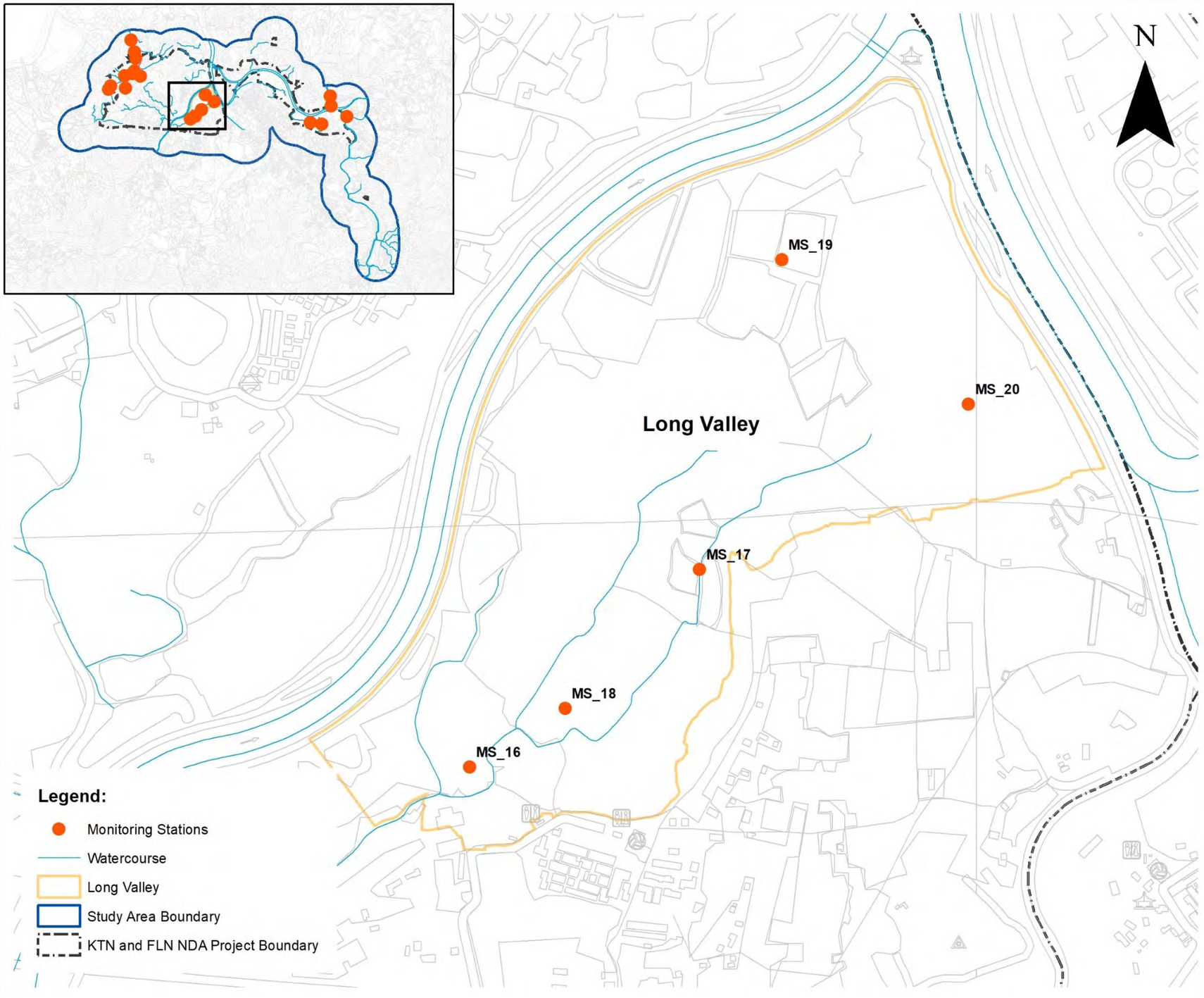
0 7,500 15,000 30,000 45,000
Kilometers

Contract No: NDO 14/2018

A.3a STREAMS MONITORING STATIONS - Ma TSO LUNG STREAM



A.3b STREAMS MONITORING STATIONS – LONG VALLEY



Stations for Freshwater Habitats Monitoring

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

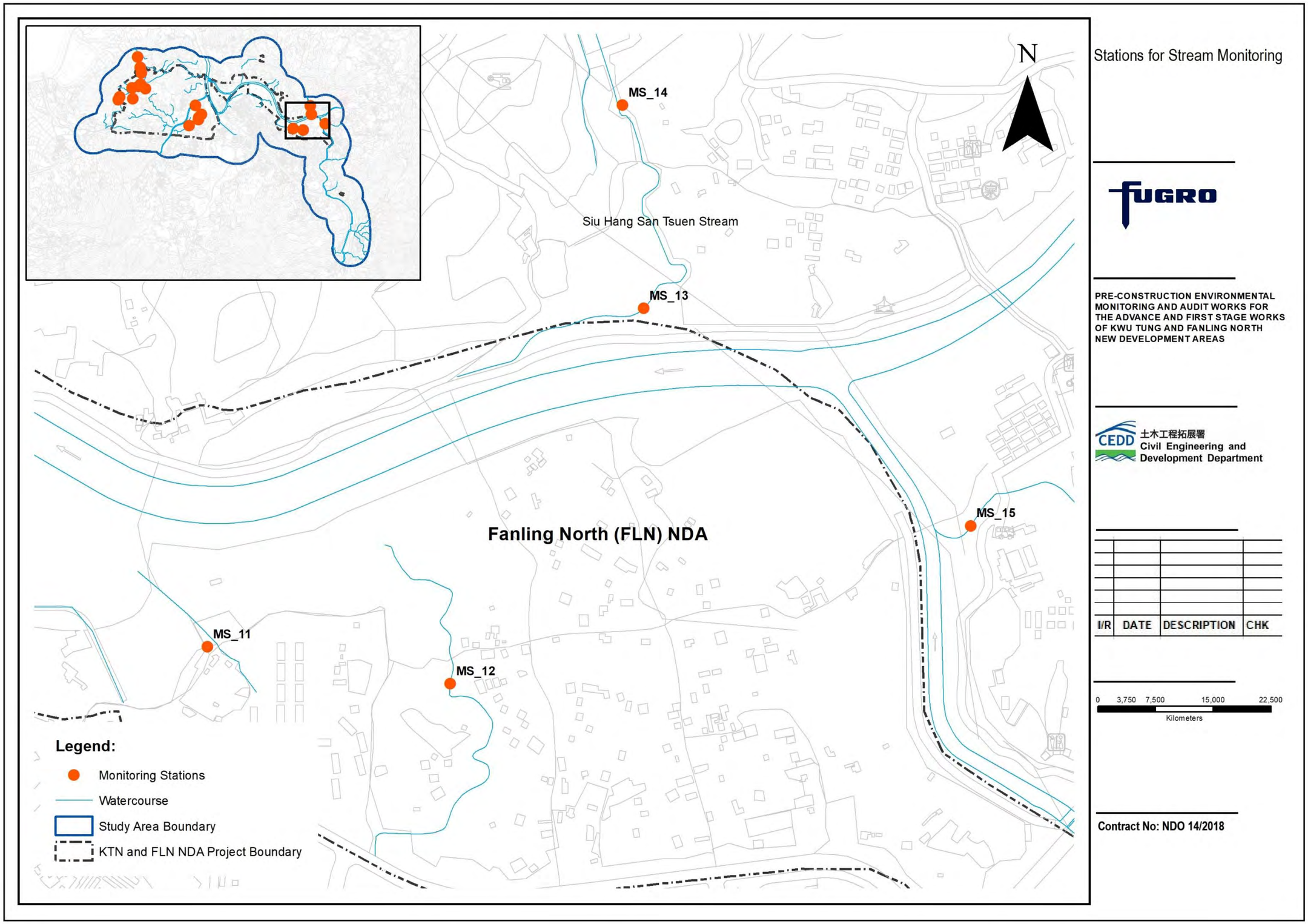
CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

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Kilometers

Contract No: NDO 14/2018

A.3c STREAMS MONITORING STATION – SIU HANG SAN TSUEN STREAM



Stations for Stream Monitoring

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

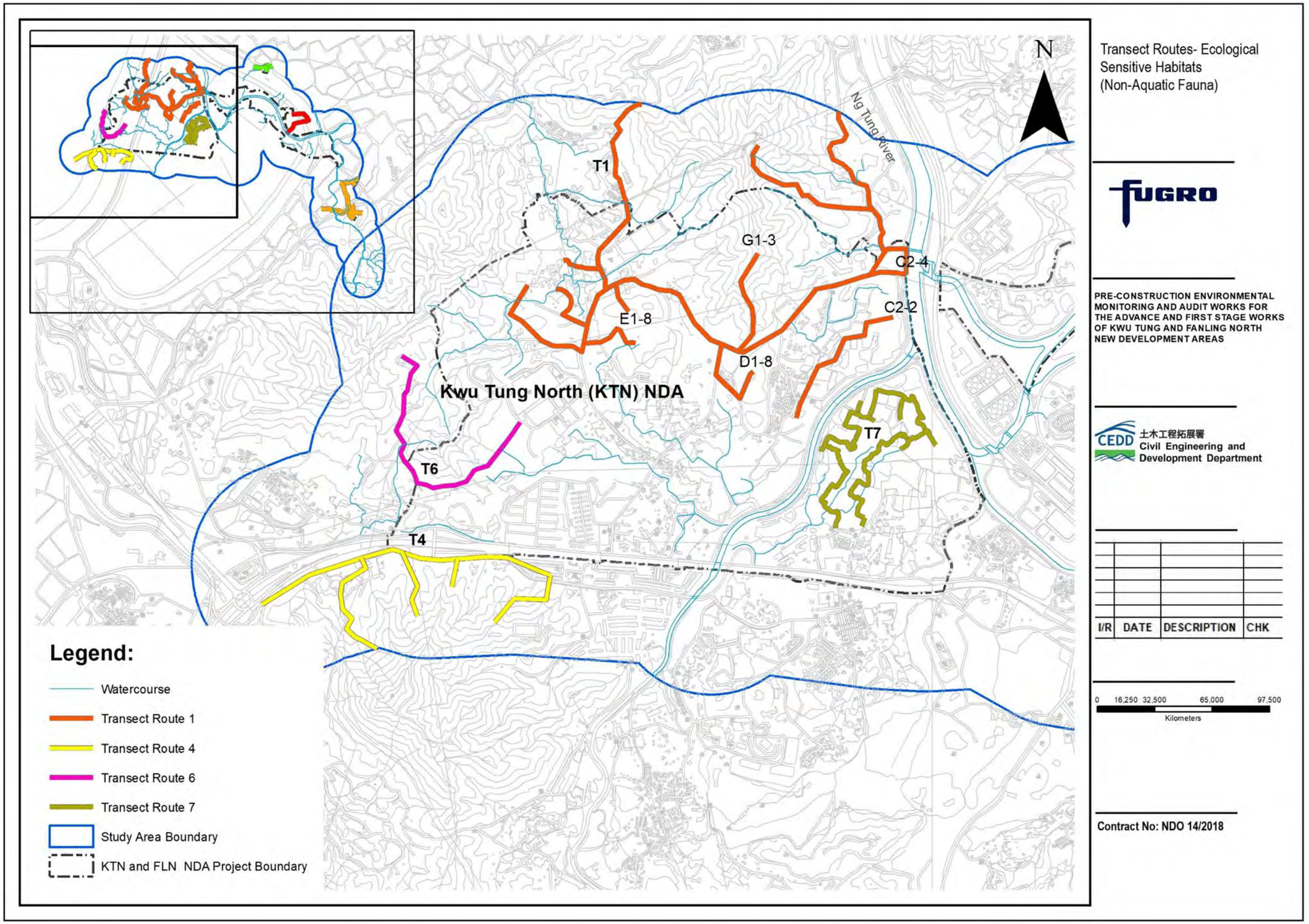
CEDD 土木工程拓展署 Civil Engineering and Development Department

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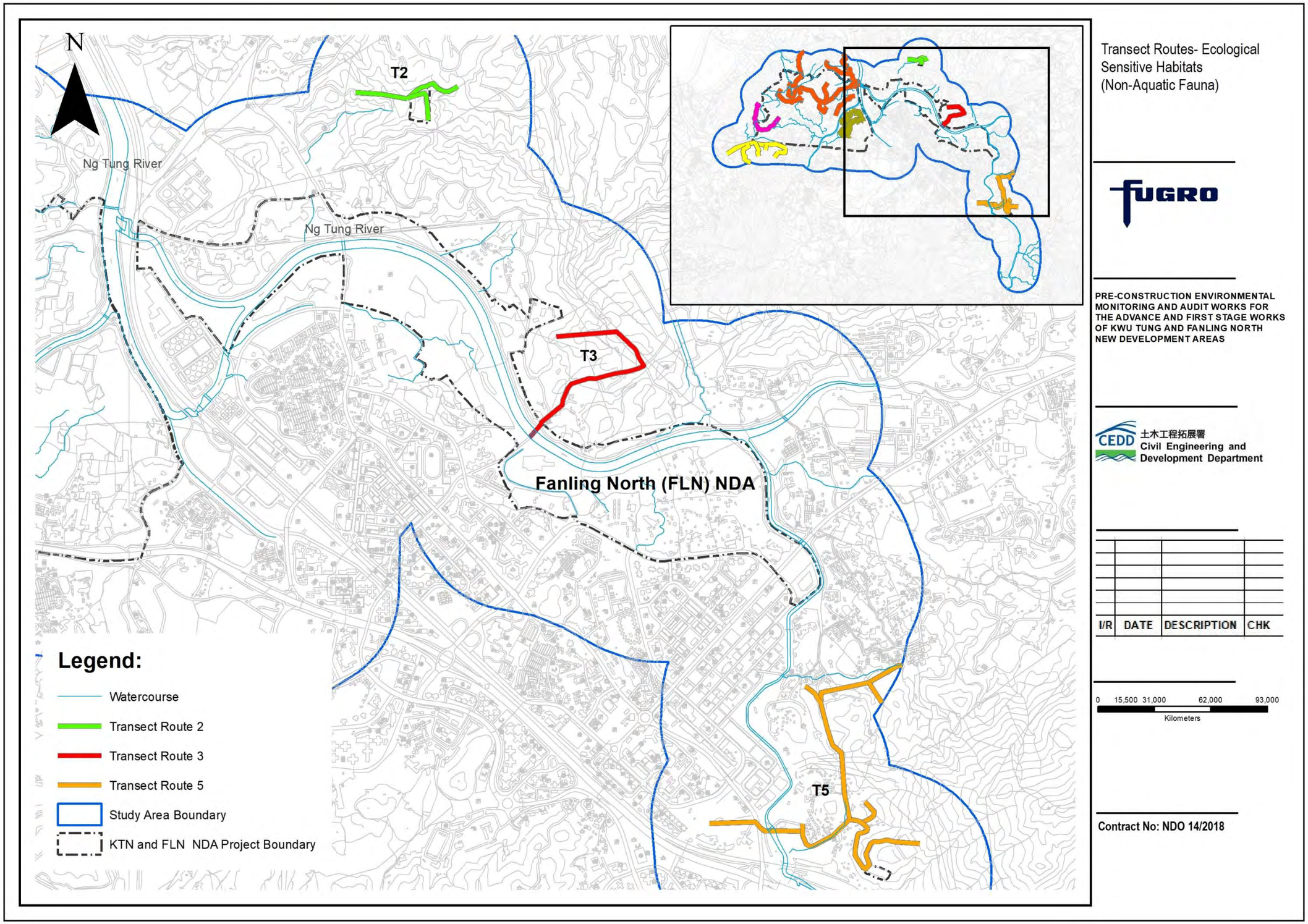
0 3,750 7,500 15,000 22,500
Kilometers

Contract No: NDO 14/2018

A4.a TRANSECT ROUTES FOR ECOLOGICAL SENSITIVE HABITAT MONITORING – KTN NDA



A4.b TRANSECT ROUTES FOR ECOLOGICAL SENSITIVE HABITAT MONITORING – FLN NDA



Transect Routes- Ecological Sensitive Habitats (Non-Aquatic Fauna)

FUGRO

PRE-CONSTRUCTION ENVIRONMENTAL MONITORING AND AUDIT WORKS FOR THE ADVANCE AND FIRST STAGE WORKS OF KWU TUNG AND FANLING NORTH NEW DEVELOPMENT AREAS

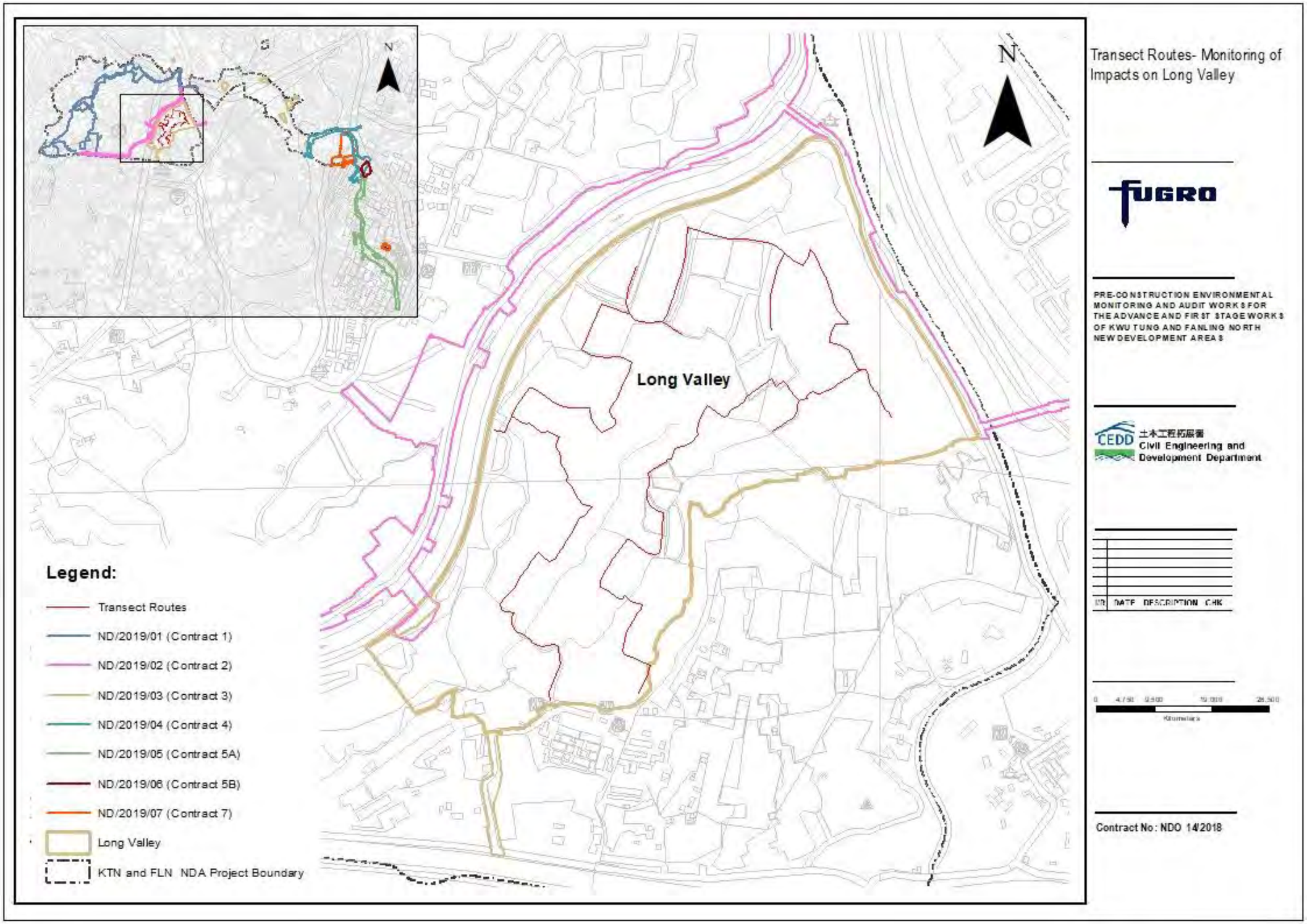
CEDD 土木工程拓展署 Civil Engineering and Development Department

I/R	DATE	DESCRIPTION	CHK

0 15,500 31,000 62,000 93,000
Kilometers

Contract No: NDO 14/2018

A5. TRANSECT ROUTES FOR LONG VALLEY



B. CURRICULUM VITAE – QUALIFIED ECOLOGIST

SHEA She-sang, Mark

Senior Ecology Consultant

PERSONAL INFORMATION

Nationality Chinese

Profile Dr. Mark Shea is an ecology consultant with over 25 years of experience in the field of Biology, ecology, and environmental impact assessment in Hong Kong, China, Macau, and the region. He has undertaken over 250 projects with ecological component dealing with terrestrial ecology, wetland ecology, insect taxonomy, pollution biology, mangrove, herpetofauna, avifauna, terrestrial vertebrates, fishery, benthic community ecology in Hong Kong's stream, river, coastal, marine, and terrestrial environments. During the last fifteen years, he conducted and led over 200 tree survey projects and a number of tree risk assessment projects.

Education

B.Sc. Biology, Hunan Normal College, PRC, 1981
M.Sc. Zoology, Nanjing Normal University, PRC, 1987
Ph.D. Ecology/Environmental Science, The University of Hong Kong, 1995

Qualification

Member of The Institution of Hong Kong Environmental Impact Assessment (1995 - present)
Member of The Marine Biological Association of Hong Kong 1989 – 2006
Member of International Association for Landscaping Ecology (1996 – 2004)
Member of International Association of Impact Assessment (2002 – 2005, 2013 – 2018)
Certified Arborist of International Society of Arboriculture (2011 – 2014)
Member of China Flower Association (2008 – present)
Council member of Southern China Palm Plants Association (2001 – present)
Member of Zoological Society of China (1994 – present)
Member of Ecological Society of China (1995 – present)

Languages spoken

Native	Chinese
Fluent	English (spoken and written)

Employment History

1997 – present: Senior Ecology Consultant, China Hong Kong Ecology Consultants
1995 – 1997: Senior Ecology Consultant, Hyder Consulting Ltd.
1993 – 1995: Ecology Consultant, Binnie Consulting Ltd.
1988 – 1993: Ph.D. Research Student and Demonstrator, The University of Hong Kong

RELEVANT PROJECT EXPERIENCE FOR THE PAST FIVE YEARS

Agreement No. CE 50/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package G, Landslip Prevention and Mitigation Works - Investigation, Design and Construction, Study Area No.11SW-B/HPSA4, Below Magazine Gap Road and Above Bowen Road, Provision of Full Time Residential Ecologist for Ground Investigation Works：Vegetation Survey and Protection; Client: CEDD/CMA, 2018-2019.

Architectural Services Department Quotation Contract No. CPM301_13/18: Mui Wo Lai Chi Yuen Extension. Ecological survey, plant transplantation proposal and other related ET tasks. Client: AEC, 2018-2020.

BEAM Plus SA 5-Ecological Site Appraisal Report For Proposed Residential Development at N.K.I.L. 6549, Off Hing Wah Street West, Cheung Sha Wan, Kowloon. Client: AEC, 2018.

BREEAM (UK) LE02 & LE04 -Ecological Site Appraisal Report for Refurbishment Works at International Commerce Centre (ICC): Ecological survey and preparing required submissions.

Section 12A Rezoning Application Proposed Rezoning For An Extension Of The Ling To Monastery, Including A Temple, Columbarium And Access Road, At San Wai, Ha Tsuen, Yuen Long: Ecological Impact Assessment. Client: Man Fung Industries Holding Ltd., 2018.

BREEAM (UK) LE02 & LE04 -Ecological Site Appraisal Report for Refurbishment Works at 4 Headland Road, Repulse Bay: Ecological survey and preparing required submissions. Client: AEC, 2018.

Planning Consultancy Services for Sassoon Road Campus Expansion for the Hong Kong University: Ecological impact assessment. Client: BMT, 2018.

Agreement No. CE/35/2015 (GE) Landslip Prevention and Mitigation Programme, 2015, Package A Landslip Prevention and Mitigation Works and Provision of Emergency Works Services for Natural Terrain Landslides Occurring in Mainland East (North) – Investigation, Design and Construction: Behind Shuen Wah Chim Uk, Ting Kok Road, Tai Po (Feature No. 3SE-C/C23): Ecological survey and reporting, Client: CEDD/CMA, 2018-2019.

Wanke (萬科) Building renovation project in Xiong An （雄安）, He Bei Province, China: Ecological Baseline Survey/Condition Report and Suggestion on Plants for Green Design: Client: Biodiversity by Design (UK), 2018.

Section12A rezoning application site from "Agriculture", "Village Type Development" to "Residential (Group C)": Ecological Impact Assessment．Aikon Planning, 2018.

Contract No. NDO/02/2018 Baseline Survey for Golden-Headed *Cisticola* for Site Formation and Infrastructure Works for Police Facilities in Kong Nga Po: Ecological Baseline Survey and report. Client: CEDD/AECOM, 2017-2018.

Ecological Impact Assessment for Section 16 Application To Allow Columbarium Use At Lot Nos. 879, 880A1, 880B1, 881, 882, 883, 884, 885, 889RP (Part), 891(Part), 1318, 1326 and 1344(Part) all in D.D. 115 and adjoining Government Land, Au Tau, Yuen Long. Client: Ramboll 2018.

Agreement No. CE 51/2016 (HY): Route 11 (between North Lantau and Yuen Long – Feasibility Study. Responsible for ecological survey and reporting. Client: Meinhardt. 2018 – 2020.

Agreement No. CE 36/2011 (HY): Further Study and Preliminary Design for Improvement of Hiram's Highway from Marina Cove to Sai Kung Town – Investigation Addition Service No.4 – Ecology Survey and Ecology Impact Assessment. Responsible for ecological survey and reporting. Client: Meinhardt. 2018 – 2020.

Project title. ([RFQ-EMD14033VW]) Consultancy Services on Provision of Ecological Baseline Survey and Monitoring at Ma On Kong River. Responsible for ecological survey, monitoring and reporting. Client: Hong Kong Productivity Council. 2018 – 2020.

Contract No. CV/2017/04: Environmental Monitoring of Sediment Disposal to the South of Brothers, East of Sha Chau and East of Tung Lung Chau: diving monitoring of coral and sea bottom; demersal trawling samples of fishes and invertebrates. In supporting of EGS/Lam, responsible for on-board sampling supervision, sorting, taxonomic identification, tissue preparation for chemical testing, data analysis and reporting. Sub-consultant of EGS. 2018-2022.

Contract No. CM 14/2016: Environmental Team for Operational Environment Monitoring and Audit for Siu Ho Wan Sewage Treatment Plant. Responsible for undertaking bi-monthly marine benthic sampling, sorting, identification and reporting. Client: Fugro / DSD, 2018-2023.

Mountain Bike Training Ground & Expansion of Mountain Bike Trail Net Works in Mui Wo and Chi Ma Wan, S.L. Employed as independent ecologist responsible for ecological survey, eco report updating, supporting mountain bike specialist in ecology aspects. Client: Sheung Moon Construction Ltd., / CEDD, HKSAR, 2016-2019.

Contract No.: CV/2012/05. Bathing Beach at Lung Mei, Tai Po, Rule of qualified ecologist responsible for ecological baseline surveys, rat snake capture survey, marine benthic, fish and intertidal fauna monitoring, mangrove plantation, fauna relocation. Client: Welcome Construction / CEDD, HKSAR, 2016-2019.

Landscape Consultancy Service Campus Landscape Master Plan: Ecological Enhancement Proposal; Client: Earth Asia / The Chinese University of Hong Kong, 2014-2018.

Application for Small House Re-Development of Lot 966 RP in D.D. 22 Pan Chung San Tsuen, Tai Po. Site Investigation and Landscape Proposal. Client: Ms. Peggy Wong, 2016-2017.

Rezoning Proposal for Various Lots At Ha Wo Hang, Sha Tau Kok: Ecological Impact Assessment and Mitigation. Client: Eton Properties Agency Co Ltd, 2016-2018.

Contract No. DP 01/2016 Drainage Improvement Works at North District –Package B – Investigation: Ecology, Client: DSD, HKSAR, 2016-2018.

Section 12A Application for Proposed Amendments to the Ma On Shan Outline Zoning Plan in Support of Private Residential Development and Primary School at Various Lots and Adjoining Government Land in DD 167, Nai Chung, Ma On Shan: Ecological Impact Assessment, Client/leading consultant: Ramboll Environ Hong Kong Limited, 2016-2017.

BEAM Plus V1.2 SA5 Ecological Assessment for Shum Shui Po building site, Client/leading consultant: Fugro, 2016.

Contract WQ/053/15: Consultancy Study on Strategic Street Ecology for Hong Kong. Client, LCSD/ HKSAR, Leading consultant: Earth Asia Ltd. 2016-2017.

BEAM Plus V1.2 SA5 Ecological Assessment for Proposed Factory Development at 95-99 Fuk Hi Street, Yuen Long Industrial Estate, Yuen Long, Client/leading consultant: Hip Hing, 2016.

BEAM Plus V1.2 SA5 Ecological Assessment for Proposed building at Wai Yip Street, Kowloon Bay, Client/leading consultant: Hip Hing, 2016.

Agreement No. Ce 13/2009 (WS) In-Situ Re-provisioning of Sha Tin Water Treatment Works – South Works, Ecology: site investigation and woodland compensation plan. Client, DSD/ HKSAR, Leading consultant: Acumen Environment Ltd. 2015-2016,

BEAM Plus V1.2 SA5 Ecological Assessment for proposed property development at Tsuen Wan Town, Client/leading consultant: Acumen Environment Ltd., 2016.

Programme No.: 085MM: Consulting engineer services in connection with Preliminary Environmental Review, Traffic Impact Assessment and Drainage & Sewerage Impact Assessment for Hospital Authority Supporting Services Centre in Tin Shui Wai. Ecological Impact Assessment, Client/leading consultant: ASD/HKSAR / Parsons Brinckerhoff (Asia) Limited, 2016.

Improvement to sharp bend of Keung Shan Road near Shek Pik reservoir service access road (slope works): Preliminary Ecological Assessment. Client/leading consultant: HyD/HKSAR / Maurice Lee Limited, 2015.

BEAM Plus V1.2 SA5 Ecological Assessment for proposed property development at Kwun Tong, Client/leading consultant: Meinhardt Environment Ltd., 2015.

Application for Proposed Low Density Residential Development at Various Lots in D.D. 433, Chuen Lung, New

Territories. Conducting full scale of ecological surveys including habitat, flora and fauna and ecological impact assessment. Client: Environ, 2015.

Ecological Impact Assessment for the Proposed Development at STTL 601 Yiu Sha Road Whitehead Ma On Shan. Conducting ecological surveys including habitat, flora and fauna and ecological impact assessment. Client: AEC, 2015.

Agreement No. CE9/2006 (DS) Tolo Harbour Sewerage of Unsewered Areas, Stage II-Investigation, Design and Construction: Conducting full scale of ecological surveys including habitat, flora, diving monitoring of coral and sea bottom; and fauna and ecological impact assessment. Client: DSD/AECOM, 2015.

Ecological consultation for a site at Ka Wai Man Road and Ex-Mount Davis Cottage Area, Kennedy Town: Conducting ecological surveys including habitat, flora and fauna and ecological impact assessment. Client: Environ, 2015.

Contract No. 12-06337: Provision of Services for the Post Project Monitoring of HATS 2A (also named as Performance Verification of Discharge of HATS 2A). Undertaken marine benthic sampling, sorting, identification, data analysis and reporting. Sub-consultant of EGS. 2014-2016.

Site Formation and Infrastructural Works for Eight Housing Sites in Ma On Shan Feasibility Study, Conducting ecological surveys including habitat, flora and fauna and ecological impact assessment. Client: Environ, 2015-2018.

Environmental Consultancy Services For Planning, Supervision And Management Of The Proposed Fish Fry Release Scheme By Ecologist/Biologist For Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities. Sub-consultant of AEC. 2014.

Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation. Client: AEC/DSD, 2014-2017.

Contract No. 2013/11: Environmental Monitoring of Sediment Disposal to the South of Brothers, East of Sha Chau and East of Tung Lung Chau: diving monitoring of coral and sea bottom; demersal trawling samples of fishes and invertebrates. In supporting of EGS/Lam, responsible for on-board sampling supervision, sorting, taxonomic identification, tissue preparation for chemical testing, data analysis and reporting. Sub-consultant of EGS. 2014-2017.

Theme Park and Resort Hotel Development in Macau - Ecological Impact Assessment: Responsible for ecological consultancy services including eco impact assessment and mitigation. Client: BMT, 2014.

Proposed Student Hostel of The City University of Hong Kong within “CDA (1)” Zone, South of Yiu Sha Road Whitehead, Ma On Shan, The New Territories: Environmental Assessment - Responsible for ecological consultancy services including eco impact assessment and mitigation. Client: Environ, 2013 -2014.

Residential cum Recreational Development at Kam Tsin Road, Kwu Tung: Environmental Assessment: Responsible for ecological consultancy services including eco impact assessment and mitigation. Client: Environ, 2013-2014.

Architectural Services Department – Consultancy Agreement No. 9AA 115 for Provision of Columbarium at Wo Hop Shek Cemetery –Phase I. Responsible for ecological consultancy services including eco-assessment and mitigation. Client: DLN, 2013-2014.

Contract 823B – Shek Kong Stabling Sidings & Emergency Rescue Siding: Sub-Contract for Provision of Consultancy Services for Stream Habitat Restoration Works (M50/153), provision of wetland construction specialist and wetland plant botanist for the project. Client: MTR / Maeda – China State Construction JV, 2011-2016.

Agreement No. DP/01/2010 Services as Independent Environmental Checker for Drainage Improvement Works in Shatin and Tai Po: Responsible for ecology aspects for transplanted projected plants, ecological mitigation wetland, ecological monitoring in areas under Contract 1 & 2. 2011 – 2014. Client: DSD / Environ Hong Kong Ltd.

Contract No. CV 2005/06, Contract No. CV 2008/07 & Contract No. 2009/16: Field Sampling and Laboratory

Testing for Contaminated Mud Pit IV and V East of Sha Chau -- Demersal trawling samples of fishes and invertebrates. In supporting of Lamlab Ltd. And EGS, responsible for on-board sampling supervision, sorting, taxonomic identification, tissue preparation for chemical testing, data analysis and reporting. Sub-consultant of Lam Lab and EGS. March 2006- February 2009; and 2010-2014.

Contract No. CV 2008/07 & Contract No. 2009/16: Testing and Sampling for Contaminated Mud Pits IV and V at East of Sha Chau, - Benthic Survey, sorting, taxonomy and reporting. Sub-consultant of EGS (Asia) Ltd. 2009 - 2014.

Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River. Employed by Contractor (Chiu Hing Construction & Transportation Co. Ltd.) as ecology specialist responsible for conducting ecological baseline survey (flora and fauna), impact monitoring, mitigation, part of post-construction monitoring and as well as capture surveys. The project also required to capture and relocate some rare fish and amphibian species with conservation value to unaffected river sections to reduce adverse impact by the river works construction period. 2007 - 2014.

F. COMFIRMATION FROM RE

H

Ho, Yung Chi Chris <chris.ho@aecom.com>
週二 2020-08-11 16:04

收件者: Leung, Min Pong Calvin
副本: Yung, Colin; Lui, Jimmy; So, Wingo

Dear Calvin,

We spoke.

Please be clarify the following:

1. The area under Contract 3 near DMS-5 under Arup EM&A Figure is the area for collection of rose bitterling and mussels. No constructions works should be carried out in that area. Details of the works you may refer to the Proposal of Rose Bitterling you certified recently
2. The area under Contract 3 near DMS-6 under Arup EM&A Figure is the area for site formation and drainage works for village resite. However, as advised by CEDD, the works within this area will possibly be deleted. Hence, you are recommended to check with CEDD or our AECOM RSS team to confirm if there will be construction works at this area.
3. The site boundary of Contract 4 as shown in Fugro EM&A Figure 2.1 is generally correct. You may double check with DMS-8 under Arup EM&A Figure is within 500m from the site boundary of C4. You may also seek AECOM RSS team for the dgn of exact C4 boundary to check.

Thanks.

Best Regards,
Chris Ho
3922 8981

G. PRELIMINARY ADDITIONAL WATER QUALITY MONITORING PROGRAMME

Service Contract No. NDO 04/2019 – Environmental Team for Environmental Monitoring & Audit Works in Construction Phase for the First Phase Development of Kwu Tung North and Fanling North New Development Areas

Preliminary Additional Water Quality Monitoring Programme

1. Introduction

1.1 According to the comments provided by EPD on the updated EM&A Manual prepared by pre-construction ET, additional water quality monitoring is suggested to be conducted at River Beas, River Indus and near Siu Hang San Tsuen Stream.

2. Monitoring Locations

2.1 Water quality monitoring at the rivers is required during the relevant construction works.

2.2 The water quality monitoring stations and control stations are shown Figure 1 and Figure 2. The proposed locations are classified as Impact Station and Control Station according to their functions. The ET shall seek approval from IEC and EPD for any alternative monitoring locations.

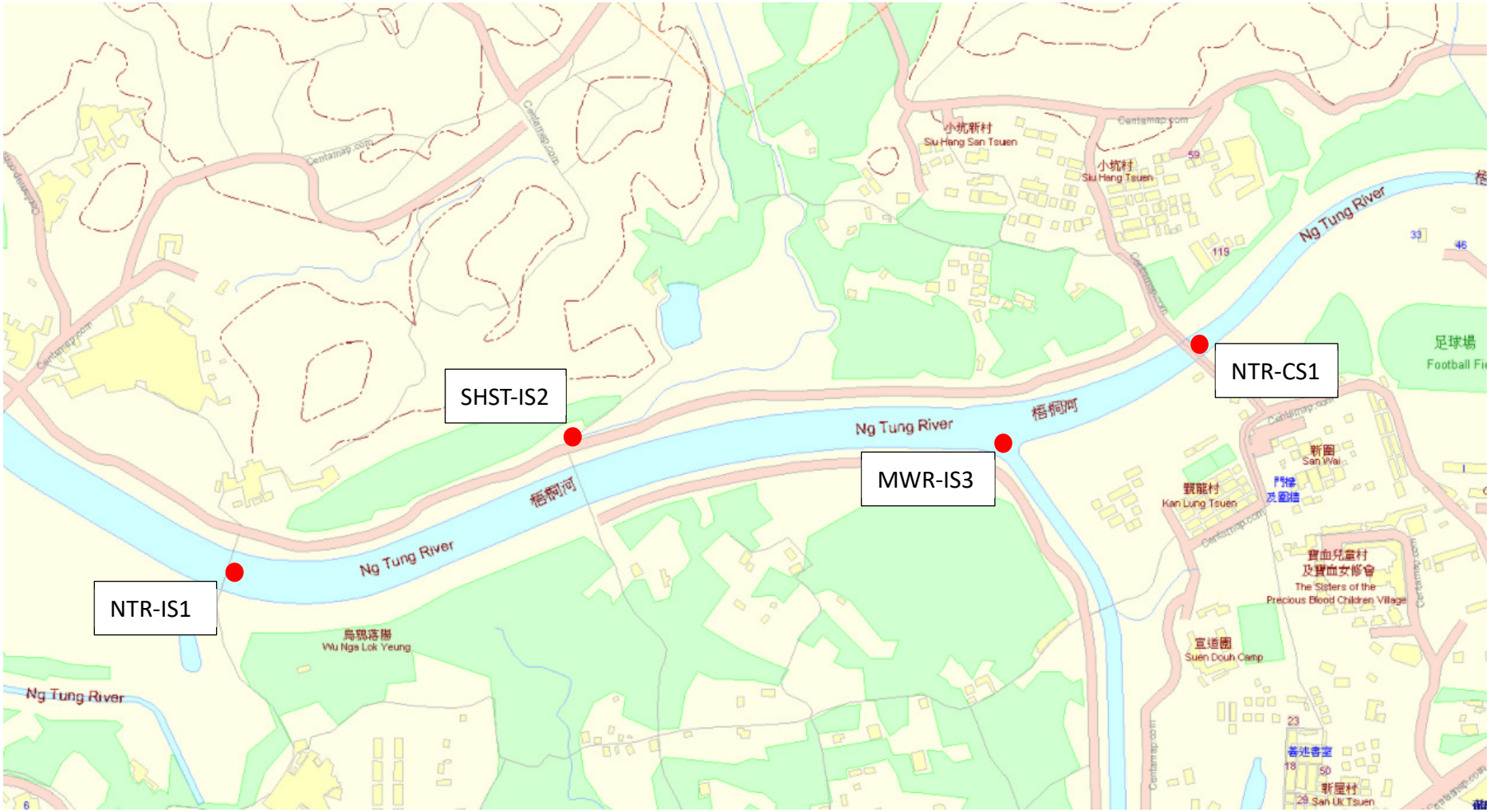
Table 2.1 Proposed Water Quality Monitoring Stations for Baseline and Construction Phase Monitoring

Station	Description	Locations	Measurement Periods
River Beas			
SYR-CS1	Control Station	Upstream of river	During the construction site drainage along River Beas and Construction of Footbridge across River Beas
SYR-IS1	Impact Station	Downstream of river	
River Indus and near Siu Hang San Tsuen Stream			
NTR-CS1	Control Station	Upstream of river	Construction of bridge across River Indus
NTR-IS1	Impact Station	Downstream of river	
SHST-IS2	Impact Station	Water sensitive receiver at near Siu Hang San Tsuen Stream	
MWR-IS3	Impact Station	Water sensitive receiver at near Ma Wat River	

Figure 1 – Location of Additional Water Quality Monitoring at River Beas (Sheung Yue River)



Figure 2 – Location of Additional Water Quality Monitoring at River Indus (Ng Tung River) and near Siu Hang San Tsuen Stream



3. Monitoring Parameters

3.1 The monitoring shall normally be established by measuring the Dissolved Oxygen (DO), temperature, turbidity, pH, Suspended Solids (SS) at all designated locations as specified in Section 2 above. The testing parameter, Arsenic is recommended for the water quality monitoring stations at River Beas due to the river flows through the existing areas of KTN NDA (with Arsenic-containing soil).

3.2 Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. DO, temperature, pH and turbidity should be measured in-situ whereas SS should be determined by an accredited laboratory.

3.3 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, weather conditions and any special phenomena or work underway at the construction site.

3.4 Measurements shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above river bed, except where the water depth is less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored.

4. Baseline Monitoring

4.1 Baseline conditions for water quality shall be established and agreed with EPD prior to commencement of related construction works in the rivers. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations.

4.2 The baseline conditions shall normally be established by measuring the water quality parameters as specified in Section 3. The measurement shall be taken at all designated monitoring stations, 3 days per week, for two or four weeks prior to the commencement of the works subject to the stability of the collected data.

4.3 There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

4.4 In the exceptional case when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

5. Impact Monitoring

5.1 The impact monitoring shall be conducted during the works period as presented in Table 2.1. The purpose of impact monitoring is to ensure the implementation of the recommended mitigation measures, provide effective control of any malpractices, and provide continuous improvements to the environmental conditions.

5.2 The monitoring shall be undertaken three days per week at all the designated monitoring stations. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit Levels, in which case the monitoring frequency will be increased.

5.3 The water quality parameters as specified in Section 3 shall be measured.

6. Monitoring Equipments

Dissolved Oxygen and Temperature Measuring Equipment

6.1 The dissolved oxygen (DO) measuring instruments should be portable and weatherproof. The equipment should also complete with cable and sensor, and DC power source. It should be capable of measuring:

- A DO level in the range of 0 – 20 mg/L and 0 – 200% saturation; and
- A temperature of 0 – 45 degree Celsius

6.2 The equipment should have a membrane electrode with automatic temperature compensation complete with a cable.

6.3 Should salinity compensation not be built-in to the DO equipment, in-situ salinity should be measured to calibrate the DO measuring instruments prior to each measurement.

pH Measuring Equipments

6.4 A portable pH meter capable of measuring a pH range between 0.0 and 14.0 shall be provided under the specified conditions (e.g., Orion Model 250A or an approved similar instrument).

Turbidity Measuring Equipments

6.5 The turbidity measuring instruments should be a portable and weatherproof with DC power source. It should have a photoelectric sensor capable of measuring turbidity level between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument).

Water Depth Detector

6.6 A portable, battery-operated echo sounder should be used for water depths determination at each designated monitoring station. The detector can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Water Sampler

6.7 A water sampler is required for SS and Arsenic (if any) monitoring. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Sample Containers and Storage

6.8 Water samples for SS and Arsenic (if any) determinations should be stored in high density polythene bottles with with appropriate preservatives added, packed in ice (cooled to 4°C without being frozen) and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

Calibration of In-situ Instruments

6.9 The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at quarterly basis throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring station.

Back-up Equipment

6.10 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, malfunction, etc.

6.11 A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency.

7. Laboratory Measurement / Analysis

7.1 At least 2 replicate samples from each independent sampling event are required for the suspended solids and Arsenic (if any) measurement which shall be carried in a HOKLAS or international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analysis for SS and Arsenic (if any) is presented in Table 7.1.

Table 7.1 Laboratory analysis for SS and Arsenic

Parameters	**Analytical Method**	**Reporting Limit**	**Detection Limit**
Suspended Solids (SS)	APHA 17ed 2540 D	2.5 mg/L	*0.5 mg/L

Arsenic (As)	In-house Method SOP 053 (ICP-ES) and SOP 076 (ICP-MS) [Ref. Method: APHA 19e 3030F 3b and 3120B, USEPA 3005A & 6020A]	1μg/L	0.2 μg/L

Remark: 1) * Limit of Reporting will be reported as Detection Limit

8. Quality Control

Field Logs

8.1 Field logs shall be maintained for all monitoring work, noting the date, equipments, monitoring manager and the record of all construction related activities and observations. The field log records shall be retained for the duration of the entire project and archived on completion.

8.2 In-situ monitoring results shall be digitally recorded from the instruments and converted into spreadsheet format or manually noted. Both hard and soft copies shall be retained for file records. Any deviation from the standard procedure and the reasons for deviation shall be noted in the log.

Measurement Procedures

8.3 All in-situ monitoring instruments shall be checked, calibrated and certified and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring, or as required by the manufactures specification. Certificate(s) of Calibration specifying the instrument shall be attached to the monitoring reports.

Sampling

8.4 The Contractor will record all data from in situ testing and from any analysis carried out in a Field Log. All samples will be identified with a unique date/time/location/depth/sample-type code which will be attached to the sample container or written in indelible ink directly on the container. In order to avoid contamination of the samples, all containers will be new and unused and of analytical grade quality. Sources of contamination will be isolated from the working area and any sample contaminated by local material will be discarded and the sampling repeated.

Transport of Samplers

8.5 All samples transferred from one sub-contractor to another will be accompanied by

Chain of Custody (COC) forms. Any missing or damaged samples require notification to ET Leader following logging in the laboratory QA system. The number of samples, the parameters to be tested and the time of delivery should be clearly stated on the COC forms to ensure that samples are analysed for the correct parameters and suitable time is provided to the analytical laboratory for provision of resources required in the analyses.

9. Action and Limit Levels

9.1 The Action and Limit Levels for water quality are defined in Table 9.1

Table 9.1 Action and Limit Levels for Water Quality

Parameters	Action Level	Limit Level
DO in mg/L (depth average) [1]	5 percentile of baseline data. [2]	4 mg/L or 1 percentile of baseline data. [2]
Turbidity in NTU (depth averaged) [1]	95 percentile of baseline data or 120% of upstream control station. [3]	99 percentile of baseline data or 130% of upstream control station. [3]
SS in mg/L (depth averaged) [1]	95 percentile of baseline data or 120% of upstream control station. [3]	20 mg/L or 99 percentile of baseline data or 130% of upstream control station. [3]
Arsenic in μg/L (depth average) (2)	95 percentile of baseline data or 120% of upstream control station[4]	50μg/L[4]

[1] "Depth-averaged" is calculated by taking the arithmetic mean of reading of all three depths. (Refer S3)

[2] For DO, non-compliance occurs when monitoring results is lower than the limits.

[3] For SS, turbidity, non-compliance occurs when monitoring results is larger than the limits.

[4] There is no local criterion for heavy metal. Limit Level of heavy metal is adopted from Category III Surface Water Quality Standards (GB3838-2002) (地表水環境質量標準), which applicable for Shenzhen River on mainland side.

10. Event and Action Plan

Should non-compliance of the criteria occur, action in accordance with the Action Plan in the Table 10.1 shall be carried out.

Table 10.1 Event / Action Plan for Water Quality

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action level being exceeded by one sampling day	1. Inform IEC, Contractor and ER; 2. Check monitoring data, all plant, equipment and Contractor's working methods; and 3. Discuss remedial measures with IEC and Contractor and ER.	1. Discuss with ET, ER and Contractor on the implemented mitigation measures; 2. Review proposals on remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the implemented mitigation measures; 2. Make agreement on the remedial measures to be implemented; 3. Supervise the implementation of agreed remedial measures.	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4.Check all plant and equipment; 5. Consider changes of working methods; 6. Discuss with ER, ET and IEC and purpose remedial measures to IEC and ER; and 7. Implement the agreed mitigation measures.
Action level being	1. Repeat in-situ measurement on next day	1. Discuss with ET, Contractor	1. Discuss with ET, IEC and	1. Identify source(s) of impact;

exceeded by more than one consecutive sampling days	of exceedance to confirm findings; 2. Inform IEC, Contractor and ER; 3. Check monitoring data, all plant, equipment and Contractor's working methods; 4. Discuss remedial measures with IEC, contractor and ER 5. Ensure remedial measures are implemented	and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	Contractor on the proposed mitigation measures; 2. Make agreement on the remedial measures to be implemented ; and 3. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.	2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of remedial measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed mitigation measures.
Limit level being	1. Repeat measurement on next day	1. Discuss with ET, Contractor	1. Discuss with ET, IEC and	1. Identify source(s) of

exceeded by one sampling day	of exceedance to confirm findings; 2. Inform IEC, Contractor and ER; 3. Rectify unacceptable practice; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Consider changes of working methods; 6. Discuss mitigation measures with IEC, ER and Contractor; and 7. Ensure the agreed remedial measures are implemented	and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; and 4. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.	impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures.

Limit level being exceeded by more than one consecutive sampling days	1. Inform IEC, contractor and ER; 2. Check monitoring data, all plant, equipment and Contractor's working methods; 3. Discuss mitigation measures with IEC, ER and Contractor; and 4. Ensure mitigation measures are implemented; and 5. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days	1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with ET, IEC and Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; 4. Discuss with ET and IEC on the effectiveness of the implemented mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed

			part of the dredging activities until no exceedance of Limit level.	remedial measures. 7. As directed by the ER, to slow down or stop all or part of the dredging activities until no exceedance of Limit level.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer's Representative