JOB NO.: TCS00715/14

TUEN MUN - CHEK LAP KOK LINK
CONTRACT NO. HY/2013/12 –
NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS

CONTRACT SPECIFIC ENVIRONMENTAL MONITORING AND AUDIT (EM&A) MANUAL

PREPARED FOR
CRBC AND KADEN JOINT VENTURE

Date	Reference No.	Prepared By	Certified By
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20 March 2014

By Fax (2293 6300) and By Post

AECOM
Supervising Officer Representative's Office
No. 8 Mong Fat Street, Tuen Mun,
New Territories, Hong Kong

Attention: Mr. Roger Man

Dear Roger,

Re: Agreement No. CE 48/2011 (EP)
Environmental Project Office for the
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and Tuen Mun-Chek Lap Kok Link – Investigation

Contract No. HY/2013/12 TM-CLKL Northern Connection Toll Plaza and Associated Works
Contract Specific EM&A Manual

Reference is made to the Contract Specific EM&A Manual certified by the ET Leader (AUES reference: TCS00715/14/600/R0015v3 dated 20 March 2015) provided to us via e-mail on 20 March 2015.

Please be informed that we have no adverse comment on the EM&A Manual.

Thank you for your kind attention. Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y. H. Hui should you have any queries.

Yours sincerely,

F. C. Tsang
Independent Environmental Checker
Tuen Mun – Chek Lap Kok Link

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1 INTRODUCTION

1.1 BACKGROUND INFORMATION

1.1.1.1 According to the findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway (NLH) will be operating beyond capacity after 2016 due to the increase in cross boundary traffic, developments in the NWNT, and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new connections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

1.1.1.2 The proposed TM-CLKL if combined with the TMWB will provide a direct route linking NWNT and North Lantau, from north to south, the Kong Sham Western Highway (KSWH), port back-up areas in NWNT, Tuen Mun River Trade Terminal, the existing EcoPark in Tuen Mun Area 38, the Airport, the proposed LLP, HZMB and North Lantau developments. The new connection will significantly reduce the travelling time between the KSWH and the NWNT region at its northern side, and North Lantau at its southern side.

1.1.1.3 In 2005, Highways Department (HyD) commissioned an engineering feasibility study (FS), namely Tuen Mun Chek Lap Kok Link and Tuen Mun Western Bypass – Feasibility Study (Agreement No. CE 28/2005 (HY)), to evaluate the technical feasibility and impacts of the Project. The FS recommended that the TM-CLKL should be a dual 2-lane road with a total length of about 9 km with about 4 km long submarine tunnel and 5 km long elevated structure.

1.1.1.4 In order to progress this project, Maunsell Consultants Asia Ltd. were appointed by HyD to carry out the Assignment on Tuen Mun – Chek Lap Kok Link - Investigation under Agreement No. CE 52/2007 (HY). The Assignment commenced on 19 May 2008 and shall be completed within 24 months, i.e. by mid-May 2010.

1.1.1.5 The Feasibility Study initially proposed an alignment of the TM-CLKL comprising a toll plaza island at Tai Mo To and this alignment formed the basis of the EIA Study Brief (ESB 175/2007). However, subsequent to these documents being prepared and based upon the proposed schemes for the Hong Kong-Zhuhai-Macao Bridge (HZMB) and Hong Kong Boundary Crossing Facilities (HKBCF), it was decided to integrate the TM-CLKL southern landfall reclamation with the HKBCF reclamation. It was considered that this arrangement would also provide a cost-effective connection between the HKBCF and North Lantau. Following a full option assessment, the preferred scheme was selected, as detailed in Section 2 of this EM&A Manual.

1.1.1.6 The project is a designated project under Section A.1 of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). As such, the statutory procedures under the EIAO need to be followed and an environmental permit (EP) will be required prior to the commencement of construction. Thus, as part of this assignment, an Environmental Impact Assessment (EIA) has been undertaken.

1.1.1.7 The EIA for the project has recommended comprehensive Environmental Monitoring and Audit requirements to be undertaken during the design, construction and operational stages of the project. This Report constitutes the Environmental

Monitoring and Audit (EM&A) Manual for the proposed Tuen Mun - Chek Lap Kok Link (TM-CLKL) Project, providing details of the EM&A recommendations.

1.1.1.8 The Hong Kong SAR Government's applicable environmental regulations for noise, air quality, ecology, water quality, landscape and visual resources and waste management and heritage protection, the Hong Kong Planning Standards and Guidelines and recommendations in the TM-CLKL EIA Report have served as guidance documents in the preparation of this Manual. This EM&A Manual fulfills the requirements of the Study Agreement and follows the approach recommended in EPD's Generic EM&A Manual, Annex 21 of the Technical Memorandum on the EIA Process and EM&A Guidelines for Development Projects in Hong Kong.

1.2 POLICY

1.2.1.1 The Engineer's Representative (ER) and the Contractor shall adopt Environmental Policy Statements in accordance with the requirements of this Manual in order to foster a sound EM&A programme to protect the environment. The following policy statements shall be adopted:

- establish a commitment to environmental excellence in all activities arising from the development project;
- encourage the adoption of environmental management principles to prevent potential impacts and minimize adverse impacts; and
- commit to the recommendations in the EIA study report and related EIA process requirements.

1.3 EM&A PROGRAMME OBJECTIVES

1.3.1.1 The broad objective of this EM&A Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the TM-CLKL project during design, construction and implementation.

1.3.1.2 The manual provides details of the environmental monitoring requirements arising from the EIA including air, noise and water quality, as well as audit recommendations for the noise, air, water quality, ecology, landscape and visual, waste and cultural heritage. The purposes of the defined EM&A programme are as follows:

- to ensure the specified mitigation recommendations of the EIA are included in the design of the project;
- to clarify and identify sources of pollution, impact and nuisance arising from the works;
- to confirm compliance with legal, contract specifications and EIA study recommendations;
- to provide an early warning system for impact prevention;
- to provide a database of environmental parameters against which to determine any short term or long term environmental impacts;
- to propose timely, cost-effective and viable solutions to actual or potential environmental issues;
- to monitor performance of the mitigation measures and to assess their effectiveness and, whenever necessary, identify any further need for additional measures;
- to verify the EIA predicted impacts;
- to collate information and evidence for use in public, District Council and

Government consultation; and

- to audit environmental performance.

1.3.1.3 EM&A procedures are required during the design, construction and operational phases of the project implementation and a summary of the requirements for each of the environmental parameters is detailed in ***Table 1.1*** below.

Table 1.1 Summary of EM&A Requirements

Parameter	EM&A Phase		
	Design	**Construction Phase**	**Operational Phase**
Air Quality		Y	
Noise	Not relevant to the Northern Connection Toll Plaza and Associated Works since there is no noise sensitive receiver identified for the Project area at Tuen Mun.		
Ecology	Y	Y	Y
Water Quality	The major construction activity of Northern Connection Toll Plaza and Associated Works is land based and no water quality monitoring is therefore required.		
Landscape and Visual	Y	Y	Y
Waste/Contaminated Land		Y	
Cultural Heritage	Y	Y	

Remarks: Y = Yes

1.4 SCOPE OF THE EM&A PROGRAMME

1.4.1.1 The scope of the EM&A programme is to undertake the following:

a.) Implement monitoring and audit activities for each environmental parameter as follows:

Dust:
i. Establish baseline dust levels at specified locations and review these levels on a regular basis.
ii. Implement construction dust impact monitoring programme.

Noise:
i. ***Not relevant to Toll Plaza***.

Ecology:
i. Implement design phase audit for integrated ecological mitigation measures.
ii. Implement baseline survey to establish existing ecological conditions.
iii. Implement construction phase monitoring and audit requirements for ecology resources.
iv. Implement operational phase monitoring.

Water Quality:
i. ***Not relevant to Toll Plaza***.

Landscape and Visual:
i. Design detailed landscape specifications.
ii. Implement baseline survey to establish/confirm existing landscape and visual conditions.
iii. Implement construction phase audit requirements for landscape and visual resources.
iv. Implement operational phase audit requirements for landscape and visual aspects.

Waste:
i. Implement construction phase audit requirements for waste

aspects.

Heritage:
i. Implement design phase audit for toll plaza design to ensure set back from grave as been integrated.
ii. Implement walkover survey to confirm existing conditions.
iii. Implement construction phase audit requirements for historical resources.

b.) Liaison and provision of advice to construction site staff on the purposes and implementation of the EM&A programme.

c.) Identify and resolve environmental issues that may arise from the project.

d.) Check and quantify the Contractor's overall performance, implement Event/Action Plans and recommend and implement remedial actions to mitigate adverse environmental effects as identified by the EM&A programme and EIA.

e.) Conduct monthly reviews of monitored impact data during the construction phase and bi-monthly reviews during the operational phase as the basis for assessing compliance with defined criteria and ensuring that necessary mitigation measures are identified, designed and implemented and to undertake additional ad hoc monitoring and audit as required by particular circumstances.

f.) Evaluate and interpret all environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards and to verify the environmental impacts predicted in the EIA.

g.) Manage and liaise with other individuals or parties concerning any relevant environmental issues.

h.) Audit the effectiveness of the Environmental Management System (EMS) practices and procedures and implement any changes as appropriate.

i.) Conduct regular site audits of formal or informal nature to assess:
- the level of the Contractor's general environmental awareness;
- the Contractor's implementation of the recommendations in the EIA;
- the Contractor's performance as measured by the EM&A;
- the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
- to advise the site staff of any identified potential environmental issues.

j.) Submit EM&A reports which summaries project monitoring and auditing data, with full interpretation, illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

1.4.1.2 Thus, this EM&A Manual provides the following information:

a.) Description of the project.

b.) Identification and recommendations for monitoring requirements for all phases of development, including:
- identification of sensitive receivers;
- monitoring locations;
- monitoring parameters and frequencies;
- monitoring equipment to be used;
- programmes for baseline monitoring and impact monitoring; and
- data management of monitoring results.

c.) The organization management structure and procedures for auditing of the

Project and implementation of mitigation measures that are recommended for the Project.

d.) The environmental quality performance limits for compliance auditing for each of the recommended monitoring parameters to ensure compliance with relevant environmental quality objectives, statutory or planning standards.

e.) Organization and management structure, and procedures for reviewing the design submissions, monitoring results and auditing the compliance of the monitoring data with the environmental quality performance limits, contractual and regulatory requirements, and environmental policies and standards.

f.) Event and Action plans for impact and compliance procedures.

g.) Complaints handling, liaison and consultation procedures.

h.) Interim notification of exceedances, reporting procedures, report formats and reporting frequency including periodical quarterly summary reports and annual reviews to cover all construction, post-Project and operational phases of the development.

i.) Implementation schedules, summarizing all recommended mitigation measures.

1.4.1.3 This Manual is considered to be a working document and should be reviewed periodically and revised once substantial changes have been made.

1.5 PROJECT ORGANIZATION

1.5.1.1 For the purpose of this EM&A Manual, the Highways Department of the Hong Kong SAR Government is referred to as the "Employer" and the Project "Engineer" defined as the Engineer's Representative (ER), who will be responsible for the supervision of the construction of the Project.

1.5.1.2 The mitigation/enhancement measures recommended by the TM-CLKL EIA that will require a design audit or preparation of specifications during the detailed design phase of the project will include:

- installation of hoarding for the protection of the pitcher plants and surrounding habitat;
- design of toll plaza for grave G1 set back and protection; and
- landscape design drawings.

1.5.1.3 In respect of the design phase EM&A, the Consultant commissioned to undertake the Detailed Design contract will be required to designate an auditor(s) to undertake the preparation of the design specifications as detailed above, in addition to an environmental audit of the design of the specified landscape measures in order to ensure that the recommendations of the EIA have been fully and properly specified. The Consultant shall use suitably qualified staff to undertake the audit requirements to the satisfaction of the EPD and the AFCD as appropriate. A flow chart of the design phase EM&A procedures is shown in ***Figure 1.1***.

1.5.1.4 During the construction and operational phases of the project, an Environmental Team (ET) is to be employed by the Contractor. The ET will be headed by an Environmental Team Leader (ETL). He shall ensure the Contractor's compliance with the project's environmental performance requirements during construction and undertake the post construction EM&A works and his responsibilities will include field measurements, sampling, analysis of monitoring results, reporting and auditing.

The ETL shall be approved by the ER and the Director of Environmental Protection (DEP) and shall be competent and shall have at least 7 years relevant environmental monitoring and audit experience on projects of a similar scale and nature.

1.5.1.5 The ET will comprise suitably qualified support staff to carrying out the EM&A programme. The ET shall be independent and shall not be in any way connected to the Contractor's company. Due to the specialist nature of some of the EM&A works required for this project, the ET should comprise professionals proficient to undertake the tasks involved. Thus, the ET should include personnel experienced in dust monitoring and mitigation, supervision of waste management and compensatory tree planting.

1.5.1.6 Accordingly, a Registered Landscape Architect, as defined by the Landscape Architect's Registration Board, will be required on the ET to monitor and audit the landscaping installation works and assist in the audit of the ecological transplantation and restoration works.

1.5.1.7 The overall duties of ETL and the team are as follows:

- Sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements in respect of noise, dust and water quality.
- Environmental site surveillance.
- Audit of compliance with environmental protection and pollution prevention and control regulations.
- Monitor the implementation of environmental mitigation measures.
- Monitor compliance with the environmental protection clauses/specifications in the Contract.
- Review construction programme and comment as necessary.
- Review construction methodology and comment as necessary.
- Complaint investigation, evaluation and identification of corrective measures.
- Audit of the EMS and recommend and implement any changes as appropriate.
- Liaison with the Independent Environmental Checker IEC) on all environmental performance matters.
- Advice to the Contractor on environmental improvement, awareness, enhancement matter, etc., on site.
- Timely submission of the designated EM&A reports to the ER, the IEC, the DEP, the AFCD and the AMO as appropriate.

1.5.1.8 In addition to the ETL and ET, an Independent Environmental Checker (IEC) shall be employed to advise the ER on environmental issues related to the project. The role of the IEC shall be independent from the management of construction works, but the IEC shall be empowered to audit the environmental performance of the construction activities and operational mitigation. The IEC shall have project management experience in addition to the requirements of the ET specified above and the appointment of the IEC will be subject to the approval of the ER and the DEP. The IEC may require specialist support staff in order to properly carry out his duties, which shall include the following:

- Review and audit all aspects of the EM&A programme.
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers.
- Carry out random sample check and audit on monitoring data and sampling

procedures, etc.

- Conduct random site inspection.
- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site.
- Review the effectiveness of environmental mitigation measures and project environmental performance.
- Audit the Contractor's construction methodology and agree the least impact alternative in consultation with the ET and the Contractor.
- Check complaint cases and the effectiveness of corrective measures.
- Review EM&A report submitted by the ET.
- Feedback audit results to ET by signing off relevant EM&A proformas.

1.5.1.9 An organization chart showing the lines of communication between the key parties with respect to the EM&A works is provided on ***Figure 1.2***. Both the ET and IEC shall be retained for the duration of the EM&A works which will span both the construction phase and one year into the operational phase of the project. The operational EM&A works will be the responsibility of the Contractor and will be undertaken in parallel to the maintenance period after the completion of construction.

1.5.1.10 Notwithstanding the above, given that the TM-CLKL, HKBCF and HKLR will be constructed concurrently, an Environmental Protection Office (ENPO) or equivalent to oversee the cumulative construction projects in North Lantau area will be established by the Project Proponent. The responsibility of the ENPO would be similar to that of the IEC but should also include:

- coordination of the monitoring and auditing works for all the on-going projects in the area in order to identify possible sources/causes of exceedances and recommend suitable remedial actions where appropriate;
- identify and assess cumulative impacts including possible sources/causes of exceedance and recommending suitable remedial actions;
- undertake liaison with the mainland project teams counterparts to identify and assess any cross-boundary cumulative impacts; and
- coordinate the assessment and response to complaints/enquires from locals, green groups, district councils or the public at large.

1.5.1.11 The exact responsibilities and organization of the ENPO will be defined during the detailed design stage.

1.6 TERMINOLOGY

1.6.1.1 To clarify the terminology for impact monitoring and audit, key definitions are specified below and are used throughout this Manual.

1.6.1.2 Monitoring refers to the systematic collection of data through a series of repetitive measurements. The stages of monitoring are defined in this document as follows:

a.) Baseline Monitoring refers to the measurement of air quality parameter during a representative pre-project period for the purpose of determining the nature and ranges of natural variation and to establish, where appropriate, the nature of change.

b.) Impact Monitoring involves the air quality measurement of environmental parameter, during Project construction and implementation so as to detect changes in the parameter which can be attributed to the Project.

1.6.1.3 Audit is a term that infers the verification of a practice and certification of data. The types of audit are defined below:

a.) Compliance audit is defined as follows:

- the process of verification that all or selected parameters measured by a noise or air quality impact monitoring programme or levels of an operation are in compliance with regulatory requirements and internal policies and standards; and
- the determination of the degree and scope of any necessary remediation in the event of exceedance of compliance.

b.) Post Project Audit is carried out after the implementation and commissioning of a Project.

1.6.1.4 For the purpose of air impact monitoring and audit, the Action and Limit Levels are defined as follows:

a.) The Action Level is the level defined in which there is an indication of a deteriorating ambient level for which a typical response could be an increase in the monitoring frequency.

b.) The Limit Level is the level beyond the appropriate remedial pollution control ordinances, air quality objectives or Hong Kong Planning Standards and Guidelines established by the EPD for a particular project, such that the works should not proceed without appropriate remedial action, including a critical review of plant and work methods.

2 PROJECT DESCRIPTION

2.1 SCOPE OF THE PROJECT

2.1.1.1 Further to the recommendations of the Option Assessment and subsequent alignment developments detailed in Section 2 of the EIA report, the preferred TM-CLKL scheme comprises Northern Connection Option N1b, Main Connection Option M3 and Southern Connection Option S1. This preferred alignment is shown in ***Figure 2.1*** and will comprise:

(a) construction of approximately 5.0km long dual 2-lane road tunnel between Tuen Mun Area 40 and the HZMB HKBCF at north-east of HKIA;

(b) construction of approximately 4.2km seawalls and approximately 35.6ha of reclamation to the Government foreshore and sea-bed at Tuen Mun Area 40 and Lantau for the tunnel portals and the associated roads, as shown in ***Figures 2.2a*** and ***2.2b***;

(c) construction of approximately 1.6km long dual 2-lane viaduct between HZMB HKBCF and NLH and the associated roads at Tai Ho;

(d) construction of a toll plaza at Tuen Mun Area 46 and the associated roads at Tuen Mun;

(e) construction of footpaths areas;

(f) construction of administration building, ventilation buildings and other ancillary buildings to facilitate ventilation and tunnel control operation serving the proposed road tunnel in (a) above and toll plaza in (d) above;

(g) modification and realignment of sections of Lung Fu Road and Lung Mun Road at Tuen Mun;

(h) modification and realignment of sections of North Lantau Highway and Cheung Tung Road at Tai Ho;

(i) permanent closure and demolition of sections of existing at-grade carriageways, footpaths and central median/refuge islands;

(j) temporary closure and reconstruction/modifications of sections of existing at-grade carriageways, footpaths and central median/refuge islands; and

(k) ancillary works including site formation, slope, drainage, utilities, footbridge, noise barriers, retaining walls, berths and temporary pontoon.

2.1.1.2 Details of the various elements of the selected TM-CLKL alignment are detailed in the sections below.

2.2 NORTHERN SECTION IN TUEN MUN

2.2.1 Northern Reclamation (Not used)

2.2.2 Viaduct Connection and Slip Roads (Not used)

2.2.3 Toll Plaza

2.2.3.1 A toll plaza at Tuen Mun Area 46 is proposed for the TM-CLKL, as shown in detail in ***Figures 2.4a to 2.4e***. The toll plaza is also considered as a co-location to accommodate the tolling provision for the interface project, TMWB. In order to facilitate the tunnel operator(s) applying different toll levels to TM-CLKL and TMWB road users, the following 3 separate groups of toll booths are proposed to be provided at the toll plaza:

- travelling from/to TM-CLKL only;
- travelling from/to TMWB only; and
- travelling from/to both TM-CLKL and TMWB.

2.2.3.2 The proposed toll plaza is approximately 190m x 680m in size, with tunnel operation facilities located at the northern side of the site. With reference to the latest traffic forecast at year 2031, the required number of tolling lanes for different travelling trips are summarised in **Table 2.1** below:

Table 2.1 Proposed Tolling Arrangements at Toll Plaza

Travelling Trip	Northbound		Southbound		Sub-total
	Auto-toll Lane	Manual-toll Lane	Auto-toll Lane	Manual-toll Lane	
TM-CLKL only	2	2	2	2	8
TMWB only	2	2	2	2	8
Both TM-CLKL & TMWB	2	2	2	3	9
Total:					25

2.2.3.3 The nearside tolling lane for each direction is proposed to be 6.2m wide, for the passage of exceptionally wide vehicles and special vehicles such as tunnel operator's vehicles or other authorized vehicles. The other tolling lanes are proposed to be 3.65m wide in order to allow the flexibility of switching between manual-toll and auto-toll if necessary. A 1.6m wide physical island will be provided to accommodate the toll booth, the access staircase landing and the concrete median barriers.

2.2.3.4 The following facilities are required at the toll plaza area for tunnel operations:

- an administration building which could cater for 2 tunnel operators (including individual workshops, garage and maintenance buildings);
- a weigh station;
- a vehicle recovery area;
- turnaround facilities;
- vehicle cross-over area;
- a petrol filling station;
- bus lay-bys with footbridge links; and
- parking spaces for employees, visitors, recovery, operation and maintenance vehicles.

2.2.3.5 The southwest end of the toll plaza will connect with both northbound and southbound of the TM-CLKL. In order to tie in with the lane configuration of TM-CLKL, both 3-lane and 2-lane carriageways will be provided at the toll plaza for TM-CLKL northbound and southbound traffic respectively. Roads connecting traffic heading to or coming from the TMWB will, also, be provided between the toll plaza and TMWB tunnel portal.

2.2.3.6 A dual single-lane carriageway linking the proposed enlarged roundabout at the junction of Lung Mun Road / Mong Tat Street and the TMWB mainline tunnel will be provided in between the northbound and southbound carriageways of the TM-CLKL.

2.2.3.7 Traffic from the Tuen Mun south road network destined for TM-CLKL will use the approach single carriageway slip road branching from the proposed roundabout at Lung Mun Road and Lung Fu Road. The traffic from TM-CLKL leading to the Tuen Mun south road network will use the exit slip road after leaving the toll booth. The slip road, which takes the form of a single carriageway tunnel, will connect with the proposed roundabout at Lung Mun Road and Lung Fu Road.

2.2.3.8 An internal 7.3m wide 2-way service road providing the turnaround service route around the portal area will also be provided, with a 2.0m wide footpath provided on one side of the road. An ingress/egress is proposed at both ends of the toll plaza to allow for access of tunnel operation, recovery and emergency vehicles.

2.2.3.9 The toll plaza will be formed as a raised platform above the general existing ground. It will be partly constructed on fill supported by retaining walls, and partly constructed on elevated structures. Cut slopes will also be required, which will mostly be along the northern edge of the toll plaza, with some isolated ones associated with the formation of the various slip roads connecting the toll plaza to the local roads in Tuen Mun. The excavated materials from the cut slopes will be re-used for the filling as part of the earthwork balancing exercise.

2.2.3.10 In order to cope with the proposed layout of the toll plaza, the existing Lung Mun Road will have to be realigned sideway to the south by about 30m to suit. An alternative option of providing a decking support for the portion of the toll plaza overhanging the existing Lung Mun Road has, also, been considered as viable.

2.2.3.11 The current layout of the toll plaza, on the basis of co-locating the tolling provision for both the TM-CLKL and TMWB, represents the worst cases scenario for the EIA purposes in so far as the scale and extent of works are concerned, as the combined toll plaza requires a larger land take than a single, TM-CLKL only, toll plaza. The option remain, however, to separate the tolling facilities and/or to adopt “non-tolling” for TMWB, which could result in a “single” toll plaza of a smaller scale.

2.2.3.12 As described in Section 1 and 2, the EIA Study Brief (ESB 175/2007), was based upon a toll plaza being located on either the northern or southern landfall reclamation and, therefore, did not interface with the 250m Consultation Zone of the Pillar Point Valley Landfill and, therefore, no specific requirements for a landfill gas hazard assessment were included in the EIA Study Brief. However, as shown in ***Figures 2.4f***, the proposed location of the combined toll plaza will encroach into the 250m consultation zone of the Pillar Point Valley Landfill and, as such, could be affected by the migration of landfill gas. Notwithstanding the scope of the EIA Study Brief, this issue should be assessed as part of the EIA and, therefore, a Landfill Gas Hazard Assessment has been undertaken as part of this Assignment.

2.2.4 Other Construction Works

2.2.4.1 Site formation and associated slopes and retaining walls will be required to form the toll plaza and associated road carriageways. In general, soil and rock cut slopes would be involved. All slopes will be formed in a stable slope angle with proper maintenance access and drainage surface channels. If necessary, soil nails will be installed to ensure adequate current safety standard. Fill slope formation will unlikely be required according to the current road alignment. The feasible retaining wall structures could be mass concrete, reinforced concrete L-shape or crib walls and reinforced earth for road embankment.

2.3 SUBMARINE TUNNEL (NOT USED)

2.4 SOUTHERN SECTION AT HKBCR/ NORTH LANTAU (NOT USED)

2.5 WORKS AREAS

2.5.1.1 Six works areas have been identified for use during the construction period of

TM-CLKL, and will be used for locating site offices and for storage of materials and viaduct segments, etc. The locations of the works areas are shown in ***Figures 2.8a*** and ***2.8b*** and described in ***Table 2.2*** below.

Table 2.2 Details of TM-CLKL Proposed Works Areas

Works Area	Location	Proposed Use
Lantau #		
WA4	At the existing reclaimed land near Tai Ho Offtake and Pigging Station at Cheung Tung Road in Lantau	Works area for storage of materials and viaduct segment and site office
WA5	At the existing site offices for Yam O Road Watermains near Yam O Wan at Cheung Tung Road in Lantau	Works area for storage of materials and viaduct segment and site office
WA6	At the existing site offices and storage yard for Penny's bay Reclamation near Yam O Wan at Cheung Tung Road in Lantau	Works area for storage of materials and viaduct segment and site office
WA23	At the existing reclaimed land at Wok Tai Wan in Tsing Yi	Casting yard for fabrication of precast units, storage of work boats, materials and site office
Tuen Mun		
WA18	At the existing River Trade Golf at Pillar Point in Tuen Mun	Works area for storage of materials and viaduct segment and site office
WA19	At the existing closed Pillar Point Valley Landfill at Pillar Point in Tuen Mun	Works area for storage of materials and viaduct segment and site office

 # Works Area Lantua is not relevant to Toll Plaza

2.5.1.2 All the works areas are currently formed on developed land, with some already being used as works areas for on-going construction projects. The exception to this is WA19 which is within the Pillar Point landfill area, and the site as a whole is largely covered with vegetation with only a relatively small portion formed and utilized. However, the terms for use of this site during the TM-CLKL construction requires that no trees will be removed and therefore, only the already formed areas will be utilized. In addition, all the sites are located away from any residential areas.

2.6 SEWAGE AND DRAINAGE

2.6.1.1 Stormwater drainage systems will be provided to collect stormwater from the carriageway surfaces. The stormwater will enter into gullies along the kerb lines. The gullies will be fitted with sumps to trap silt and grit prior to discharging the stormwater into the stormwater drainage systems. The drainage systems will eventually discharge the stormwater into the sea at discrete locations. Similar systems will be provided along the marine viaduct. Sump traps will be built into the deck structure, and the collected stormwater will discharge into the sea at the column locations.

2.6.1.2 Operational sewage will be generated but, again, in relatively small quantities as summarized in ***Table 2.3*** below, based upon the staffing estimates required for the TM-CLKL project.

Table 2.3 Estimated Sewage Generation

Location	Staff	Average Dry Weather Flow (m^3/day)
Toll Plaza	110	38.5

2.6.1.3 In Tuen Mun, the sewage (Average Dry Weather Flow (ADWF)) from the toll plaza and northern ventilation building is estimated to be about 178m^3 per day and with about 510 personnel on site in total. The sewage will be discharged to the existing sewerage system and it is expected that that adequate capacity in the local system to accommodate this amount is available.

2.6.1.4 Not relevant to Toll Plaza EM&A programme

2.7 PROJECT PROGRAMME

2.7.1.1 It is anticipated that construction for the TM-CLKL will commence in late 2014, with a target opening date for the entire road link at the end of 2016. An indicative construction programme showing the key activities in different major construction areas is shown in ***Figures 2.9a***. Locations of the construction areas referenced in the construction programme are shown in ***Figures 2.9c***. This is based upon working 12 hours per day for all land works.

2.7.1.2 Not used.

2.7.1.3 Not used.

2.7.1.4 Not used.

2.7.1.5 Not used.

2.8 CONCURRENT PROJECTS

2.8.1 Interface with HKBCF and HZMB HKLR

2.8.1.1 Not used.

2.8.1.2 As the projects HKBCF, HKLR and TM-CLKL are proposed to be constructed concurrently and will be operational at the same time, cumulative impacts are possible and have been assessed.

2.8.2 Interface with Tuen Mun Western By-pass

2.8.2.1 The construction of the TMWB is tentatively planned to commence in late 2011 and be completed by late 2016. The TMWB southern tunnel and its portal will abut with the toll plaza and will interface with the TM-CLKL (see ***Figures 2.4a and 2.4b***). Interface of construction activities, including construction access, temporary stockpile area within the toll plaza site for processing, sorting, stockpiling of excavated material from the TMWB tunnel, and any blasting impacts from the drill and blast tunnelling method of the TMWB southern tunnel, will require detailed coordination during the construction phase. As the projects are proposed to be constructed concurrently and will be operational at the same time, cumulative impacts are possible and have been assessed.

2.8.3 Other Concurrent Projects

2.8.3.1 In addition to the interface with the major concurrent projects described above, details of other concurrent projects during either the construction and/or the operational phases, together with details of how these are assessed in the EIA, are described in the summary table of concurrent projects included as *Appendix A2* of the

EIA report.

2.9 TRAFFIC DATA AND ASSUMPTIONS

2.9.1.1 A Local Area Model was developed to provide traffic forecasts for EIA purposes. The EIA requires cumulative traffic forecasts and, hence, EIA flows were produced assuming the HZMB, HKLR, HKBCF, TMWB and TM-CLKL were all in place. In order to achieve consistency, a consistent set of model input assumptions have been adopted for the interfacing studies of TM-CLKL, HKBCF, HKLR and TMWB.

2.9.1.2 The TMWB was assumed to be "non-tolled" for the purposes of the TM-CLKL EIA forecasts. This would make a marginal difference to the predicted TM-CLKL traffic forecasts, increasing the traffic flows slightly and, therefore, would represent a potentially worst case for assessing the environmental impacts. The traffic flows have been divided into the 16 vehicle classes required to determine the emissions of the traffic.

2.9.1.3 The opening year for the whole TM-CLKL, i.e. both northern and southern sections, is 2016. Design year peak hour traffic forecasts have, therefore, been prepared for the years 2016, 2021 and 2031 which reflect the full operation of the TM-CLKL. In addition, to assess the environmental impacts at the interim year of 2014, when the southern section will be opened to form part of the new road network servicing the HKBCF Phase 1 commissioning, the relevant traffic forecasts for this year have also been prepared. A summary of the traffic data for the prevailing year of 2007 and the future years of 2014, 2016, 2021 and 2031 and the road links are included in the EIA Report.

3 AIR QUALITY

As per Condition 2.4 of the EP of TM-CLKL, an enhanced monitoring plan on TSP level at Tuen Mun ("the Enhanced TSP Monitoring Plan") is required to be submitted to the DEP for approval at least 1 month before the commencement of construction of the Project. Details of the Enhanced TSP Monitoring Plan are provided in this Contract specific EM&A Manual. The air quality monitoring work under this Contract and Contract HY/2012/08 will follow the monitoring requirement of enhanced TSP monitoring under the project.

3.1 AIR QUALITY PARAMETERS

3.1.1.1 Monitoring of the Total Suspended Particulates (TSP) levels shall be carried out by the Environmental Specialist (ET) (see Section 1) to ensure that construction works are not generating dust which exceeds the acceptable level. Timely action should be taken to rectify the situation if an exceedance is detected.

3.1.1.2 1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The 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), *Appendix B*. Upon approval by the Engineer's Representative (ER) and the Environmental Protection Department (EPD), 1-hour TSP levels may be measured by direct reading methods for ad hoc measurements.

3.1.1.3 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, any other special phenomena and work progress of the concerned site shall be recorded in detail by the ET. A sample data sheet is shown in ***Figure 3.1***.

3.2 MONITORING EQUIPMENT

3.2.1.1 A high volume sampler in compliance with the following specifications shall be used for carrying out the 1-hr and 24-hr TSP monitoring:

(i) 0.6-1.7 m3/min (20-60 SCFM) adjustable flow range;
(ii) equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
(iii) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
(iv) capable of providing a minimum exposed area of 406 cm2 (63 in^2);
(v) flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
(vi) equipped with a shelter to protect the filter and sampler;
(vii) incorporated with an electronic mass flow rate controller or other equivalent devices;
(viii) equipped with a flow recorder for continuous monitoring;
(ix) provided with a peaked roof inlet;
(x) equipped with a manometer;
(xi) able to hold and seal the filter paper to the sampler housing in a horizontal position;
(xii) easy to change the filter; and
(xiii) capable of operating continuously for 24-hr period.

3.2.1.2 The Contractor is responsible for provision of the monitoring equipment and shall

ensure that sufficient numbers of high volume samplers with an appropriate calibration kit are available for carrying out the baseline monitoring, impact monitoring and ad hoc monitoring. The high volume samplers 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 by the ET.

3.2.1.3 Calibration of dust monitoring equipment shall be conducted by the ET upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by concerned parties, such as the IEC. All the data shall be converted into standard temperature and pressure condition.

3.2.1.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and recorded in the data sheet as described in ***Section 3.1***.

3.2.1.5 If the ET proposes to use a direct reading dust meter to measure 1-hr TSP levels on an ad hoc basis, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that the High Volume Sampler (HVS) and may be used for the 1-hr sampling. The instrument should also be calibrated regularly and the 1-hr sampling shall be checked periodically by the HVS to check the validity and accuracy of the results measured by the direct reading method.

3.2.1.6 Wind data monitoring equipment shall also be provided and set up at suitable locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the ER, in consultation with the IEC.

3.2.1.7 For installation and operation of wind data monitoring equipment, the following points shall be observed:

(i) the wind sensors should be installed on masts at an elevated level 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;

(ii) the wind data should be captured by a data logger to be down-loaded for processing at least once a month;

(iii) the wind data monitoring equipment should be re-calibrated at least once every six months; and

(iv) wind direction should be divided into 16 sectors of 22.5 degrees each.

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

3.3 LABORATORY MEASUREMENT/ANALYSIS

3.3.1.1 A clean laboratory with constant temperature and humidity control and equipped with necessary measuring and conditioning instruments shall be used for sample analysis and equipment calibration and maintenance. The laboratory shall be HOKLAS accredited.

3.3.1.2 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, in consultation with the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC. The IEC shall conduct regular audits of the measurements performed by the laboratory to ensure the accuracy of the results. The ES shall provide the ER and the IEC with one copy each of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), *Appendix B* for reference.

3.3.1.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.

3.3.1.4 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 0.1mg. The balance shall be regularly calibrated against a traceable standard.

3.3.1.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

3.4 MONITORING LOCATIONS

3.4.1.1 The air quality sensitive receivers, as determined by the EIA, are shown in ***Figure 3.2*** and these will also form the recommended dust monitoring locations. In addition, three extra air monitoring stations are proposed in the approved Enhanced TSP Monitoring Plan which simultaneously with the air quality impact monitoring in the EM&A Programme. The air quality monitoring stations under the Contract is shown ***Figure 3.2a*** and summarized in ***Table 3.1.*** The status and locations of dust sensitive receivers may change after issue of this manual. If this happens, the ET shall propose updated monitoring locations and seek approval from the ER and agreement from IEC.

Table 3.1 Air Quality Monitoring Station under the Contract

Air quality monitoring station	Location	Landuse	No. of Storey	Horizontal Distance to the Major Construction Area (m)	
				Northern Landfall	Toll Plaza
ASR1	Tuen Mun Fireboat Station	Office	1	<50	<50
ASR5	Pillar Point Fire Station	Office	5	<50	>500
AQMS1	Previous River Trade Golf	Bare ground	0	270	60
ASR6	Butterfly Beach Laundry	Office	0	350	<50
ASR10	Butterfly Beach Park	Recreational uses	0	>1000	170

3.4.1.2 When alternative monitoring locations are proposed, the following preferred locations and factors shall be considered:

(i) the site boundary or locations close to the major dust emission source;

(ii) close to the sensitive receptors; and

(iii) the prevailing meteorological conditions.

3.4.1.3 The ET shall agree with the ER, in consultation with the IEC, the position of the high volume samplers. When positioning the samplers, the following points shall be noted:

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

3.4.1.4 Prior to construction, the dust monitoring schedule shall be developed by the ET based upon the construction schedule supplied by the Contractor. The ET shall inform the IEC of the impact monitoring programme such that he can conduct onsite audits to ensure accuracy of the impact monitoring results. The environmental monitoring schedule shall be approved by the ER.

3.5 BASELINE MONITORING

Baseline monitoring at five monitoring stations has been conducted by the ET of HyD Contract HY/2012/08 in October 2013 and the associated baseline report has been submitted to the EPD for approval. It is agreed amongst by the Contractor, RE, IEC that this Contract could make use of the baseline monitoring data collected by the ET under HY/2012/08 and therefore no baseline monitoring is required under this Contract.

3.6 IMPACT MONITORING

3.6.1.1 The Enhanced TSP Monitoring Plan will be implemented simultaneously with the air quality impact monitoring in the EM&A programme. In addition to the TSP monitoring at ASR1 and ASR5, monitoring will also be undertaken at the additional monitoring stations AQMS1, AQMS2 and ASR10 following the frequency of air quality impact monitoring stated in the EM&A Manual. The data collected will be used to provide an indication of whether there is any significant increase in TSP levels upon commencement of construction activities of the Northern Connection, toll plaza and tunnel buildings. TSP monitoring, including those required under the approved EM&A Manual (ie for ASR1 andASR5 only) and this Enhanced TSP Monitoring Plan, will not be implemented during the TCSS installation works which will not involve any civil works.

3.6.1.2 The major sources of dust nuisance arising from the Northern Connection, toll plaza

and tunnel buildings are related to excavation, slope works, foundation works, construction of road and superstructures, wind erosion from reclaimed areas, open sites and stockpiling areas. Therefore during these construction activities, the TSP monitoring frequency will be increased at all air quality monitoring stations such that any deteriorating air quality can be readily detected and timely action taken to rectify the situation. The Enhanced TSP Monitoring Plan during construction phase is summarized in **Table 3.2**.

Table 3.2 Enhanced TSP Monitoring Plan – Construction Phase

Monitoring Parameter	Monitoring Location	Frequency	Monitoring Condition
1-hour TSP	ASR1, ASR5, ASR10, AQMS1, AQMS2	3 times per day every six days	Throughout the Northern Connection, toll plaza and tunnel buildings construction works
24-hour TSP	ASR1, ASR5, ASR10, AQMS1, AQMS2	Daily every six days	Throughout the Northern Connection, toll plaza and tunnel buildings construction works
1-hour TSP	ASR1, ASR5, ASR10, AQMS1, AQMS2	3 times per day every three days	**Northern Connection** During excavation works for launching shaft, excavation work for Cut and Cover Tunnel and Cut and Cover Tunnel Construction **Toll Plaza** During excavation, slope works, construction of road an superstructures and wind erosion from open sites and stockpiling areas **Tunnel Buildings** During excavation, foundation works, construction of superstructures and wind erosion from open sites and stockpiling areas
24-hour TSP	ASR1, ASR5, ASR10, AQMS1, AQMS2	Daily every three days	**Northern Connection** During excavation works for launching shaft, excavation work for Cut and Cover Tunnel and Cut and Cover Tunnel Construction **Toll Plaza** During excavation, slope works, construction of road an superstructures and wind erosion from open sites and stockpiling areas **Tunnel Buildings** During excavation, foundation works, construction of superstructures and wind erosion from open sites and stockpiling areas

3.6.1.3 The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined for each location and be strictly followed by the operator.

3.6.1.4 In accordance with the PS Clause 25.32 under this contract, dust monitoring by the ET under this Contract could be exempted until the completion of the air quality

monitoring carried out by the ET of HyD Contract No. HY/2012/08. It is agreed amongst by the Contractor, RE, IEC that the ET under this Contract could make use of impact air quality monitoring data collected by the ET under HY/2012/08 for its own reporting.

3.7 EVENT AND ACTION PLAN FOR AIR QUALITY

3.7.1.1 The baseline monitoring results will form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. The method of derivation and the proposed Action and Limit Levels are shown in ***Tables 3.3*** and ***3.3a*** respectively.

Table 3.3 Action and Limit Levels for Air Quality

Parameters	Action	Limit
24 Hour TSP Level in $\mu g/m^3$	For baseline level ≤ 200 $\mu g/m^3$ Action level = (Baseline *1.3+ Limit level)/2; For baseline level >200 $\mu g/m^3$ Action level = Limit level	260
1 Hour TSP Level in $\mu g/m^3$	For baseline level ≤ 384 $\mu g/m^3$ Action level = (Baseline *1.3+ Limit level)/2; For baseline level >384 $\mu g/m^3$ Action level = Limit level	500

Table 3.3a TSP Action and Limit Levels for Impact Air Quality Monitoring

Parameters	Air Quality Monitoring Stations	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
24 hour TSP ($\mu g/m^3$)	ASR1	213	260
	ASR5	238	260
	AQMS1	213	260
	AQMS2	238	260
	ASR10	214	260
1 hour TSP ($\mu g/m^3$)	ASR1	331	500
	ASR5	340	500
	AQMS1	335	500
	AQMS2	338	500
	ASR10	337	500

3.7.1.2 In case of non-compliance with the air quality criteria, more frequent monitoring exercise shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified. The Event/Action Plan for air quality is given in the attached ***Table 3.4***.

3.7.1.3 The Independent Environmental Checker (IEC) shall be empowered to audit the environmental performance of construction, all aspects of the EM&A programme, validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations and procedures. If any exceedances occur, the IEC shall follow the actions stated in the Event and Action Plan in ***Table 3.4***.

3.8 DUST MITIGATION MEASURES

3.8.1.1 The EIA report has recommended dust control and mitigation measures. The

Contractor shall be responsible for the design and implementation of the following measures. The recommended construction dust mitigation measures are summarized in the Air Quality Environmental Mitigation Implementation Schedule provided in *Appendix A.*

(i) all unpaved roads/exposed area shall be watered which results in dust suppression by forming moist cohesive films among the discrete grains of road surface material. An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum;

(ii) Watering on all exposed soil within the Project site and associated work areas in Tuen Mun area throughout the construction phase for at least 12 times per day;

(iii) The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels;

(iv) The Contractor shall not burn debris or other materials on the works areas;

(v) in hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet;

(vi) where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created;

(vii) open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimize the fugitive dust arising from unloading;

(viii) during transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards;

(ix) no earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site;

(x) areas of exposed soil shall be minimized to areas in which works have been completed shall be restored as soon as is practicable; and

(xi) all stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.

3.8.1.2 If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of the ET, the Contractor shall liaise with the ET regarding other mitigation measures and consult the IEC for their effectiveness, and then propose these measures to the ER for approval prior to the implementation of the measures.

Table 3.4 Event / Action Plan for Air Quality

EVENT	ACTION			
	ET[1]	IEC[1]	SOR[1]	Contractor(s)
Action Level				
Exceedance recorded	1 Identify the source. 2 Repeat measurements to confirm findings. If two consecutive measurements exceed Action Level, the exceedance is then confirmed. 3 Inform the IEC and the SOR 4 Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5 If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6 Discuss with the IEC and the Contractor on remedial actions required. 7 If exceedance continues, arrange meeting with the IEC and the SOR. 8 If exceedance stops, cease additional monitoring.	1 Check monitoring data submitted by the ET. 2 Check the Contractor's working method. 3 If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4 Advise the SOR on the effectiveness of the proposed remedial measures. 5 Supervisor implementation of remedial measures.	1 Confirm receipt of notification of failure in writing. 2 Notify the Contractor. 3 Ensure remedial measures properly implemented.	1 Rectify any unacceptable practice. 2 Amend working methods if appropriate 3 If the exceedance is confirmed to be Project related, submit proposals for remedial actions to IEC within 3 working days of notification 4 Implement the agreed proposals 5 Amend proposal if appropriate.
Limit Level				
Exceedance recorded	1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Limit Level, the exceedance is then confirmed. 3. Inform the IEC, the SOR, the DEP and the Contractor. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 7. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 8. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 9. If exceedance stops, cease additional monitoring.	1 Check monitoring data submitted by the ET. 2 Check Contractor's working method. 3 If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4 Advise the SOR on the effectiveness of the proposed remedial measures. 5 Supervisor implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. If the exceedance is confirmed to be Project related after investigation, in consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.	1 Take immediate action to avoid further exceedance. 2 If the exceedance is confirmed to be Project related after investigation, submit proposals for remedial actions to IEC within 3 working days of notification. 3 Implement the agreed proposals. 4 Amend proposal if appropriate. 5 Stop the relevant activity of works as determined by the SOR until the exceedance is abated.

Note: ET – Environmental Team, IEC – Independent Environmental Checker, SOR – Supervising Office's Representative

4 NOISE

4.1 INTRODUCTION

4.1.1.1 The TM-CLKL EIA study concluded that no existing noise sensitive receiver (NSR) has been identified within the Study Area, and no planned NSR has been identified from the Project Site. Based upon this, no noise monitoring is necessary for either the construction or operation phases.

4.1.1.2 Regular site inspections and audits will be carried out during the construction phase in order to confirm compliance with the regulatory requirements and conformity of the Contractor with regard to noise control and contract conditions.

4.2 NOISE PARAMETERS (NOT USED)

4.3 MONITORING EQUIPMENT (NOT USED)

4.4 MONITORING LOCATIONS (NOT USED)

4.5 BASELINE MONITORING (NOT USED)

4.6 CONSTRUCTION PHASE IMPACT MONITORING (NOT USED)

4.7 EVENT AND ACTION PLAN FOR CONSTRUCTION NOISE (NOT USED)

4.8 NOISE MITIGATION MEASURES

4.8.1.1 As no impacts are predicted during the construction stage at the existing NSRs in north Lantau, no specific mitigation measures have been recommended. However, the Contractor will be responsible for ensuring noise levels are minimized as far as possible through the application of good site practices, including maintenance of equipment. During the operational phase, no mitigation is required.

5 WATER QUALITY

5.1 INTRODUCTION

5.1.1.1 No marine works will be undertaken under Contract No. HY/2013/12. Based upon this, no water quality monitoring is necessary for either the construction or operation phases.

5.2 MITIGATION MEASURES

5.2.1.1 Not used.

5.2.1.2 Prior to the commencement of the construction work, a detailed site drainage management plan should be submitted to EPD. The plan should cover measures to minimize all potential water quality impact arising from the surface runoffs of all the related constructions.

5.2.1.3 The guidelines outlined in the Practice Note for Professional Persons (ProPECC), Construction Site Drainage (PN 1/94) should be adopted to control construction site runoff. Mitigation measures to minimise water quality impacts from construction site runoff and wastewater and sewage generated from construction activities are:

- Provision of site drainage systems over the entire construction site with sediment control facilities. Regular inspection and maintenance of the site drainage systems are required to ensure proper and efficient operation at all times.
- Sedimentation tanks or package treatment systems are required to treat the large amount of sediment-laden wastewater generated from foundation construction work, wheel washing and site runoff. Any construction activities that generate wastewater with high concentrations of SS should also be collected to these facilities for proper treatment prior to disposal. Treated wastewater can be reused for vehicle washing, dust suppression and general cleaning. Bentonite slurry used in bore-pile construction should be reconditioned and reused to minimize the disposal volume of the used slurry.
- The construction programme should be properly planned to avoid soil excavation in rainy seasons. Exposed stockpiles of excavated soils or construction materials should be covered with tarpaulin or impervious sheets to avoid release of pollutants into the drainage channels.
- Sewage generated from site toilets and canteen should be collected using a temporary storage system. Chemical toilets should be provided at different locations for use by the workers on site. Licensed waste collectors should be employed for collection and disposal of the sewage. The drainage system for collection of wastewater generated from canteen, if any, should be equipped with grease trap capable of providing at least 20 minutes retention during peak flow.
- Wheel washing facilities should be installed at all site entrances/exits.
- An emergency plan should be developed by the contractors to deal with accidental spillage of chemicals.

5.2.1.4 Upon completion of the TM-CLKL / HKLR / HKBCF development, stormwater drainage systems would be completed to collect stormwater generated from the whole area including new roads. Sewage generated from the TM-CLKL southern landfall and HKBCF development would be treated on site to fulfill effluent limit for discharge. Additional mitigation measures would not be required.

5.2.1.5 Not used.

5.2.1.6 The EIA Report has recommended construction and operational phase mitigation measures. All the prepared mitigation measures are summarized in the Environmental Mitigation Implementation Schedules in ***Appendix A***.

5.3 WATER QUALITY PARAMETERS (NOT USED)

5.4 MONITORING EQUIPMENT (NOT USED)

5.5 LABORATORY MEASUREMENT / ANALYSIS (NOT USED)

5.6 MONITORING LOCATIONS (NOT USED)

5.7 BASELINE MONITORING FOR WATER QUALITY (NOT USED)

5.8 EFFICIENCY OF SILT CURTAINS (NOT USED)

5.9 IMPACT MONITORING FOR WATER QUALITY (NOT USED)

5.10 POST-CONSTRUCTION MONITORING (NOT USED)

5.11 OPERATIONAL PHASE MONITORING (NOT USED)

5.12 EVENT AND ACTION PLAN(NOT USED)

6 ECOLOGY

6.1 INTRODUCTION

6.1.1.1 The EIA has recommended that an EM&A for ecology is undertaken during the design, construction and operational phases of the project. The objectives of the design phase EM&A are to prepare detailed specifications for translocation works to be undertaken prior to construction. The construction and operational EM&A objectives are to ensure that the ecological contract works and construction mitigation procedures recommended in the EIA are carried out as specified and are effective. The construction and operational phase EM&A will be carried out as part of the site monitoring and audit programme

6.2 ECOLOGY EM&A PROCEDURES

6.2.1.1 Not used.

6.2.1.2 The construction phase ecological audit is concerned with checking the effectiveness of the implementation of the ecology contract works, together with auditing the effectiveness of site mitigation. Operational phase EM&A will comprise the audit of the reestablishment of habitat areas and the on-going effectiveness of mitigation measures as appropriate. The operational phase EM&A shall be undertaken during the Contractor's one year maintenance period. The overall procedures for the ecological EM&A during construction and operation are shown in ***Figures 1.2*** and ***6.1***.

6.3 DESIGN PHASE AUDIT

6.3.1.1 Ecological measures proposed by the EIA to mitigate the ecology impacts of the scheme will be incorporated into the detailed design of the project. In particular, ecology specifications will be produced for the elements detailed in ***Table 6.1*** below.

Table 6.1 Ecological Design Specifications

Number	Specification
1	Hoarding along the works boundary for protecting the pitcher plants and its surrounding habitat.

6.3.1.2 The specifications should be issued to the EPD and AFCD and other relevant Authorities for approval before being implemented prior to construction.

6.3.1.3 Designs and specifications will be prepared during the detailed design stage by suitably qualified staff on the design team. The designs will be checked by a design auditor(s) to ensure that the measures are fully incorporated and that potential conflicts with the engineering are resolved prior to construction. In the event of a non conformity, the Event/Action plan detailed in ***Table 6.2*** below shall be followed by the relevant parties.

Table 6.2 Event / Action Plan for Design Phase

Action Level	Ecology Auditor	Project Engineer (PE)	Project Ecologist (PEC)
Non Conformity (with Design Standards and Specification)	• Identify Source • Inform PE and PEC • Discuss remedial actions with PE, and PEC	• Notify PEC • Discuss remedial actions with PEC • Ensure remedial designs are fully incorporated	• Amend designs • Discuss remedial actions with PE

	• Verify remedial actions when complete		

6.4 BASELINE MONITORING

6.4.1 Background

6.4.1.1 Ecological baseline EM&A will consist of undertaking the following:

- a walk-over survey, prior to construction works, of the land and streams where works will be undertaken. It may be necessary to rope off and protect specific habitats or species of special interest identified during the ecological surveys;

6.4.2 Baseline Walkover Survey

6.4.2.1 The purpose of the walk over survey will be to confirm the existing ecological conditions, with reference to the habitat maps included in the EIA Report and the established baseline conditions, in relation to the extent and condition of the habitats and species noted during the walkover survey. No detailed ecological surveys of flora and fauna will be required at this stage.

6.4.3 Baseline Translocation Works

6.4.3.1 During the Environmental Impact Assessment (EIA) Stage of the TM-CLKL (which was approved on 23 October 2009), no Pitcher Plant (*Nepenthes mirabilis*) was identified within the proposed works area of the toll plaza. It was believed that the Pitcher Plant area identified would not be directly impacted by the toll plaza works and the only mitigation measures required were to install hoarding at the perimeter of the proposed works area to avoid encroachment into the Pitcher Plant area. There was no requirement for Pitcher Plant transplantation in the EIA, Environmental Monitoring and Audit (EM&A) Manual, and Environmental Permit (EP). However, during an ecology survey for the TMWB EIA in late 2011, Pitcher Plant was identified within the proposed works area for the TM-CLKL toll plaza. Pitcher Plant is protected under the Forestry Regulations (subsidiary legislation of the Forests and Countryside Ordinance, Cap. 96) and the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586). Discussion with Agriculture, Fisheries and Conservation Department (AFCD) (27 October 2012) has confirmed that if the TM-CLKL project was to impact the Pitcher Plant area that further mitigation measures for the Pitcher Plant would be required under the TM-CLKL project. As such, the project proponent Highways Department (HyD) has appointed AECOM to undertake baseline survey and propose a transplantation strategy for Pitcher Plant to be affected by the proposed TM-CLKL project.

6.4.3.2 During baseline survey in 2013, a total of 280 numbers of Picher Plants were identified within the construction site. The health and condition of the Pitcher Plant individuals was assessed and each plant was tagged and photographed by Pegasus Greenland Ltd. All plants were assessed as being in “fair” health condition. As the plants mostly grew on rock faces with thin soils, the successful removal and transport of the existing individuals is likely to be challenging given the weak nature of the plant’s roots.

6.4.3.3 Baseline survey to confirm the exact quantity of the Pitcher Plant in relation to this Contract will be conducted by the Project Ecologist. The baseline monitoring result as well as the translocation plan shall be submitted for EPD and AFCD for approval.

6.4.4 Baseline Dolphin Monitoring (Not used)

6.4.5 Bored Piling Monitoring Programme (Not used)

6.5 CONSTRUCTION AND OPERATIONAL PHASE EM&A

6.5.1 Background

6.5.1.1 During the construction and operational phases the ET will be required to undertake the following:

- continued audit of the translocation works as per the requirements
- audit of habitat protection measures as follows:
  - in order to avoid damage and disturbance to the protected Pitcher Plant species and surrounding natural habitat,
  - ensure placement of hoarding along the works boundary of the Project Site before commencement of works to prevent vehicle movements and encroachment of personnel into adjacent areas. No openings in the hoarding should be provided on the north of the Toll Plaza work areas to avoid access to the uphill area where the Pitcher Plants are located;
  - ensure that work site boundaries are not breached and that damage does not occur to surrounding areas;
  - provided and scheduled environmental briefing/training sessions for site staff to raise their awareness on environmental protection;
  - ensure placement of equipment is within designated areas within the existing disturbed land;
  - ensure construction activities are restricted to within the proposed works boundary;
  - ensure spoil heaps are be covered at all times;
  - ensure that disturbed areas are reinstated immediately after completion of the works;
  - ensure enhancement planting works undertaken.

6.5.2 Construction Ecological Audit

6.5.2.1 A monitoring programme should be established to monitor the survival of the Pitcher Plants and evaluate the success of the transplantation exercise. A separate detailed monitoring plan would be submitted to AFCD by the appointed contractor responsible for the transplantation exercise. This will include roles and responsibilities, monitoring parameters, event and action plan, adaptive management, etc.

6.5.2.2 For the overall audit of habitat protection, in the event of non-compliance, the Event /Action plan detailed in ***Table 6.3*** below should be implemented.

Table 6.3 Event / Action Plan for General Ecology

Action Level	ET	IEC	ER	Contractor
Non-conformity on one occasion	• Identify Source • Inform the IEC and the ER • Discuss remedial actions with the IEC, the ER and the Contractor • Monitor remedial actions until rectification has been completed	• Check report • Check the Contractor's working method • Discuss with the ET and the Contractor on possible remedial measures • Advise the ER on effectiveness of proposed remedial measures. • Check implementation of remedial measures.	• Notify Contractor • Ensure remedial measures are properly implemented • Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the works in the case of a serious nonconformity until situation rectified.	• Amend working methods • Rectify damage and undertake any necessary replacement
Repeated Non conformity	• Identify Source • Inform the IC(E) and the ER • Increase monitoring frequency • Discuss remedial actions with the • IC(E), the ER and the Contractor • Monitor remedial actions until rectification has been completed • If exceedance stops, cease additional monitoring	• Check monitoring report • Check the Contractor's working method • Discuss with the ES and the Contractor on possible remedial measures • Advise the ER on effectiveness of proposed remedial measures • Supervise implementation of remedial measures	• Notify the Contractor • Ensure remedial measures are properly implemented • Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the works in the case of a serious nonconformity until situation rectified.	• Amend working methods • Rectify damage and undertake any necessary replacement

Note: ET – Environmental Specialist, IC(E) – Independent Checker (Environmental), ER – Engineer's Representative

6.5.3 Construction and Operation Phase Dolphin Monitoring (Not used)

6.6 MITIGATION AND ENHANCEMENT MEASURES

6.6.1.1 Ecological mitigation and enhancement measures recommended by the EIA are largely related to the protection of key floral and fauna species and are summarized below. The ecological mitigation and enhancement measures to be implemented during the construction phase are as following.

- Use of fencing along the works boundary to avoid disturbance to the protected pitcher plant species and the surrounding habitat;
- Regularly check the work site boundaries to ensure that they are not breached and that damage does not occur to surrounding areas;
- Provided environmental briefing/ training session for site staff

6.6.1.2 The mitigation measures shall be audited at least once every week as part of the site audit programme. In the event of a non-compliance, the Event /Action plan detailed above shall be followed by the relevant parties.

6.6.1.3 Not used.

7 LANDSCAPE AND VISUAL ASSESSMENT

7.1 INTRODUCTION

7.1.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during both the construction and operational phases of the project. This section outlines the monitoring and audit of these measures.

7.1.1.2 The sensitive receivers are shown in ***Figure 7.1.1.1 to 7.1.1.2, 7.2.1.1 to 7.2.1.2, 7.3.1.1, 7.3.1.3*** and ***7.3.2.1.***

7.2 RELEVANT LEGISLATION

7.2.1.1 The following legislation, standards and guidelines are applicable to landscape and visual impact assessment associated with the construction and operation of the project:

- Environmental Impact Assessment Ordinance (Cap.499.S.16) and the Technical Memorandum on EIA Process (EIAO TM), particularly Annexes 10 and 18
- Environmental Impact Assessment Ordinance Guidance Note 8/2002
- ETWB No. 36/ 2004 - Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS)
- ETWB TCW No. 10/2005 - Planting on Footbridges and Flyovers
- ETWB TCW No. 2/2004 - Maintenance of Vegetation and Hard Landscape Features
- ETWB TCW No. 29/2004 - Registration of Old and Valuable Trees, and Guidelines for their Preservation
- ETWB TCW No. 3/2006 - Tree Preservation
- ETWB TCW No. 5/2005 on Protection of natural streams/rivers from adverse impacts arising from construction works
- Hong Kong International Airport Approved Plant Species List (Revision 3: June 2007)
- Hong Kong Planning Standards and Guidelines, particular Chapter 4, Chapter 8, Chapter 10 and Chapter 11
- HQ/GN/13 - Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
- HyDTC No. 3/2008 - Independent Vetting of Tree Works under the Maintenance of Highways Department
- HyDTC No. 5/2000 on Control in the Use of Shotcrete (Sprayed Concrete) in Slope Works
- Protection of Endangered Species of Animals And Plants Ordinance (Cap 586)
- Study on Landscape Value Mapping of Hong Kong
- Town Planning Ordinance (Cap 131)
- WBTC No. 17/2000 on Improvement to the Appearance of Slopes
- WBTC No. 25/92 - Allocation of Space for Urban Street Trees
- WBTC No. 25/93 on Control of Visual Impact of Slopes
- WBTC No. 7/2002 - Tree Planting in Public Works

7.3 METHODOLOGY AND CRITERIA

7.3.1.1 The design, implementation and maintenance of landscape and visual mitigation measures should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without

compromise to the intention of the mitigation measures.

7.3.1.2 Site inspection and audit is necessary in the operation stage.

Table 7.1 Monitoring Programme

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Design	Monitoring of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken during detailed design and tender stages, to ensure that they fulfil the intentions of the mitigation measures. Any changes to the design, including design changes on site should also be checked.	Report by ER confirming that the design conforms to requirements of EP	Approved by Client	At Completion of Design Stage
Construction	Monitoring of the contractor's operations during the construction period.	Report on Contractor's compliance, by ET	Counter – signature of report by IEC	Weekly
Establishment Works	Monitoring of the planting works during the 24-month Establishment period after completion of the construction works.	Report on Contractor's compliance, by ET	Counter – signature of report by IEC	3 months

Design Phase

7.3.1.3 The mitigation measures proposed within the EIA to mitigate the landscape and visual impacts of the scheme should be embodied into the detailed engineering design and landscape design drawings and contract documents. Detailed landscaping drawings and specification should be checked during detailed design stage and before tender stage by a Registered Landscape Architect to ensure that the measures are fully incorporated and that potential conflicts with civil engineering, geo-technical, structural, lighting, signage, drainage, underground utility and operational requirements are resolved prior to construction. Monitoring of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken when the designs are produced to ensure that they fulfil the intentions of mitigation measures.

Construction & Establishment Period

7.3.1.4 The implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period must be supervised by fully qualified Landscape Resident Site Staff (Registered Landscape Architect or Professional Member of the Hong Kong Institute of landscape Architects).

7.3.1.5 Measures to mitigate landscape and visual impacts during construction should be checked and monitored by a Registered Landscape Architect to ensure compliance with the intended aims of the mitigation measures.

7.3.1.6 The progress of the engineering works shall be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.

7.4 BASELINE MONITORING

7.4.1.1 A one off survey shall be conducted prior to commencement of any construction works. A photographic record of the site at the time of the contractor's possession of the site shall be prepared by the Contractor and approved by the ER. The approved photographic Record shall be submitted to the Project proponent, ET, IEC and EPD for record.

7.5 EVENT AND ACTION PLAN

7.5.1.1 Should non-compliance of the landscape and visual impacts occur, actions in accordance with the action plan stated in **Table 7.2** should be carried out.

Table 7.2 Event and Action Plan for Landscape and Visual Impact

EVENT ACTION LEVEL	ACTION			
	ET	**IEC**	**ER**	**Contractor**
Design Check	• Check final design conforms to the requirements of EP and prepare report.	• Check report. • Recommend remedial design if necessary	• Undertake remedial design if necessary	
Non-conformity on one occasion	• Identify Source • Inform IEC and ER • Discuss remedial actions with IEC, ER and Contractor • Monitor remedial actions until rectification has been completed	• Check report • Check Contractor's working method • Discuss with ET and Contractor on possible remedial measures • Advise ER on effectiveness of proposed remedial measures. • Check implementation of remedial measures	• Notify Contractor • Ensure remedial measures are properly implemented	• Amend working methods • Rectify damage and undertake any necessary replacement
Repeated Non-conformity	• Identify Source • Inform IEC and ER • Increase monitoring frequency • Discuss remedial actions with IEC, ER and Contractor • Monitor remedial actions until rectification has been completed • If nonconformity stops, cease additional monitoring	• Check monitoring report • Check Contractor's working method • Discuss with ET and Contractor on possible remedial measures • Advise ER on effectiveness of proposed remedial measures • Supervise implementation of remedial measures	• Notify Contractor • Ensure remedial measures are properly implemented	• Amend working methods • Rectify damage and undertake any necessary replacement

7.6 MITIGATION MEASURES

7.6.1.1 The landscape and visual impact assessment of the EIA recommends a series on mitigation measures, as noted below:

Design Landscape and Visual Mitigation Measures

- The large surface of the retaining wall along the toll plaza area shall adopt a patterned/ smoother finishes and texture design to break the large surface.

Climber treatment is proposed to soften the structures (DM1),

- The colour and shape of the toll control buildings, ventilation building and administration building shall adopt a design which could blend it into the vicinity elements, and the details will be developed in detailed design stage (DM2),
- Round angle, patterned finishes, and oval shaped pier were considered in the viaduct design, and further details will be developed under ACABAS submission (DM3),
- Details of the street furniture will be developed in the detailed design stage (DM4),
- Aesthetic design of the viaduct, retaining wall and other structures will be developed under ACABAS submission (DM5).

Landscape and Visual Mitigation Measures during Construction Phase

- Existing trees on boundary of the Project Area shall be carefully protected during construction. 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. (Tree protection measures will be detailed at Tree Removal Application stage) (CM1),
- Trees unavoidably affected by the works shall be transplanted where practical. Trees will be transplanted straight to their final receptor site and not held in a temporary nursery. A detailed Tree Transplanting Specification shall be provided in the Contract Specification. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme (CM2),
- Hillside and roadside screen planting to proposed roads, associated structures and slope works (CM3),
- Hydroseeding or sheeting of soil stockpiles with visually unobtrusive material (in earth tone) (CM4),
- Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5),
- Control night-time lighting and glare by hooding all lights (CM6),
- Ensure no run-off into water body adjacent to the Project Area (CM7),
- Avoidance of excessive height and bulk of buildings and structures (CM8),
- Recycle/Reuse all felled trees and vegetation, e.g. mulching (CM9),
- Compensatory tree planting 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 Felling Application process under ETWBTC 3/2006 (CM10).

Landscape and Visual Mitigation Measures during Operation Phase

- Re-vegetation of affected woodland/shrubland with native species (OM1),
- Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities (OM2),
- Streetscape elements (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the local context, and minimizes potential negative landscape and visual impacts. Lighting units

should be directional and minimise unnecessary light spill (OM3),

- Structure, ornamental tree / shrub / climber planting should be provided along roadside amenity strips, central dividers and newly formed slopes to enhance the townscape quality and further greenery enhancement (OM4),
- Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5),
- Avoidance of excessive height and bulk of buildings and structures (OM6).

8 WASTE MANAGEMENT AND CONTAMINATED LAND

8.1 WASTE ISSUES

8.1.1 Summary of Waste Arisings

8.1.1.1 The Contractor is responsible for waste control within the construction site, removal of waste material produced from the site and to implement any mitigation measures to minimize waste or redress problems arising from the waste from the site. Activities during the construction phase will result in the generation of a variety of wastes which can broadly be classified into distinct categories based on their nature and the options for their disposal. These include:

- Excavated construction and demolition (C&D) materials suitable for public fill;
- Construction and demolition waste, including cleared vegetation, which is not suitable for public fill;
- Chemical waste;
- Sewage; and
- General refuse.

8.1.1.2 Not used.

8.1.1.3 Not used.

8.1.1.4 Not used.

8.1.1.5 The Construction and Demolition (C&D) materials generated from the TM-CLKL project will comprise the following:

- Surplus surcharge from the reclamation works;
- Excavation materials from the land viaduct construction, slope cutting, utility diversions, site formation of the toll plaza and administration buildings formation; and
- Road and pavement demolition waste from the modification of the existing roads for new roads connections.

8.1.1.6 For construction of Contract no. HY/2013/12, construction and Demolition (C&D) materials include public fill (inert material) and C&D wastes (non-inert material). Public fill should comprise broken concrete, brick and aggregates, etc. C&D wastes should comprise unwanted materials generated during construction, including rejected structures and materials, materials which have been over ordered or are surplus to requirement and materials, which have been used and discarded. The disposal sites for the wastes generated from the project as shown in ***Table 8.1***.

Table 8.1 Estimated quantities of C&D materials and waste from Contract No. HY/2013/12

Type of Waste	Examle	Disposal Site	Estimate Volume
Excavated material	• Rock • Rubble • Boulder • Soil • Sand	• Tuen Mun Area 38 Fill Bank– for inert construction waste excluding slurry and • bentonite; • Tseung Kwan O Area 137 Fill Bank – for slurry and bentonite	Public fill: 13000m^3
C&D material – public fill (inert)	• Broken concrete		Reused on site: 5500m^3

	• Brick • Aggregate • Asphalt • Tile • Masonry • Used bentonite	• Other disposal outlets as approved by the Engineer Representative • Reused in our contract • Reused in other contract • Public fill	Reused off site:8000 m^3
C&D material – C&D waste (non-inert)	• Wood • Bamboo • Plastic	• West New Territories (WENT) Landfill or other disposal outlets as approved by the Engineer Representative	4800 m^3
Chemical waste	• Used oil • Spent solvent	• Chemical Waste Treatment Facility at Tsing Yi • Other approved facility	30 m^3
Chemical waste (Asbesto)	• Asbestos Cement pipe	• Landfill or other disposal outlets as approved by the Engineer	0
General Refuse	• Packaging waste • Office waste	• West New Territories (WENT)Landfill or other disposal outlets as approved by the Engineer	2400 m^3
Sewage	• Chemical toilet • Site office toilet	• Licensed contractor • Discharge to existing sewer	30 m^3/d 20 m^3/d

8.1.1.7 Not used.

8.1.1.8 Not used.

8.1.2 Mitigation Measures

8.1.2.1 Based on the mitigation measures recommended in the EIA Report, the following measures, as summarized in the Environmental Mitigation Implementation Schedule in **Appendix A**, shall be undertaken when handling waste material during construction phase:

(i) The requirements as stipulated in the ETWB TC(W) No.19/2005 Environmental Management on Construction Sites and the other relevant guidelines should be included in the Particular Specification for the Contractor as appropriate.

(ii) The TM-CLKL Contractor should be requested to submit an outline Waste Management Plan (WMP) prior to the commencement of construction work, in accordance with the ETWB TC(W) No.19/2005 so as to provide an overall framework of waste management and reduction. The WMP should include:

- Waste management policy;
- Record of generated waste;
- Waste reduction target;
- Waste reduction programme;
- Role and responsibility of waste management team;
- Benefit of waste management;
- Analysis of waste materials;

- Reuse, recycling and disposal plans;
- Transportation process of waste products; and
- Monitoring and action plan.

(iii) The waste management hierarchy below should be strictly followed. This hierarchy should be adopted to evaluate the waste management options in order to maximize the extent of waste reduction and cost reduction. The records of quantities of waste generated, recycled and disposed (locations) should be properly documented.

(iv) A trip-ticket system should be established in accordance with ETWB(W) 31/2004 and Waste Disposal (Charges for Disposal of Construction Waste) Regulation to monitor the disposal of public fill and solid wastes at public filling facilities and landfills, and to control fly-tipping. A trip ticket system would be included as one of the contractual requirements for the Contractor to strictly implement. The Engineer would also regularly audit the effectiveness of the system.

(v) A recording system for the amount of waste generated, recycled and disposed (locations) should be established. The future Contractor should also provide proper training to workers regarding the appropriate concepts of site cleanliness and waste management procedures, e.g. waste reduction, reuse and recycling all the time.

(vi) The CEDD should be timely notified of the estimated spoil volumes to be generated and the Public Fill Committee should be notified and agreement sort on the disposal of surplus inert C&D materials e.g. good quality rock during detailed design of the TM-CLKL project. Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and to ensure acceptability at public filling areas or reclamation sites.

(vii) The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.

(viii) Inert C&D materials from slopes and road pavement will be reused for construction of the raised platform for the toll plaza.

(ix) Not used.

(x) The surplus surcharge should be transferred to a fill bank.

(xi) Not used.

(xii) Not used.

(xiii) The site and surroundings shall be kept tidy and litter free.

(xiv) No waste shall be burnt on site.

(xv) Make provisions in contract documents to allow and promote the use of recycled aggregates where appropriate.

(xvi) Prohibit the Contractor to dispose of C&D materials at any sensitive locations e.g. natural habitat, etc. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.

(xvii) Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust and surface run off.

(xviii) Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.

(xix) Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.

(xx) Not used.

(xxi) Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork or plastic facing for construction works should also be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should be carefully planned in order to avoid over-ordering and wastage.

(xxii) The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.

(xxiii) All falsework will be steel instead of wood.

(xxiv) Chemical waste producers should register with the EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows:

- Suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed;
- Having a capacity of <450L unless the specifications have been approved by the EPD; and
- Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations.
- Clearly labelled and used solely for the storage of chemical wastes;
- Enclosed with at least 3 sides;
- Impermeable floor and bund with capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest;
- Adequate ventilation;
- Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and
- Incompatible materials are adequately separated.

(xxv) Waste oils, chemicals or solvents shall not be disposed of to drain;

(xxvi) Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilizing them. Night soil should be regularly collected by licensed collectors.

(xxvii) General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.

(xxviii) All waste containers shall be in a secure area on hardstanding;

(xxix) Aluminum cans are usually collected and recovered from the waste stream

by individual collectors if they are segregated and easily accessible. Separately labelled bins for their deposition should be provided as far as practicable.

(xxx) Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminum cans, plastic bottles, etc. should be provided on-site.

(xxxi) Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.

8.1.3 Waste Disposal Recommendations

8.1.3.1 The recommended disposal sites for the different types of waste are detailed in ***Table 8.2*** below:

Table 8.2 Recommended Waste Disposal Sites

Type of Waste	Disposal Site
C&D materials	Tuen Mun Areas 38 public fill bank
C&D waste (plastics, glass, wood, including cleared vegetation etc.)	North Lantau Refuse Transfer Station; or NWNT Refuse Transfer Station
Chemical waste (as defined under *Schedule 1* of the Waste Disposal (Chemical Waste) Regulation)	Chemical Treatment Facility at Tsing Yi; or Other approved facility
General refuse	North Lantau Refuse Transfer Station; or NWNT Refuse Transfer Station

Note: (1) Subject to DASO application

8.2 CONTAMINATED LAND

8.2.1.1 The results of the contaminated land assessment did not reveal any contamination hotspots that might be affected by the proposed TM-CLKL works and as such no mitigation measures in the form of contaminated land remediation is required. Therefore, no EM&A activities for the construction nor operational phases have been recommended as no significant impacts are predicted.

8.3 WASTE EM&A REQUIREMENTS

8.3.1.1 EM&A requirements are required for waste management during the construction phase only and the effective management of waste arisings 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.

8.3.1.2 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 Environmental Team (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.

8.3.1.3 The Contractor shall refer to the relevant booklets issued by the DEP when applying for the licence/permit and the Environmental Team (ET) (see Section 1) shall refer to these booklets for auditing purposes.

8.3.1.4 During the site inspections and the document review procedures as mentioned in Chapter 10 of this Manual, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong. In addition to the site inspections, the ET shall review the documentation procedures prepared by the Waste Coordinator once a week to ensure proper records are being maintained and procedures undertaken in accordance with the Waste Management Plan.

8.3.1.5 The Contractor's waste management practices should be audited with reference to the checklist detailed in ***Table 8.2*** below:

Table 8.2 Waste Management Checklist

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
All necessary waste disposal permits or licences have been obtained	Before the commencement of demolition works	Once	Apply for the necessary permits/ licences prior to disposal of the waste. The ET shall ensure that corrective action has been taken.
Only licensed waste haulier are used for waste collection.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall instruct the Contractor to use a licensed waste haulier. The Contractor shall temporarily suspend waste collection of that particular waste until a licensed waste haulier is used. Corrective action shall be undertaken within 48 hours.
Records of quantities of wastes generated, recycled and disposed are properly kept. For demolition material / waste, the number of loads for each day shall be recorded (quantity of waste can then be estimated based on average truck load. Should landfill charging be implemented, the receipts of the charge could be used for estimating the quantity).	Throughout the works	Weekly	The Contractor shall estimate the missing data based on previous records and the activities carried out. The ET shall audit the results and forward to the ER and IEC for approval.
Wastes are removed	Throughout	Weekly	The ET shall inform the ER and

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
from site in a timely manner. General refuse is collected on a daily basis.	the works		IEC of the noncompliance. The ER shall instruct the Contractor to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall instruct the Contractor to clean the storage area and/or cover the waste.
Different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall instruct the Contractor to provide separate skips/containers. The Contractor shall ensure the workers place the waste in the appropriate containers.
Chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes, published by the EPD.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall instruct the Contractor to rectify the problems immediately. Warning shall be given to the Contractor if corrective actions are not taken within 24 hrs and the Waste Control Group of the EPD shall be identified.
Demolition material/waste in dump trucks are properly covered before leaving the site.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall instruct the Contractor to comply. The Contractor shall prevent trucks shall leaving the site until the waste are properly covered.
Wastes are disposal of at licensed sites.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the noncompliance. The ER shall warn the Contractor and instruct the Contractor to ensure the wastes are disposed of at the licensed sites. Should it involve chemical waste, the Waste Control Group of EPD shall be notified.

Note: ET – Environmental Team, IEC – Independent Environmental Checker, ER – Engineer's Representative

9 CULTURAL HERITAGE

9.1 INTRODUCTION

9.1.1.1 The EIA has recommended that EM&A for cultural heritage resources is undertaken during construction phase of the project. Implementation of the mitigation measures recommended by the EIA will be monitored through the site audit programme.

9.2 MITIGATION MEASURES

9.2.1.1 The identified areas of archaeological potential highlighted by the EIA are limited to areas where existing impacts would have damaged or destroyed any existing archaeological material. As such, no further investigation is recommended for these archaeological resources. However, as a precautionary measure it should be a requirement during the construction works that if any antiquity or supposed antiquity is discovered during the course of the excavation works undertaken by the Contractor, the discovery shall be reported to the AMO immediately and all necessary action taken to preserve it.

9.2.1.2 Not used.

9.2.1.3 Therefore, the mitigation is restricted to the built heritage resources, Grave G1 at the proposed toll plaza in Tuen Mun. Grave G1 is situated near the toll plaza, as shown in ***Figure 9.1***. The design of the toll plaza has been arranged so as to preserve the grave in-situ, with a minimum 1.0m permanent setback provided. With the 1.0m set back of the permanent structure, a minimum of 0.7m clearance from the grave can be maintained during construction. This will be achieved with the adoption of special precautionary measures for working adjacent to the grave, including the deployment of simple-to-erect formwork and falsework systems, the provision of construction access and the bulky components of the falsework support system being designed at locations away from the grave. The required construction clearance and the precautionary measures shall be stipulated in the construction specifications. The footpath connection from the adjacent Lung Mun Road to the grave will, also, be maintained during construction and reprovided after the works have been completed. No mitigation will be required during the operational phase.

9.3 DESIGN PHASE AUDIT

9.3.1.1 Measures proposed by the EIA to create a 1.0m permanent set back in order to mitigate any impacts on Grave G1 which is within the works boundary of the toll plaza at Tuen Mun, will be incorporated into the detailed design of the project. Designs and specifications will be prepared during the detailed design stage by suitably qualified staff on the design team. The designs will be checked by a design auditor(s) to ensure that the measures are fully incorporated and that potential conflicts with the engineering are resolved prior to construction. In the event of a non-conformity, the Event/Action plan detailed in ***Table 9.1*** below shall be followed by the relevant parties.

Table 9.1 Event / Action Plan for Design Phase

Action Level	Design Auditor	Project Engineer (PE)	Project Designer (PD)
Non-Conformity (with Design Standards and Specification)	• Identify Source • Inform PE and PD • Discuss remedial actions with PE, and PD • Verify remedial	• Notify PD • Discuss remedial actions with PD • Ensure remedial designs are fully incorporated	• Amend designs • Discuss remedial actions with PE

	actions when complete		

9.4 BASELINE MONITORING

9.4.1.1 The implementation of the above mitigation measures will need to be audited as part of the EM&A programme during the toll plaza works. Prior to construction, a baseline survey of the grave should be undertaken to establish the existing condition.

9.5 CONSTRUCTION PHASE AUDIT

9.5.1.1 All measures undertaken by the Contractor during the construction phase in the vicinity of the grave shall be audited by the Environmental Team (ET), on a regular basis to ensure compliance with the intended aims of the recommended mitigation measures. Site inspections should be undertaken at least once per week throughout the construction period adjacent to these properties. The main aim of the survey is prevention of any possible damage to the grave and to ensure that the proposed mitigation measures are implemented. The broad scope of the audit will involve supervision of the following:

- non-contact effects of the engineering works, such as vibration from pneumatic drills which could cause damage, such as foundation or wall cracks and loosening of tiles or fixtures; and
- contact between the historic structures and equipment and materials associated with the engineering works.

9.5.1.2 Specifically, the monitoring programme will entail the following tasks:

- the extent of the agreed works areas should be regularly checked during the construction phase to ensure the buffer is being maintained; and
- ensure no stockpiling or equipment storage is affecting the structures.

9.5.1.3 In the event of non-compliance the responsibilities of the relevant parties is detailed in the Event /Action plan provided on ***Table 9.2***.

Table 9.2 Event / Action Plan for Construction Phase

Action Level	ET	IC (E)	ER	Contractor
Non-conformity on one occasion	1. Identify Source 2. Inform the IEC and the ER 3. Discuss remedial actions with the IEC, the ER and the Contractor 4. Monitor remedial actions until rectification has been completed	1. Check report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures. 5. Check implementation of remedial measures.	1. Notify Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the IC(E) and the ER	1. Check monitoring report 2. Check the	1. Notify the Contractor 2. Ensure	1. Amend working methods 2. Rectify damage

Action Level	ET	IC (E)	ER	Contractor
	3. Increase monitoring frequency 4. Discuss remedial actions with the IC(E), the ER and the Contractor 5. Monitor remedial actions until 6. rectification has been completed 7. If exceedance stops, cease additional monitoring	Contractor's working method 3. Discuss with the ES and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures.	remedial measures are properly implemented	and undertake any necessary replacement

Note:
ET – Environmental Specialist, IEC – Independent Environmental Checker, ER – Engineer's Representative

10 LANDFILL GAS HAZARD ASSESSMENT

10.1 INTRODUCTION

10.1.1.1 The landfill gas hazard assessment undertaken in the EIA identified the hazards that are likely to be generated from the Pillar Point Valley (PPV) Landfill, during the construction and operation phases of this Project and evaluate the associated risk. The EIA Report recommended that some precautionary measures are required to protect the proposed Tuen Mun – Chek Lap Kok Link (TM-CLKL) toll plaza from the landfill gas risk due to the PPV Landfill. Use of "semi active" or "enhanced passive" gas control protection system referenced from the EPD's Landfill Gas Hazard Assessment Guidance Note were recommended. Regular monitoring during construction and operation phases was also recommended.

10.2 MONITORING AND MEASUREMENT OF LANDFILL GAS

10.2.1.1 During construction, a Safety Officer should be appointed to carry out the monitoring works. The monitoring frequency and areas to be monitored should be set down prior to commencement of ground-works either by the Safety Officer or an approved and appropriated qualified person. The routine monitoring should be carried out in all excavations, manholes, chambers, relocation of monitoring wells and any other confined spaces that may have been created. All measurements in excavations should be made with the extended monitoring tube located not more than 10 mm from the exposed ground surface. Monitoring should be performed properly to make sure that the area is free of landfill gas before any man enters in the area.

10.2.1.2 For excavations deeper than 1m, measurements should be carried out:

- at the ground surface before excavation commences;
- immediately before any worker enters the excavation;
- at the beginning of each working day for the entire period the excavation remains open; and
- periodically through the working day whilst workers are in the excavation.

10.2.1.3 For excavations between 300mm and 1m deep, measurements should be carried out:

- directly after the excavation has been completed; and
- periodically whilst the excavation remains open

10.2.1.4 For excavations less than 300mm deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.

10.2.1.5 Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or other appropriately qualified person. As a minimum these should encompass those actions specified as follow:

Table 10.1 Actions in the Event of Landfill Gas being Detected in Excavation / Confined Area

Parameter	Measurement	Action
Oxygen	< 19%	- Ventilate to restore oxygen to > 19%
	< 18%	- Stop work - Evacuate personnel / prohibit entry - Increase ventilation to restore to > 19%
Methane	> 10% LEL (> 0.5% v/v)	- Prohibit hot work - Ventilate to restore methane to < 10% LEL
	> 20% LEL (>1% v/v)	- Stop work

Parameter	Measurement	Action
		- Evacuate personnel / prohibit entry - Increase ventilation to restore to < 10%
Carbon Dioxide	> 0.5%	- Ventilate to restore oxygen to < 0.5%
	> 1.5%	- Stop work - Evacuate personnel / prohibit entry - Increase ventilation to restore to < 0.5%

10.2.1.6 During operation, regular monitoring of landfill gas should be done at the tunnel, subway, and any other underground structures within the landfill consultation zone. Monitoring is required to verify the effectiveness and to ensure the continued performance of the implemented protection measures.

10.2.1.7 Inspection and LFG monitoring should be carried out at buildings and enclosures (e.g. toll control building, toll booths, tunnel, subway, service manholes, etc.) prior to the operation to ensure the design measures and functioning properly. The monitoring should be continued through the operation of the Project. In particular for the first year of operation, monthly monitoring is recommended, and quarterly (or at a frequency agreed by EPD) for second year on. Should the monitoring reveal the presence of landfill gas within the tunnel, subway, or other confined area, the seal of the joints shall be inspected and consideration shall be given to seal the cracks. Action level can refer to **Table 10.1**, and should abnormality is observed, it should be reported to EPD and the PPV Landfill operator.

10.2.1.8 In addition, if any construction is required for the maintenance work during operation stage, the responsible party should follow the protective measures and monitoring works as recommended in ***Clause 10.2.1.1~10.2.1.5*** of this report.

10.2.1.9 The monitoring programme and detailed actions should be included in the detailed assessment (to be carried out in the designed design stage) and submitted to EPD for approval.

11 SITE ENVIRONMENTAL AUDIT

11.1 SITE INSPECTIONS

11.1.1.1 Site inspections provide a direct means to assess and ensure the Contractor's environmental protection and pollution control measures are in compliance with the contract specifications. Site inspections shall be undertaken routinely by the Environmental Team (ET) (see Section 1) to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented in accordance with the EIA.

11.1.1.2 The ET is responsible for the formulation of an environmental site inspection, deficiency and remedial action reporting system and for carrying out the site inspection works. In consultation with the Independent Environmental Checker (IEC), the ET shall prepare a procedure for the site inspection, deficiency and remedial action reporting requirements and submit this to the Contractor for agreement and to the Engineer's Representative (ER) for approval within 21 days of commencement to the construction contract.

11.1.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the site area and should also include the environmental conditions outside the site which are likely to be affected, directly or indirectly, by the site activities.

11.1.1.4 The ET shall make reference to the following information while conducting the inspections:

(i) the EIA recommendations on environmental protection and pollution control mitigation measures as stated in the EIA report;
(ii) work progress and programme;
(iii) individual works methodology proposals;
(iv) the contract specifications on environmental protection;
(v) the relevant environmental protection and pollution control laws;
(vi) previous site inspection results; and
(vii) environmental monitoring data.

11.1.1.5 The Contractor shall update the ET with all relevant information on the construction works prior to carrying out the site inspections. The site inspection results and associated recommendations on improvements to the environmental protection and pollution control works shall be submitted, in a site inspection proforma (see **Appendix B**), by the ET to the IEC, the ER and the Contractor within 24 hours for reference and for taking immediate action. The Contractor shall follow the procedures and time-frame, as stipulated in the environmental site inspection, deficiency and remedial action reporting system to report on any remedial measures subsequent to site inspections.

11.1.1.6 Ad hoc site inspections shall also be carried out by the ET and IEC if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint (an example of the complaint log is provided in **Appendix B**) or as part of the investigation work as specified in the Action Plan for environmental monitoring and audit.

11.2 COMPLIANCE WITH LEGAL AND CONTRACTUAL REQUIREMENTS

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

11.2.1.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to the ET for vetting to see whether sufficient environmental protection and pollution control measures have been included.

11.2.1.3 The ET 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 the laws can be prevented.

11.2.1.4 The Contractor shall regularly copy relevant documents to the ET so that the checking work can be carried out. The documents shall include at minimum the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws and all valid licence/permit. The site diaries shall also be available for the ET's inspection upon request.

11.2.1.5 After reviewing the document, the ET shall advise the IEC, the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. The ET shall also advise the IEC, the Contractor and the ER on the current status on licence/permit applications and any environmental protection and pollution control preparation works that may not be suitable for the works programme or may result in potential violation of environmental protection and pollution control requirements.

11.2.1.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ET, IEC and the ER shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

11.3 ENVIRONMENTAL COMPLAINTS

11.3.1.1 Complaints shall be referred to the ET for carrying out complaint investigation procedures. The ET shall prepare a flow chart of the complaint response procedures that addresses, complaint receiving channels, responsible parties/contacts for information, the investigation process, procedures for the implementation of mitigation/remedial action, guidelines for communication and public relation with the complainant etc. The flow chart should be agreed by all parties and issued to the Contractor, ER and IEC for reference.

11.3.1.2 The ET shall undertake the following procedures upon receipt of a complaint:

(i) log complaint and date of receipt into the complaint database and inform the IEC immediately;

(ii) investigate the complaint and discuss with the Contractor to determine its validity and to assess whether the source of the problem is due to works activities;

(iii) if a complaint is considered valid by the ER or EPD and due to the works, the ET shall identify mitigation measures in consultation with the IEC;

(iv) if mitigation measures are required, the ET shall advise the Contractor accordingly;

(v) review the Contractor's response on the identified mitigation measures and the updated situation;

(vi) if the complaint is transferred from EPD, an interim report shall be submitted to EPD on the status of the complaint investigation and follow-up action within the time frame assigned by EPD;

(vii) undertake additional monitoring and audit to verify the situation if necessary and ensure that any valid reason for complaint does not recur;

(viii) report the investigation results and the subsequent actions on the source of the complaint for responding to complainant. If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD; and

(ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

11.3.1.3 During the complaint investigation work, the Contractor and ER shall cooperate with the ET in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation by the ET, in consultation with the IEC, the Contractor shall promptly carry out the mitigation measures. The ET and ER shall approve the proposed mitigation measures and check that the measures have been carried out by the Contractor.

11.4 CHOICE OF CONSTRUCTION METHOD

11.4.1.1 At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor’s options for alternative construction methods may introduce adverse environmental impacts into the project. It is the responsibility of the ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor’s proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix B** to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

12 REPORTING

12.1 GENERAL

12.1.1.1 The following reporting requirements are based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the Engineer's Representative (ER). The reports are required to be prepared by the Environmental Team (ET).

12.2 DOCUMENTATION

12.2.1.1 All documentation is required to be filed in a traceable and systematically manner. Site documentation, including monitoring field records, laboratory analysis records, meeting minutes, correspondences etc.(some examples are provided in **Appendix B**) shall be cross-referenced by the ET and be ready for inspection upon request. All EM&A results and findings shall be documented in the respective construction and operational phase EM&A reports prepared by the ET and endorsed by the Independent Environmental Checker (IEC) prior to dissemination to the Contractor, the ER and EPD. All reports including details of water quality monitoring, ecology, landscape and visual and archaeological EM&A shall also be issued to the the AFCD and the AMO as appropriate.

12.2.1.2 All documentation shall be in paper form and/or electronic (in an agreed format) upon request. All documents and data shall be kept for at least one year after the completion of the operational phase EM&A works. All submissions (reports, data and correspondences etc.) shall be liable to free use for the purposes of communicating environmental data and the owner of information shall claim no copyright. Any request to treat all or part of a submission in confidence will be respected, but if no such request is made it will be assumed that the submission is not intended to be confidential.

12.3 DESIGN AUDIT REPORT

12.3.1.1 The Design Audit Report shall provide the means for the Consultant undertaking the detailed design of the project to certify that environmental design elements and specifications have been completed in accordance with the EIA requirements. The Consultant shall include in the report a signed off proforma (**see Appendix B**) to confirm that there are no outstanding environmental measures, identified as requiring design phase audit, that require further action. The Design Audit Report and specifications shall be prepared by the Consultants and issued to EPD, the AFCD and the PlanD, as appropriate, prior to the commencement of the tendering period.

12.4 BASELINE MONITORING REPORT

12.4.1.1 In respect of the construction phase EM&A works, the ET shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the following: the Contractor, the IEC, the ER, EPD, the AFCD and the AMO as appropriate. The ET shall liaise with the relevant parties on the exact number of copies required.

12.4.1.2 The baseline monitoring reports for both the construction and operational phases shall include at least the following:

(i) Up to half a page executive summary.

(ii) Background information.

(iii) Drawings showing locations of the baseline monitoring stations.

(iv) An updated construction programme with milestones of environmental protection/mitigation activities annotated.

(v) Monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
- name of laboratory and equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency and duration; and
- QA/QC results and detection limits.

(vi) Details on 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 the results.

(vii) Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data.

(viii) Revisions for inclusion in the EM&A Manual.

(ix) Comments and conclusions.

12.5 EM&A REPORTS

12.5.1.1 The results and findings of all construction phase EM&A work required in this Manual shall be recorded in the EM&A Reports prepared by the ET on a monthly basis and endorsed by the IEC. The EM&A Reports shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due one month and 10 days after construction commences.

12.5.1.2 A maximum of 4 copies of each EM&A Report shall be submitted to each of the following parties: the Contractor, the IEC, the ER, EPD, the AFCD, the AMO and the PlanD, as appropriate. Before submission of the first EM&A Report, the ET shall liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

12.5.1.3 The operational phase EM&A works will be undertaken on a two monthly basis for a period of one year after the commission of the project. The ET shall prepare operational phase EM&A Reports on a bi-monthly basis to be submitted within 10 working days of the end of the reporting period. The reports shall be submitted to the Contractor, the IEC, the ER, EPD and the AFCD as appropriate.

12.5.1.4 The ET shall review the monitoring programme every 6 months or on an as needed basis in order to cater for any changes in the surrounding environment and nature of works in progress and shall document all observations in the monthly/bimonthly reports.

12.6 FIRST EM&A REPORT

12.6.1.1 The first EM&A report for both the construction and operational phases shall include at least the following:

(i) 1-2 pages executive summary, comprising:
- breaches of AL levels;
- complaint Log;
- notifications of any summons and successful prosecutions;

- reporting Changes; and
- future key issues.

(ii) Basic Project information including a synopsis of the Project organization (including key personnel, contact names and telephone numbers), a drawing of the Project area showing the environmentally sensitive receivers and the locations of monitoring and control stations, programme, management structure and the work undertaken during the month.

(iii) Environmental Status, comprising:
- works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iv) 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.

(v) Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the Project EIA study report and summarized in the updated implementation schedule.

(vi) Monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
- name of laboratory and equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration; and
- QA/QC results and detection limits.

(vii) Graphical plots of trends of monitored parameters at the representative monitoring stations annotated against the following:
- 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;
- QA/QC results and detection limits.

(viii) Advice on the solid and liquid waste management status.

(ix) A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).

(x) A review of the reasons for and the implications of noncompliance including a review of pollution sources and working procedures.

(xi) A description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.

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

complaints.

(xiii) A summary of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.

(xiv) An account of the future key issues as assessed from the works programme and work method statements.

(xv) Advice on the solid and liquid waste management status.

(xvi) Comments, recommendations and conclusions for the monitoring period.

(xvii) Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.

12.7 SUBSEQUENT EM&A REPORTS

12.7.1.1 The subsequent EM&A reports prepared by the ES for both the construction and operational phases shall include the following:

(i) Title page.

(ii) Executive summary (1-2 pages), including:
- breaches of all Action and Limit levels;
- complaint log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(iii) Contents page.

(iv) Environmental status, comprising:
- drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- summary of non-compliance with the environmental quality performance limits; and
- summary of complaints.

(v) Environmental issues and actions, comprising:
- review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
- description of the actions taken in the event of noncompliance and deficiency reporting;
- recommendations (should be specific and target the appropriate party for action); and
- implementation status of the mitigatory measures and the corresponding effectiveness of the measures.

(vi) Future key issues.

(vii) Appendices, including:
- action and limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following: 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;
- monitoring schedule for the present and next reporting period;

- cumulative complaints statistics; and
- details of complaints, outstanding issues and deficiencies.

12.8 QUARTERLY EM&A SUMMARY REPORTS

12.8.1.1 The ET shall submit Quarterly EM&A Summary Reports for the construction phase EM&A works only. These reports should be around 5 pages (including about three pages of text and tables and two pages of figures) and shall contain at minimum the following information:

(i) Up to half a page executive summary.

(ii) Basic Project information including a synopsis of the Project organization, programme, contacts of key management, and a synopsis of work undertaken during the quarter.

(iii) A brief summary of EM&A requirements including:
- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures, as recommended in the Project EIA study final report.

(iv) Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the Project EIA study report and summarized in the updated implementation schedule.

(v) Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(vi) Graphical plots of the trends of monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative 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.

(vii) Advice on the solid and liquid waste management status.

(viii) A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).

(ix) A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures.

(x) Not used.

(xi) A summary description of the actions taken in the event of noncompliance and any follow-up procedures related to earlier noncompliance.

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

(xiii) Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter.

(xiv) Proponents' contacts and any hotline telephone number for the public to make enquiries.

12.9 ANNUAL/FINAL EM&A REVIEW REPORTS

12.9.1.1 An annual EM&A report should be prepared by the ET at the end of each construction year during the course of the project. A final EM&A report should be prepared by the ET at the end of both the construction and operational phases. The

annual/final EM&A reports should contain at least the following information:

(i) Executive Summary (1-2 pages).

(ii) Drawings showing the project area any environmental sensitive receivers and the locations of the monitoring and control stations.

(iii) Basic project information including a synopsis of the project organization, contacts for key management staff and a synopsis of work undertaken during the course of the project or past twelve months.

(iv) A brief summary of EM&A requirements including:
- environmental mitigation measures as recommended in the project EIA study final report;
- environmental impact hypotheses tested;
- environmental quality performance limits (Action and Limit Levels);
- all monitoring parameters; and
- Event-Action Plans.

(v) A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report and summarized in the updated implementation schedule.

(vi) Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the projects including the post-project monitoring (or the past twelve months for annual reports) for all monitoring stations annotated against the following:
- the major activities being carried out on site during the period;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- the return of ambient environmental conditions in comparison with baseline data.

(vii) A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).

(viii) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate.

(ix) A description of the actions taken in the event of non-compliance.

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

(xi) A summary record of notifications of summonses and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches investigation, follow-up actions taken and results.

(xii) A comparison of the EM&A data with the EIA predictions with annotations and explanations for any discrepancies, including a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations.

(xiii) A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness, including cost effectiveness.

(xiv) A review of the success of the EM&A programme, including a review of the effectiveness and efficiency of the mitigation measures, and recommendations for any improvements in the EM&A programme.

(xv) A clear cut statement on the environmental acceptability of the project with reference to specific impact hypotheses and a conclusion to state the return to

ambient and/or the predicted scenario as the EIA findings.

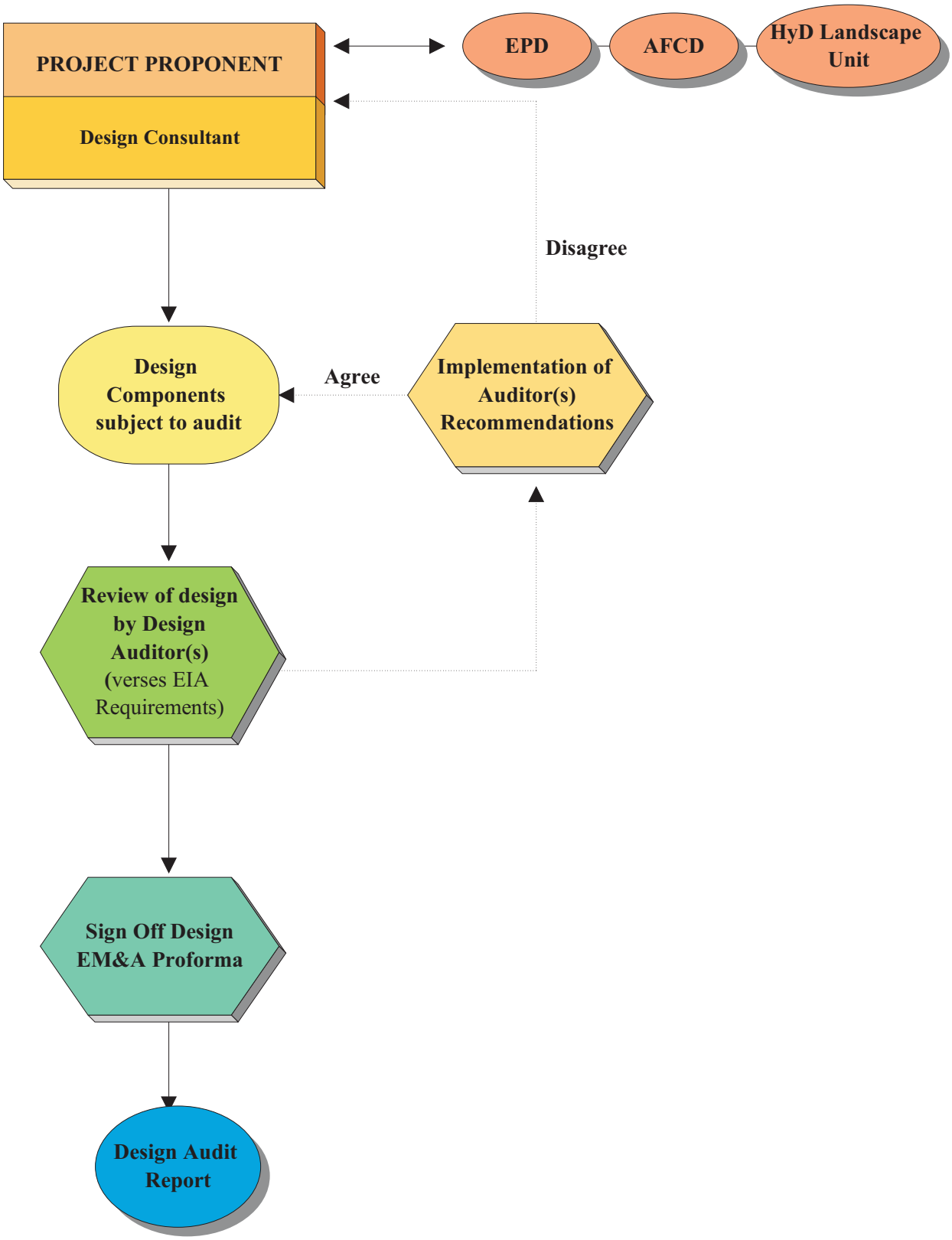
12.10 DATA KEEPING

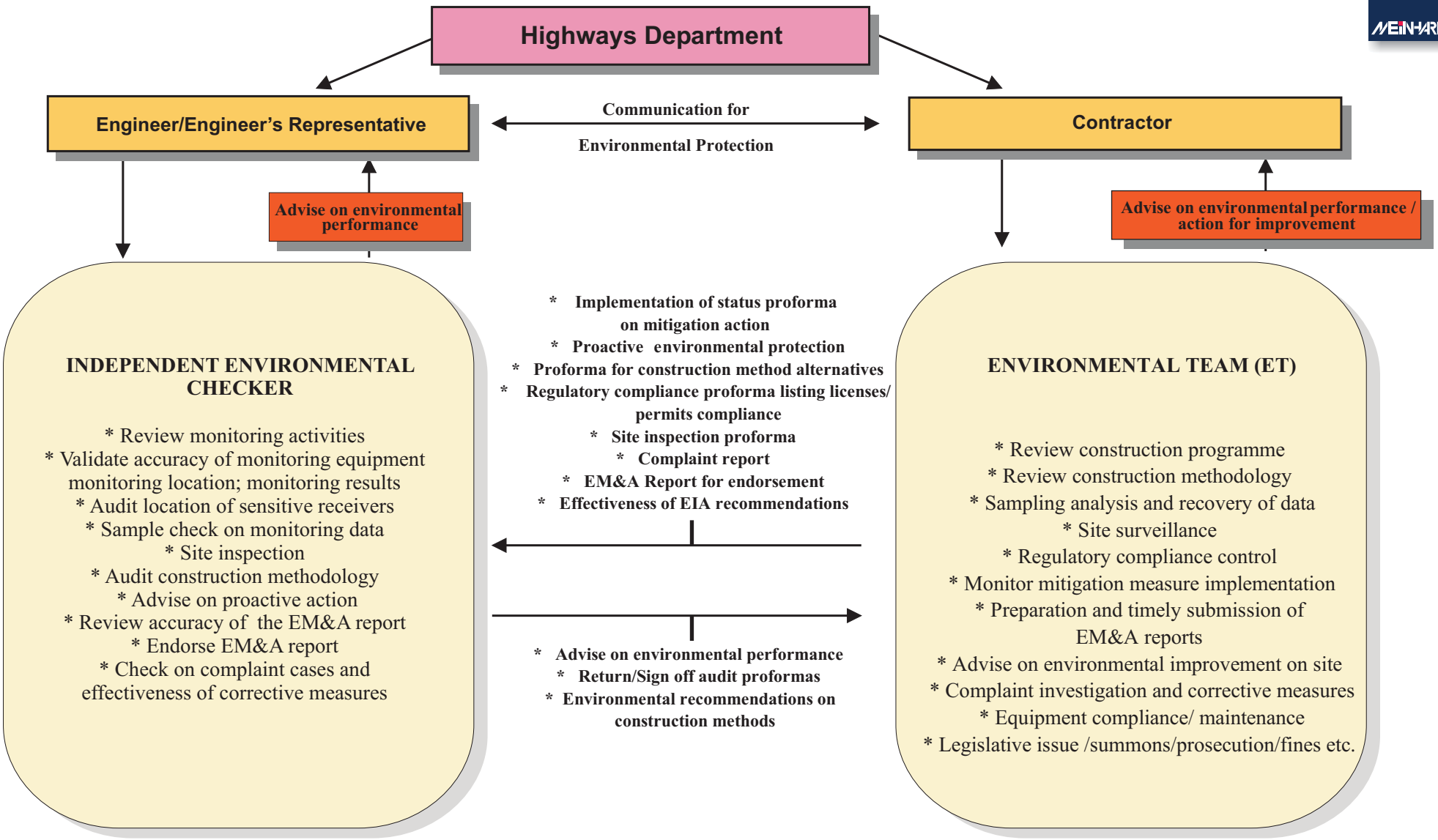
12.10.1.1 The site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the EM&A Reports for submission. However, the documents shall be kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the documents. The monitoring data shall also be recorded in magnetic media, and the software copy shall be available upon request. All the documents and data shall be kept for at least one year after the completion of the operational phase EM&A works.

12.11 INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

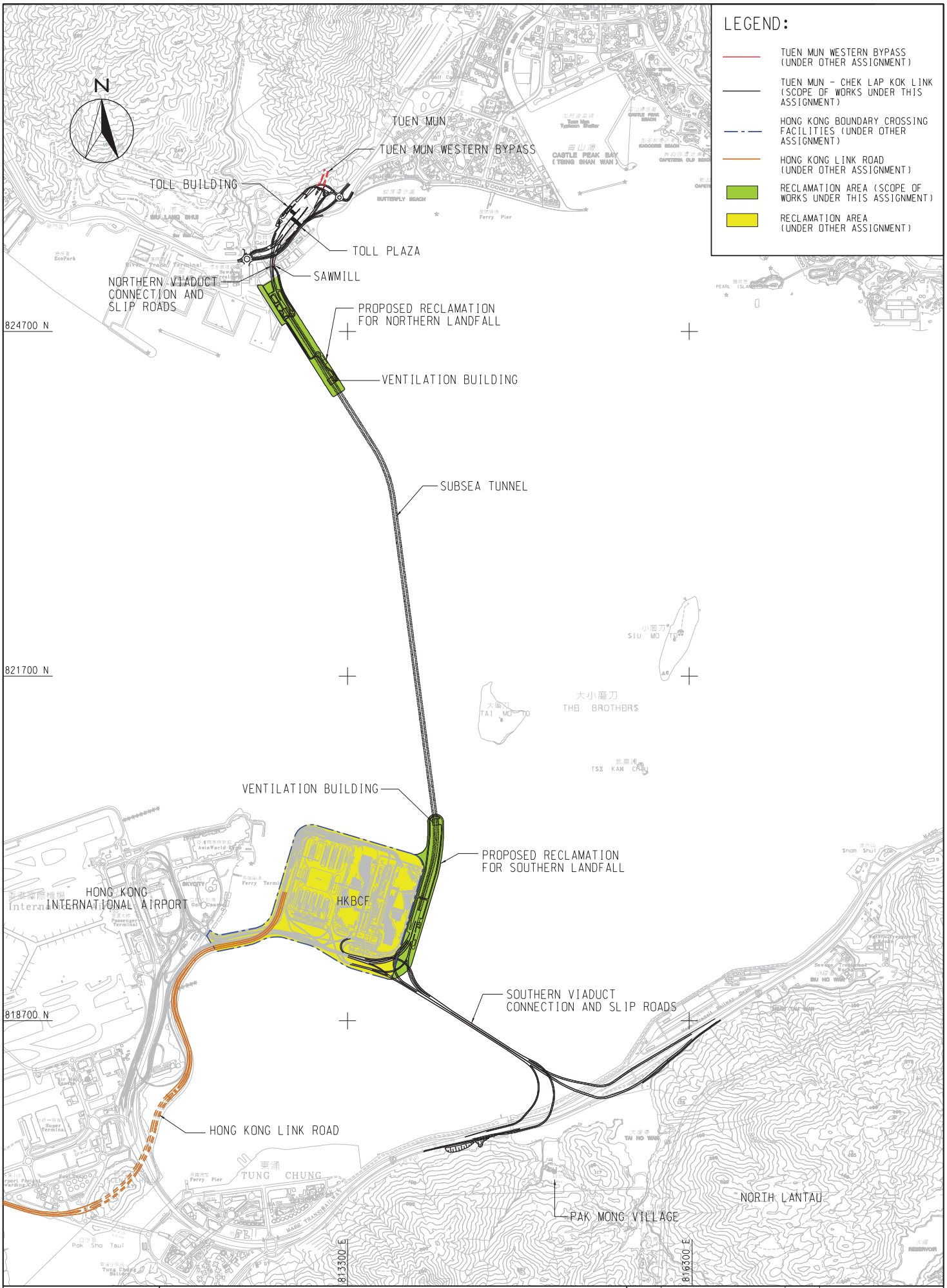
12.11.1.1 With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET shall immediately notify the Contractor, the ER, EPD and the AFCD as appropriate. The notification shall be followed up with advice to each party on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in ***Figure 12.1***.

Figures


PROJECT PROPONENT
Design Consultant
EPD
AFCD
HyD Landscape Unit
Disagree
Design Components subject to audit
Agree
Implementation of Auditor(s) Recommendations
Review of design by Design Auditor(s) (verses EIA Requirements)
Sign Off Design EM&A Proforma
Design Audit Report



Construction and Operational Phase Procedure and Organisation **Figure No. 1.2**



AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

GENERAL LAYOUT OF TM-CLKL

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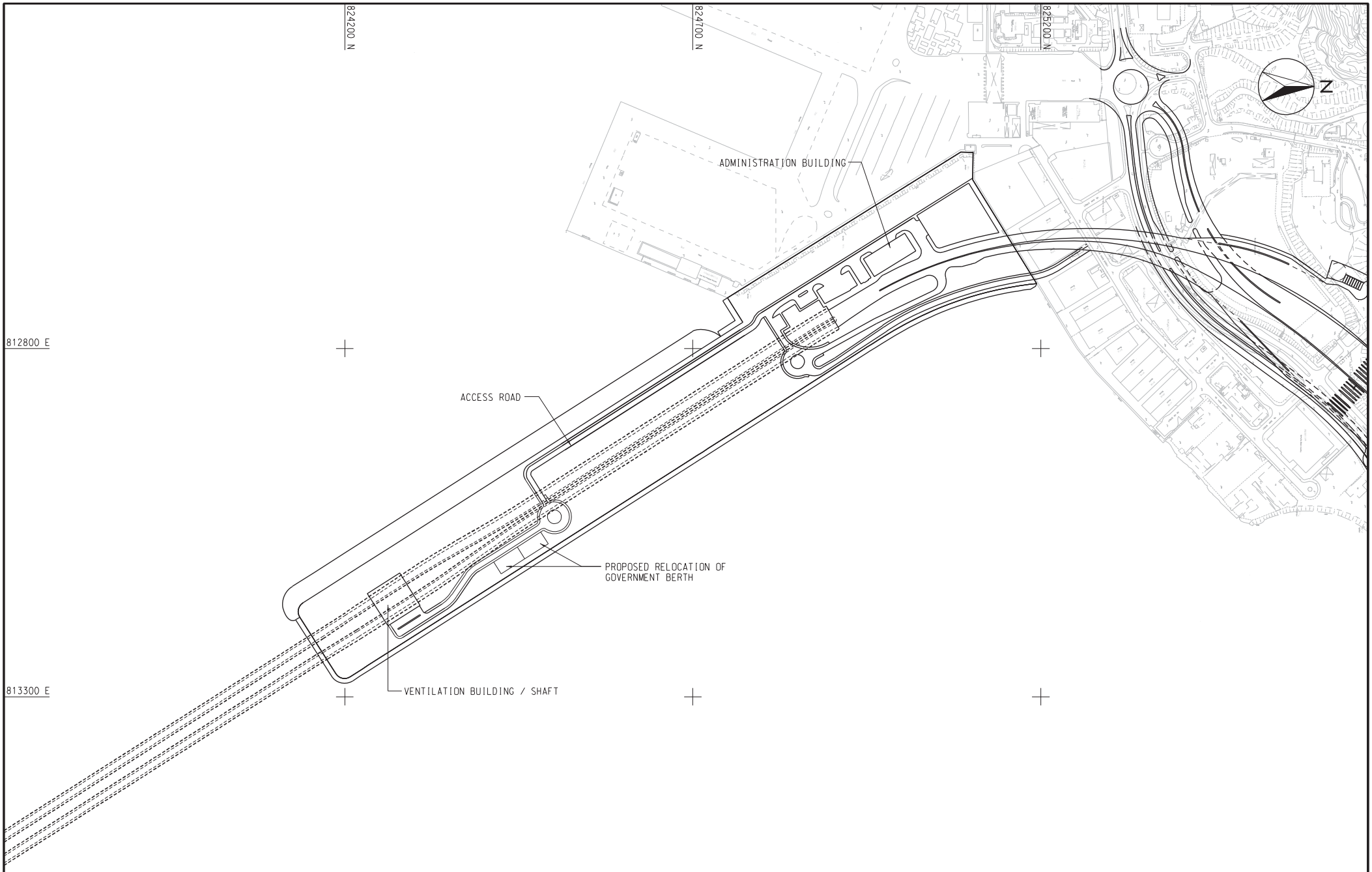
		REV	A

Plotting By: 2009-8-6 CHENCA
PLOT SCALE: 1%2

p:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH3\FIGURE 3-1.dgn



Plotting By 2008-7-22
PLOT SCALE $SCALEFACTOR$

AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

LAYOUT PLAN OF NORTHERN LANDFALL

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JOB No.	60044963	DRAWING No.	Fig 2.2a
			REV --

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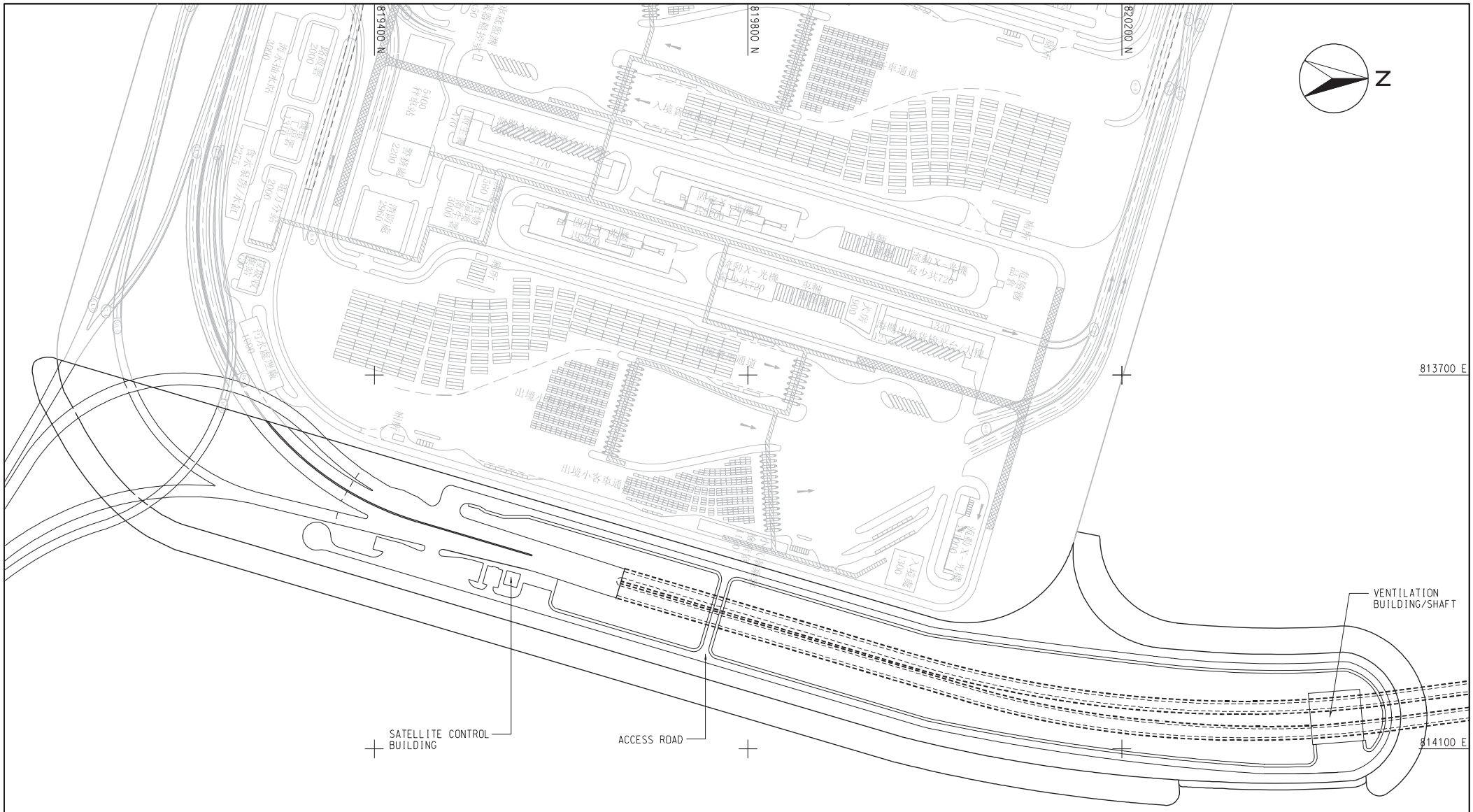

AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

LAYOUT PLAN OF SOUTHERN LANDFALL

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			REV A

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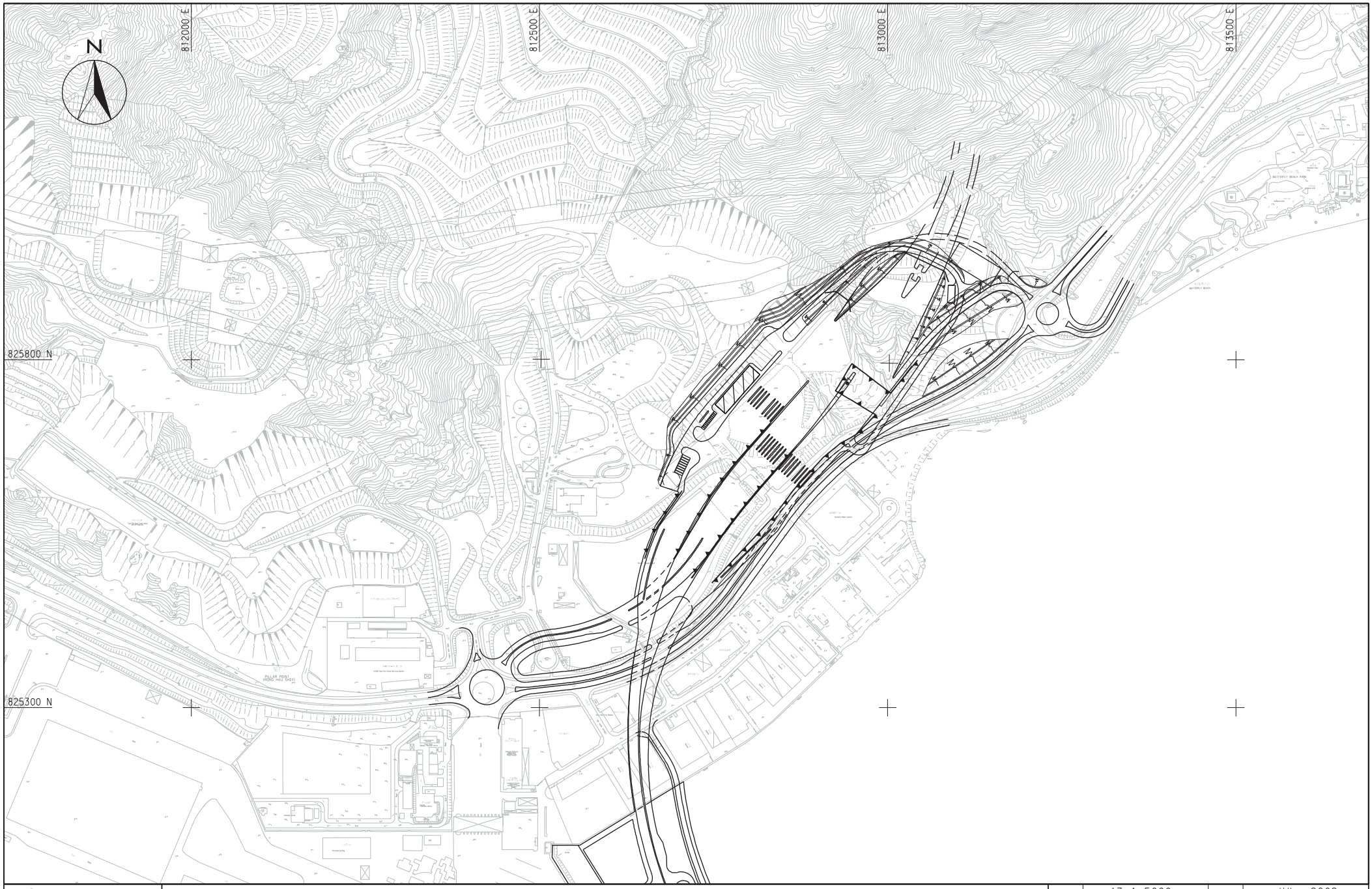
P:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH3\FIGURE 3-2b.dgn



AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

NORTHERN VIADUCT CONNECTION, SLIP ROADS AND TOLL PLAZA

AECOM

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			REV --

Plotting By: 2009-8-6
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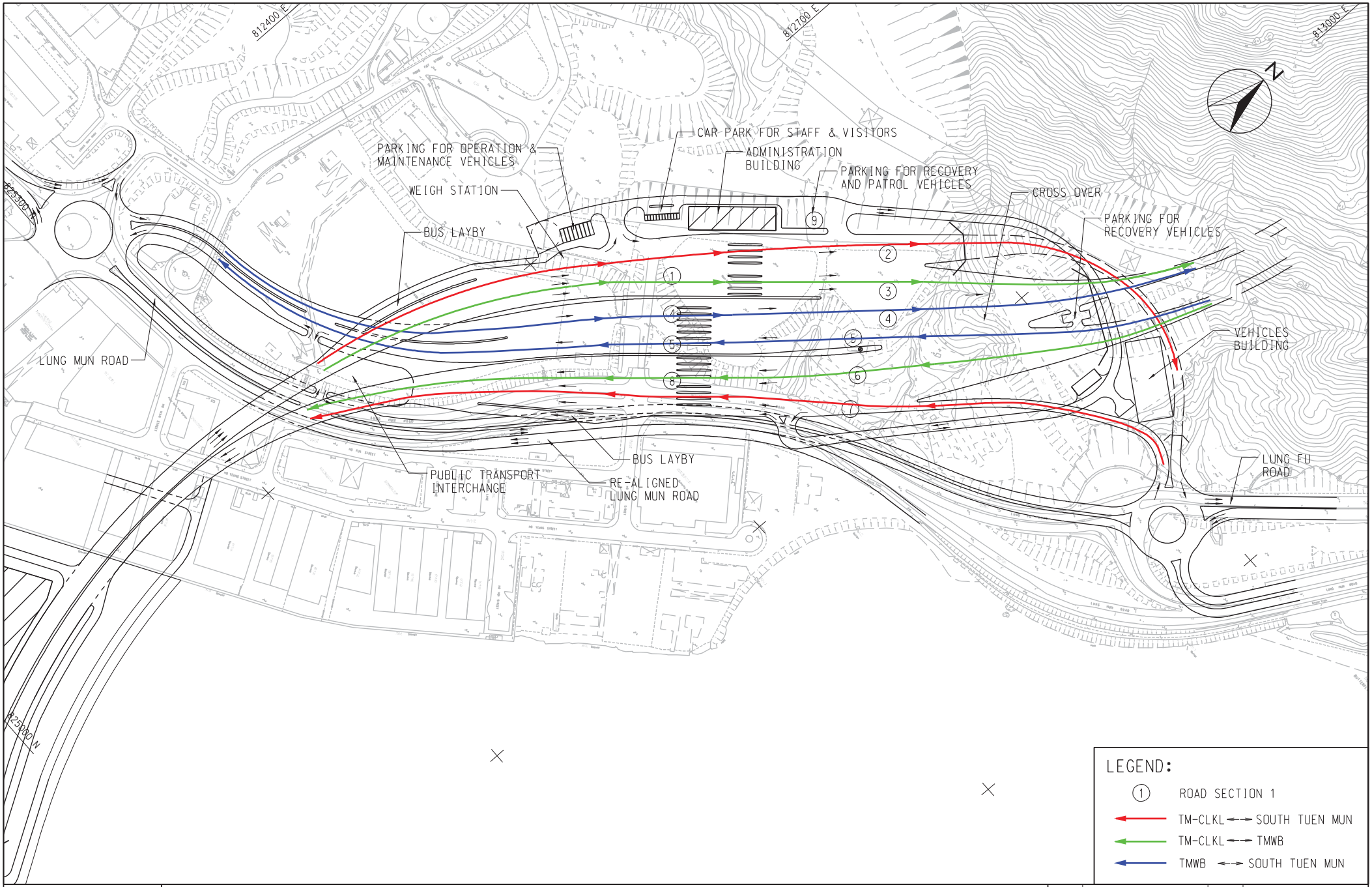

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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN – CHEK LAP KOK LINK – INVESTIGATION

TRAFFIC FLOWS AT TOLL PLAZA

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		REV	--

Plotting By 2009-8-5
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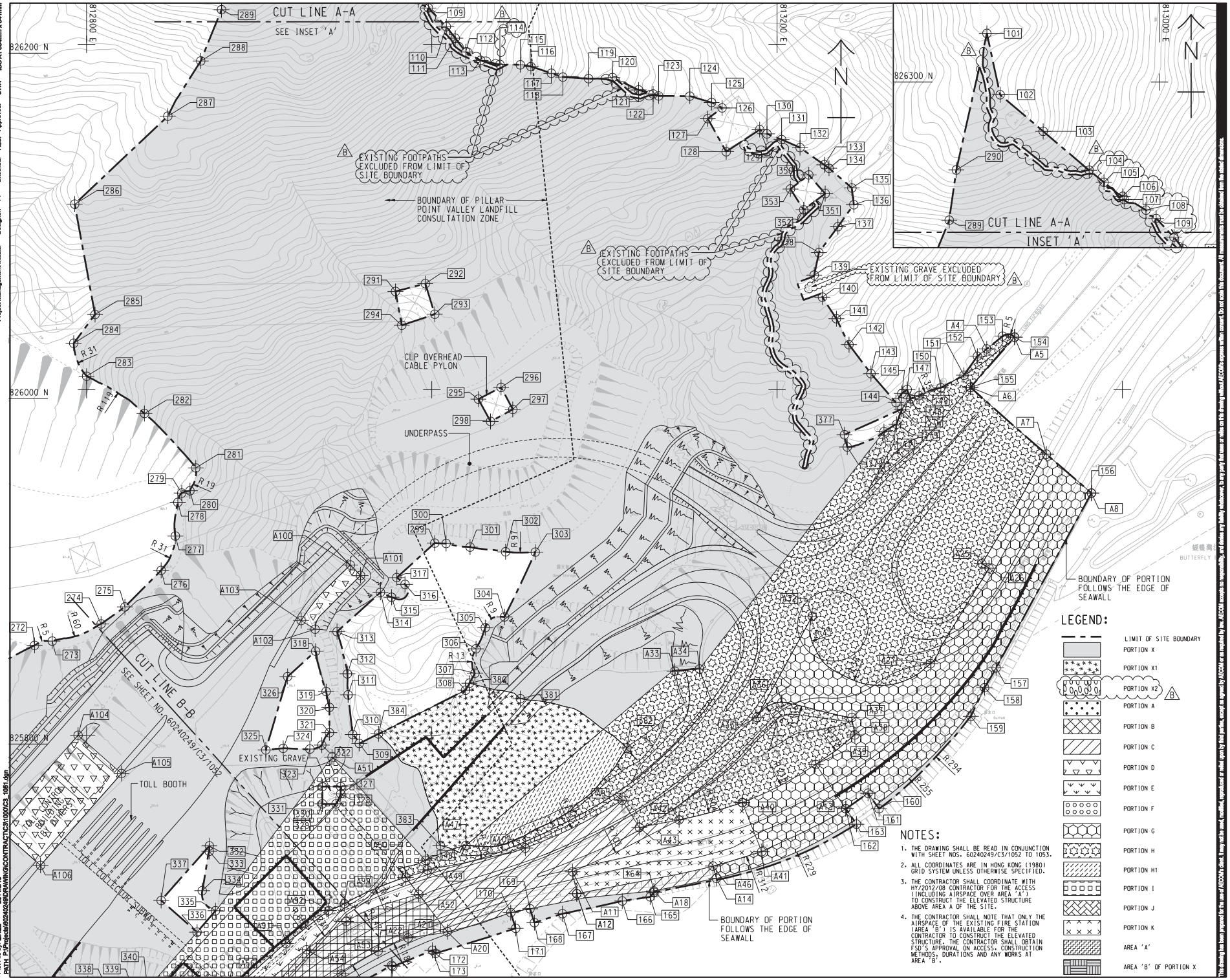

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

CONTRACT TITLE
TUEN MUN - CHEK LAP KOK LINK - NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS

CLIENT
HIGHWAYS DEPARTMENT
Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

VR	DATE	DESCRIPTION	CHK
B	MAR. 14	TENDER ADDENDUM NO. 2	CWN
A	FEB. 14	TENDER ADDENDUM NO. 1	CWN
-	JAN. 14	TENDER DRAWING	CWN

STATUS

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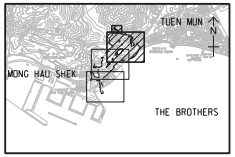
DIMENSION UNIT
METRES

KEY PLAN 1 : 50000



PROJECT NO.
60240249

CONTRACT NO.
HY/2013/12

SHEET TITLE
PORTIONS OF SITE AND SITE BOUNDARY SETTING OUT PLAN

Figure 2.4c

SHEET NUMBER
60240249/C3/1051B

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

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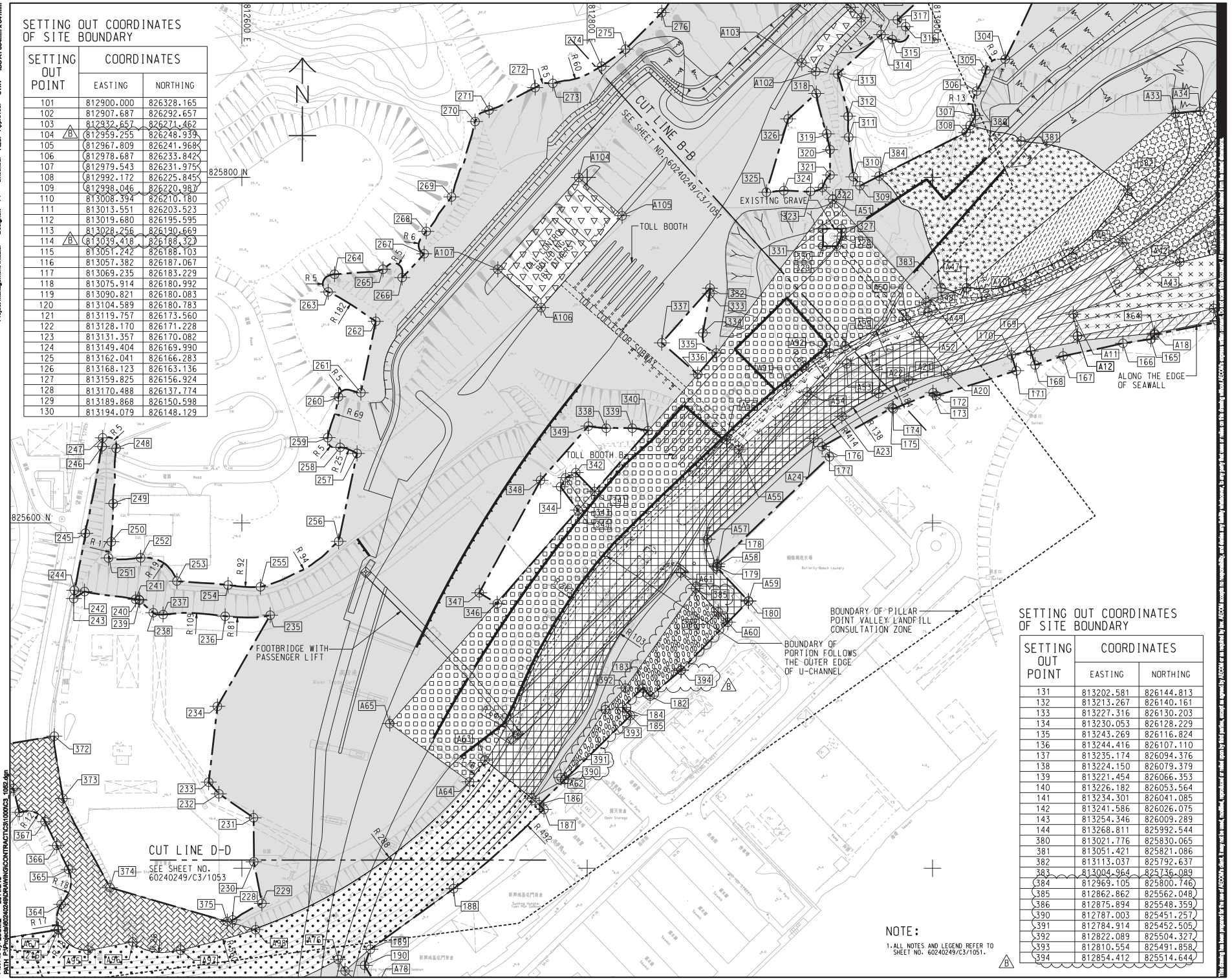

SETTING OUT COORDINATES OF SITE BOUNDARY

SETTING OUT POINT	COORDINATES	
	EASTING	NORTHING
101	812900.000	826328.165
102	812907.687	826292.657
103	812932.657	826271.462
104 B	812959.255	826248.939
105	812967.809	826241.968
106	812978.687	826233.842
107	812979.543	826231.975
108	812992.172	826225.845
109	812998.046	826220.980
110	813008.394	826210.180
111	813013.551	826203.523
112	813019.680	826195.595
113	813028.256	826190.669
114 B	813039.418	826188.327
115	813051.242	826188.103
116	813057.382	826187.067
117	813069.235	826183.229
118	813075.914	826180.992
119	813090.821	826180.083
120	813104.589	826180.783
121	813119.757	826173.560
122	813128.170	826171.228
123	813131.357	826170.082
124	813149.404	826169.990
125	813162.041	826166.283
126	813168.123	826163.136
127	813159.825	826156.924
128	813170.488	826137.774
129	813189.868	826150.598
130	813194.079	826148.129

SETTING OUT COORDINATES OF SITE BOUNDARY

SETTING OUT POINT	COORDINATES	
	EASTING	NORTHING
131	813202.581	826144.813
132	813213.267	826140.161
133	813227.316	826130.203
134	813230.053	826128.229
135	813243.269	826116.824
136	813244.416	826107.110
137	813235.174	826094.376
138	813224.150	826079.379
139	813221.454	826066.353
140	813226.182	826053.564
141	813234.301	826041.085
142	813241.586	826026.075
143	813254.346	826009.289
144	813268.811	825992.544
380	813021.776	825830.065
381	813051.421	825821.086
382	813113.037	825792.637
383	813004.964	825736.089
384	812969.105	825800.746
385	812862.862	825562.048
386	812875.894	825548.359
390	812787.003	825451.257
391	812784.914	825452.505
392	812822.089	825504.327
393	812810.554	825491.858
394	812854.412	825514.644

NOTE:

1. ALL NOTES AND LEGEND REFER TO SHEET NO. 60240249/C3/1051.

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

CONTRACT TITLE
TUEN MUN - CHEK LAP KOK LINK - NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS

CLIENT
HIGHWAYS DEPARTMENT
Hong Kong - Zhuhai - Macao Bridge
Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

VR	DATE	DESCRIPTION	CHK
B	MAR. 14	TENDER ADDENDUM NO. 2	CWN
A	FEB. 14	TENDER ADDENDUM NO. 1	CWN
-	JAN. 14	TENDER DRAWING	CWN

STATUS

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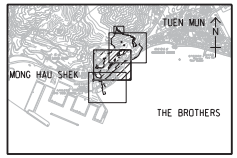

PROJECT NO. 60240249
CONTRACT NO. HY/2013/12

SHEET TITLE
PORTIONS OF SITE AND SITE BOUNDARY SETTING OUT PLAN

Figure 2.4d

SHEET NUMBER
60240249/C3/1052B

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

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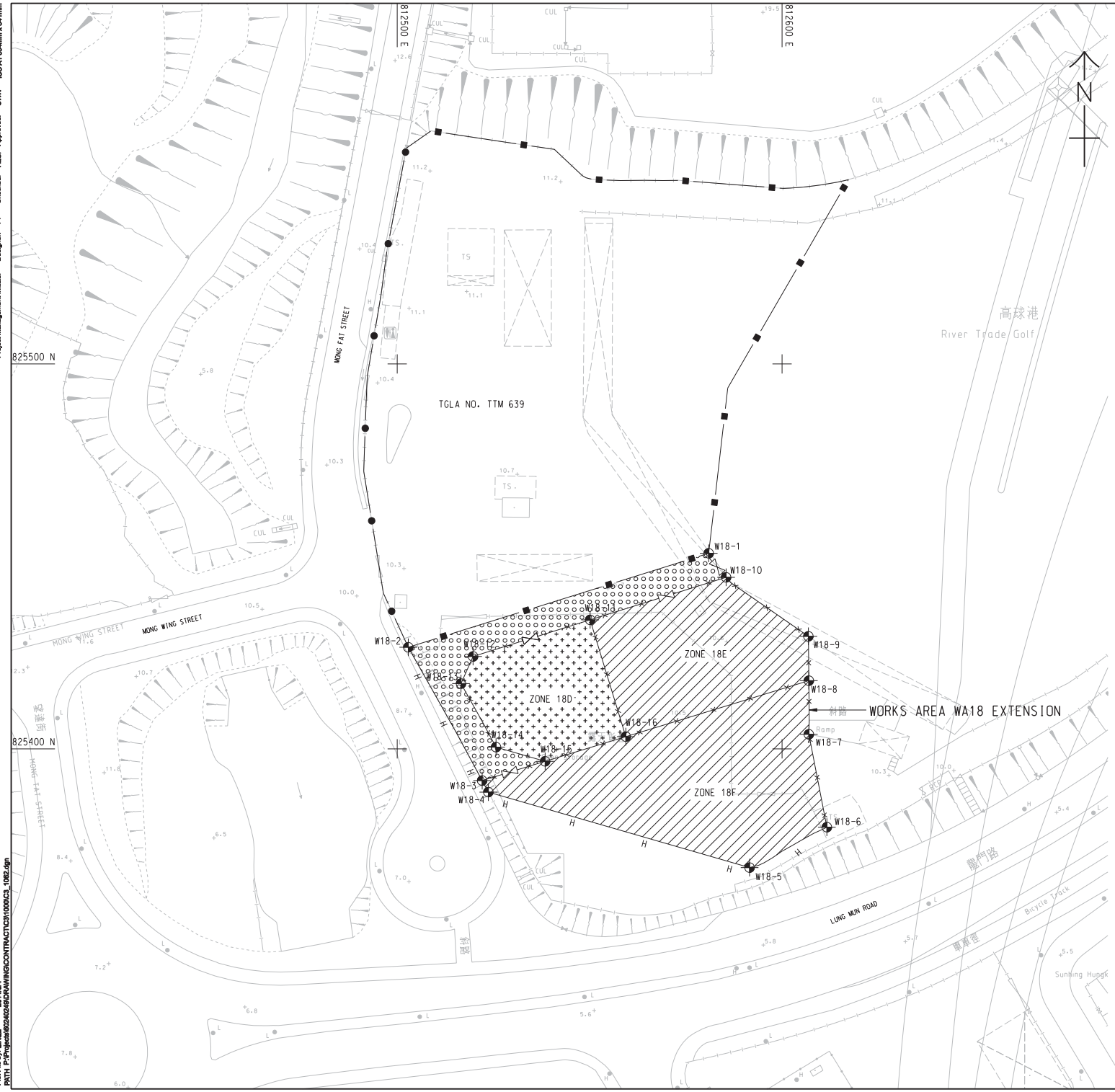

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE WORKS AREA KEY PLAN IN SHEET NO. 60240249/C3/1000.
2. DEMARCATION OF THE WORKS AREA SHALL BE DETERMINED ON SITE.
3. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6110 AND H6111 FOR DETAILS OF HOARDING.
4. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6121 AND H6122 FOR DETAILS OF CHAIN LINK FENCE.
5. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NO. H6121 FOR DETAILS OF GATE.
6. CHAIN LINK FENCE SHALL BE ERECTED ALONG THE WORKS AREA BOUNDARY. THE ALIGNMENT AND EXTENT OF HOARDING AND CHAIN LINK FENCE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE ENGINEER.
7. THE LOCATION AND WIDTH OF GATE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE ENGINEER.
8. THE SETTING OUT INFORMATION AND WORKS AREA CONDITIONS SHOWN IN THIS DRAWING ARE FOR REFERENCE ONLY. THE WORKS AREA BOUNDARY SHALL BE IN ACCORDANCE WITH THE ENGINEERING CONDITIONS FOR TEMPORARY GOVERNMENT LAND ALLOCATION NO. GLA-TTM 639. IN CASE OF DISCREPANCY BETWEEN THE BOUNDARY SHOWN ON THIS DRAWING AND THE BOUNDARY INDICATED ON THE ENGINEERING CONDITIONS, THE LATTER SHALL PREVAIL.
9. THE WORKS AREAS SHOWN ON THIS DRAWING ARE TO BE SHARED-USED AMONG THE TM-CLKL RELATED CONTRACTS. THE AREAS HATCHED WITH ▨ ARE TENTATIVELY ALLOCATED FOR THE USE BY THE CONTRACT.
10. THE COMMON AREA SHALL BE CONCRETE PAVED BY THE CONTRACTOR.
11. ZONE 18F SHALL BE USED FOR THE SITE ACCOMMODATION OF THE ENGINEER. ZONE 18E SHALL BE USED FOR SITE ACCOMMODATION OF THE CONTRACTOR.
12. ZONE 18D IS TO BE USED BY THE CONTRACTOR OF CONTRACT NO. HY/2012/08-TUEN MUN-CHEK LAP KOK LINK-NORTHERN CONNECTION SUB-SEA TUNNEL SECTION TO STORE PLANT AND EQUIPMENT ASSOCIATED WITH THE TBM TUNNELS FROM THE DATE FOR COMMENCEMENT OF THE WORKS TO 126 DAYS FROM THE DATE FOR COMMENCEMENT OF THE WORKS. THE CONTRACTOR SHALL LIAISE AND PROVIDE FREE AND UNOBSTRUCTED 24-HOUR ACCESS FOR THE CONTRACTOR OF CONTRACT NO. HY/2012/08 TO ZONE 18D. THE CONTRACTOR SHALL BE GIVEN THE POSSESSION OF ZONE 18D IN ACCORDANCE WITH APPENDIX TO FORM OF TENDER-P.3. B

LEGEND:

- WORKS AREA FOR THE CONTRACT
- COMMON AREA (MAINTAINED UNDER THE CONTRACT) TO BE SHARED-USED WITH OTHER CONTRACTS
- AREA TO BE USED BY THE CONTRACTOR OF CONTRACT NO. HY/2012/08 AND WORKS AREA FOR THIS CONTRACT TO BE EARLY HANDED OVER BY THE CONTRACTOR (SEE NOTES NO. 12 ABOVE)
- H — HOARDING AND GATE (TO BE ERECTED AND MAINTAINED UNDER THIS CONTRACT)
- EXISTING CHAIN LINK FENCE MAINTAINED BY OTHERS
- CHAIN LINK FENCE AND GATE (TO BE ERECTED AND MAINTAINED UNDER THIS CONTRACT)
- EXISTING HOARDING AND GATE MAINTAINED BY OTHERS

SETTING OUT CO-ORDINATES OF WORKS AREA WA18 EXTENSION

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	EASTING	NORTHING
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W18-2	812502.880	825426.380
W18-3	812522.068	825391.750
W18-4	812523.679	825388.756
W18-5	812591.556	825369.151
W18-6	812611.638	825379.647
W18-7	812606.954	825403.769
W18-8	812606.951	825417.705
W18-9	812606.832	825429.231
W18-10	812585.456	825444.557
W18-11	812550.126	825433.508
W18-12	812519.715	825423.997
W18-13	812516.580	825416.947
W18-14	812525.682	825400.438
W18-15	812538.435	825396.754
W18-16	812559.404	825403.166

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

CONTRACT TITLE
TUEN MUN - CHEK LAP KOK LINK - NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS

CLIENT
路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
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SUB-CONSULTANTS

ISSUE/REVISION

B	MAR. 14	TENDER ADDENDUM NO. 2	CWN
A	FEB. 14	TENDER ADDENDUM NO. 1	CWN
-	JAN. 14	TENDER DRAWING	CWN
MR	DATE	DESCRIPTION	CHK

STATUS

SCALE: A1 1 : 500
DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60240249
CONTRACT NO.: HY/2013/12

SHEET TITLE
WORKS AREA AND HOARDING PLAN

Figure 2.4e

SHEET NUMBER
60240249/C3/1062B

Project Management Initials: PI | Designer: | Checked: ALC/F | Approved: CWN | ISO A1 594mm x 841mm

Plot File by: LIXQ2 2014/3/4
PATH: P:\Projects\60240249\DRAWING\CONTRACT\C3\1000\C3_1062.dgn

250m Consultation Zone of PPV Landfill

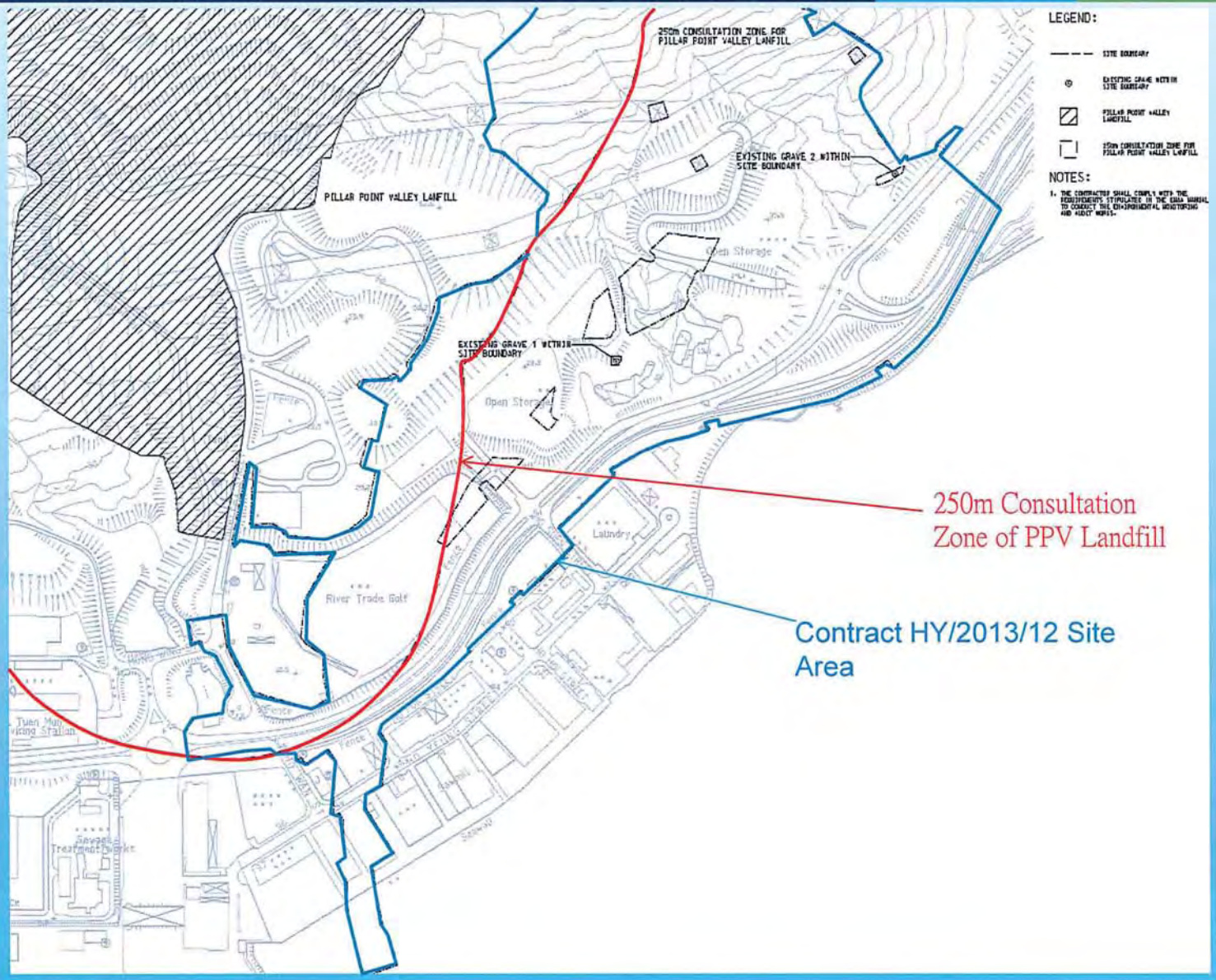


Figure 2.4f

AECOM

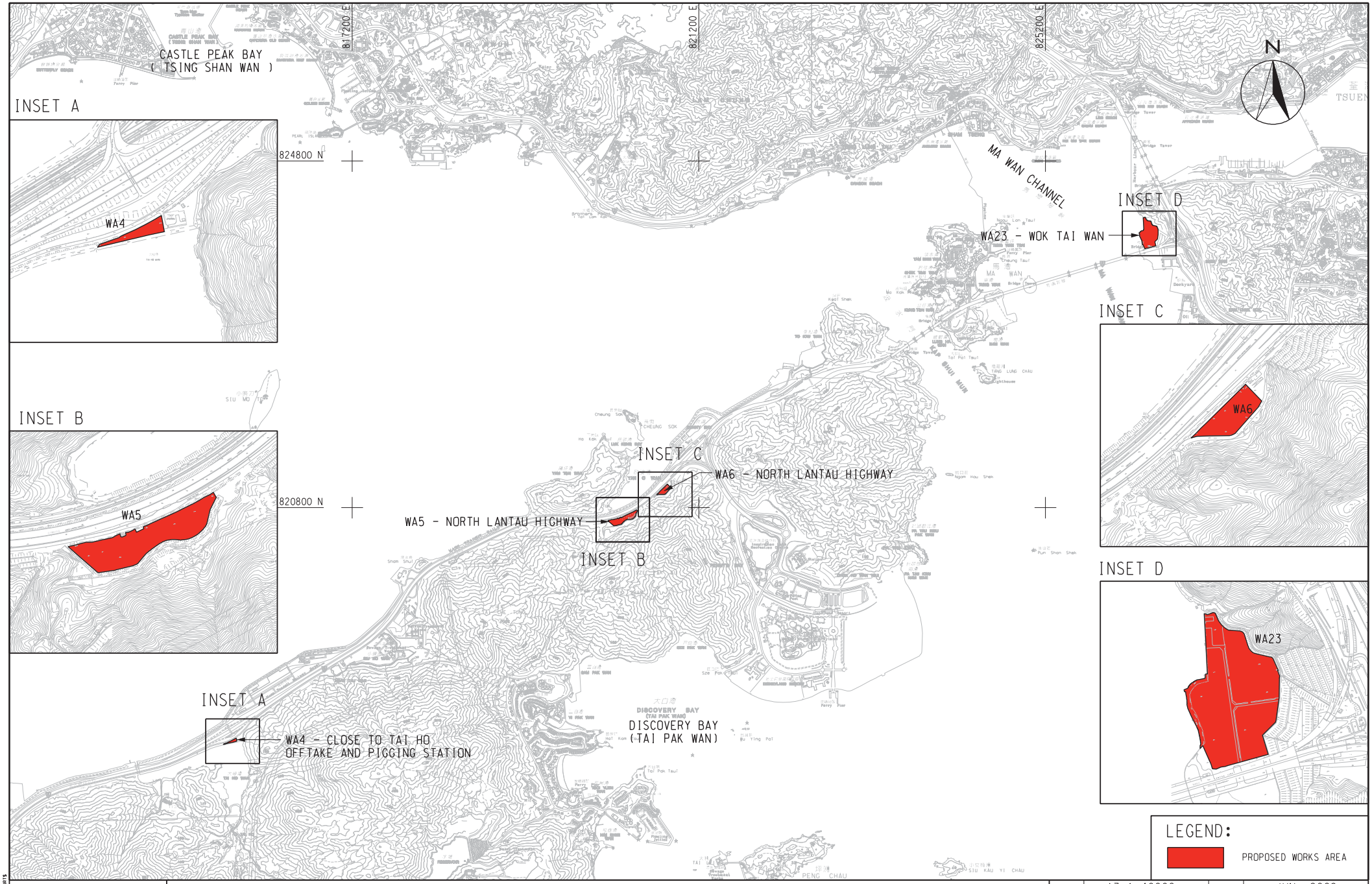
AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

PROPOSED WORKS AREAS FOR TMCLKL (TUEN MUN SIDE)

SCALE	A3 1:40000	DATE	JUN. 2009
CHECK	--	DRAWN	YMZ
JOB No.	60044963	DRAWING No.	Fig 2.8a
		REV	--

Plotting By 2009-6-12
PLOT SCALE 1=1 SCALE=1.0000

p:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH3\FIGURE 3-8a.dgn



AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

PROPOSED WORKS AREAS FOR TMCLKL (LANTAU SIDE)

SCALE	A3 1:40000	DATE	JUN. 2009
CHECK	--	DRAWN	GXS
JOB No.	60044963	DRAWING No.	Fig 2.8b
		REV	--

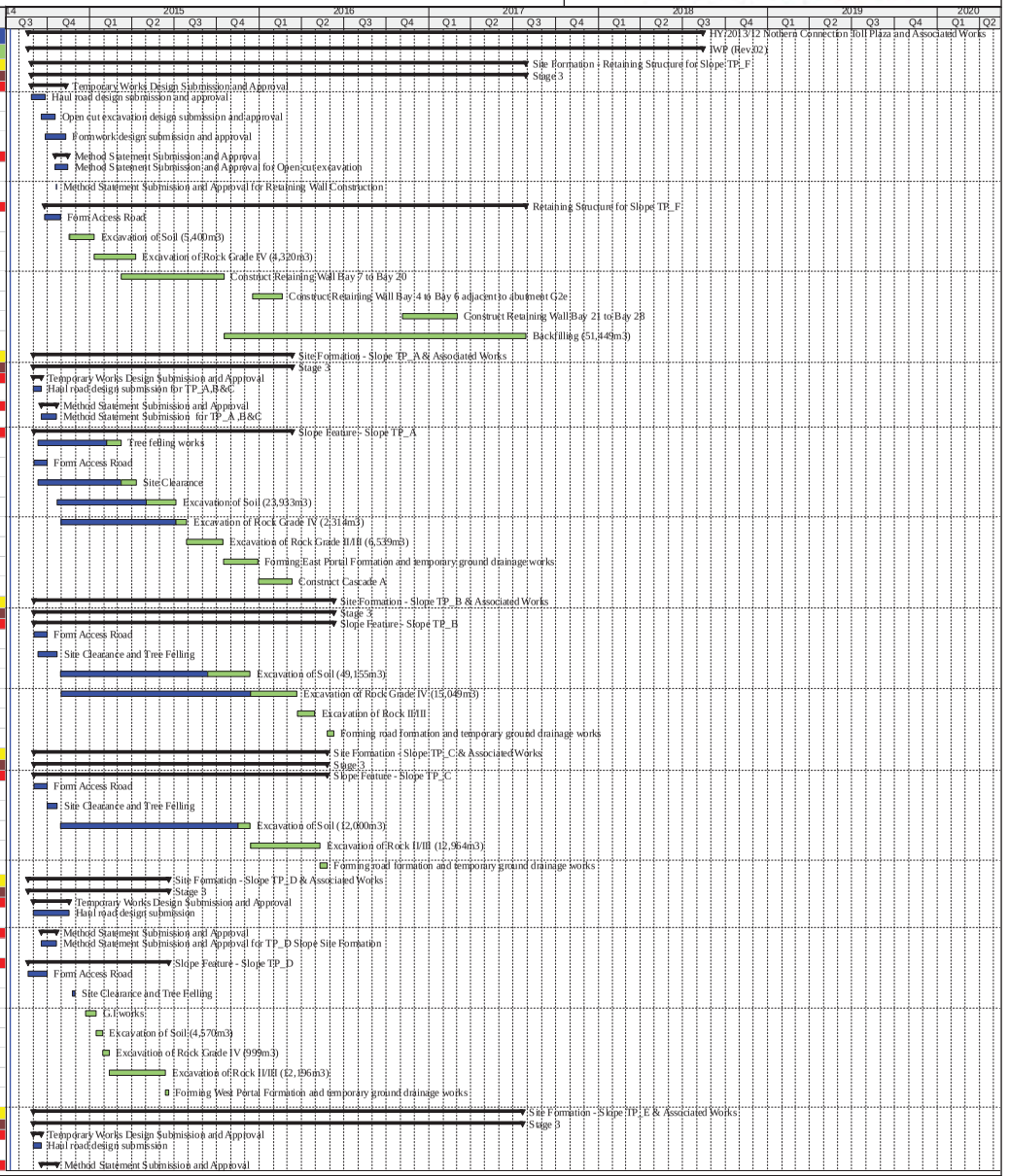
Plotting By 2009-6-12
PLOT SCALE 1 SCALE=SHORT$

p:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH3\FIGURE 3-8b.dgn

HY/2013/12 TM-CLKL Northern Connection Toll Plaza and Associated Works

CRBC - KADEN Joint Venture

Activity ID	Activity Name	Original Duration	Planned Start	Actual Start	Planned Finish	Actual Finish
HY/2013/12 Nothern Connection Toll Plaza and Associated Works		1445	29-Aug-14	21-Aug-14	13-Aug-18	
IWP (Rev.02)		1445	29-Aug-14	21-Aug-14	13-Aug-18	
Site Formation - Retaining Structure for Slope TP_F		1064	29-Aug-14	29-Aug-14	29-Jul-17	
Stage 3		1064	29-Aug-14	29-Aug-14	29-Jul-17	
Tempoorry Works Design Submission and Approval		75	29-Aug-14	29-Aug-14	11-Nov-14	11-Nov-14
RWF11000	Haul road design submission and approval	30	29-Aug-14	29-Aug-14	27-Sep-14	27-Sep-14
RWF11050	Open cut excavation design submission and approval	30	18-Sep-14	18-Sep-14	18-Oct-14	18-Oct-14
RWF11100	Formwork design submission and approval	45	27-Sep-14	27-Sep-14	11-Nov-14	11-Nov-14
Method Statement Submission and Approval		32	18-Oct-14	18-Oct-14	18-Nov-14	15-Nov-14
RWF21000	Method Statement Submission and Approval for Open cut excavation	30	18-Oct-14	18-Oct-14	15-Nov-14	15-Nov-14
RWF21050	Method Statement Submission and Approval for Retaining Wall Construction	30	21-Oct-14	21-Oct-14	18-Nov-14	21-Oct-14
Retaining Structure for Slope TP_F		799	27-Sep-14	26-Sep-14	29-Jul-17	
RWF31000	Form Access Road	24	27-Sep-14	26-Sep-14	30-Oct-14	30-Oct-14
RWF31050	Excavation of Soil (5,400m3)	43	18-Nov-14	17-Nov-14	10-Jan-15	
RWF31100	Excavation of Rock Grade IV (4,320m3)	70	10-Jan-15		10-Apr-15	
RWF31300	Construct Retaining Wall Bay 7 to Bay 20	168	09-Mar-15		17-Oct-15	
RWF31325	Construct Retaining Wall Bay 4 to Bay 6 adjacent to abutment G2e	50	17-Dec-15		20-Feb-16	
RWF31350	Construct Retaining Wall Bay 21 to Bay 28	96	04-Nov-16		03-Mar-17	
RWF31400	Backfilling (51,449m3)	504	17-Oct-15		29-Jul-17	
Site Formation - Slope TP_A & Associated Works		520	09-Oct-14	01-Sep-14	12-Mar-16	
Stage 2		520	09-Oct-14	01-Sep-14	12-Mar-16	
Tempoorry Works Design Submission and Approval		45	09-Oct-14	01-Sep-14	20-Nov-14	18-Sep-14
TPA11000	Haul road design submission for TP_A,B&C	45	09-Oct-14	01-Sep-14	20-Nov-14	18-Sep-14
Method Statement Submission and Approval		45	23-Oct-14	18-Sep-14	04-Dec-14	21-Oct-14
TPA21050	Method Statement Submission for TP_A,B&C	45	23-Oct-14	18-Sep-14	04-Dec-14	21-Oct-14
Slope Feature - Slope TP_A		309	06-Feb-15	03-Sep-14	12-Mar-16	
TPA31030	Tree felling works	24	06-Feb-15	11-Sep-14	10-Mar-15	
TPA31040	Form Access Road	24	10-Mar-15	03-Sep-14	11-Apr-15	01-Oct-14
TPA31050	Site Clearance	24	11-Apr-15	11-Sep-14	13-May-15	
TPA31100	Excavation of Soil (23,933m3)	48	03-Jun-15	23-Oct-14	05-Aug-15	
TPA31150	Excavation of Rock Grade IV (2,314m3)	18	05-Aug-15	01-Nov-14	27-Aug-15	
TPA31200	Excavation of Rock Grade II/III (6,539m3)	60	29-Jul-15		14-Oct-15	
TPA31250	Forming East Portal Formation and temporary ground drainage works	60	16-Oct-15		29-Dec-15	
TPA31300	Construct Cascade A	60	30-Dec-15		12-Mar-16	
Site Formation - Slope TP_B & Associated Works		207	17-Sep-15	03-Sep-14	10-Jun-16	
Stage 2		207	17-Sep-15	03-Sep-14	10-Jun-16	
Slope Feature - Slope TP_B		207	17-Sep-15	03-Sep-14	10-Jun-16	
TPB31000	Form Access Road	24	17-Sep-15	03-Sep-14	19-Oct-15	01-Oct-14
TPB31050	Site Clearance and Tree Felling	24	20-Oct-15	11-Sep-14	18-Nov-15	23-Oct-14
TPB31100	Excavation of Soil (49,155m3)	72	19-Nov-15	30-Oct-14	17-Feb-16	
TPB31150	Excavation of Rock Grade IV (15,049m3)	80	18-Feb-16	01-Nov-14	01-Jun-16	
TPB31210	Excavation of Rock II/III	28	23-Mar-16		29-Apr-16	
TPB31260	Forming road formation and temporary ground drainage works	11	26-May-16		10-Jun-16	
Site Formation - Slope TP_C & Associated Works		195	17-Sep-15	03-Sep-14	26-May-16	
Stage 3		195	17-Sep-15	03-Sep-14	26-May-16	
Slope Feature - Slope TP_C		195	17-Sep-15	03-Sep-14	26-May-16	
TPC31015	Form Access Road	24	17-Sep-15	03-Sep-14	19-Oct-15	01-Oct-14
TPC31030	Site Clearance and Tree Felling	24	20-Oct-15	02-Oct-14	18-Nov-15	23-Oct-14
TPC31060	Excavation of Soil (12,000m3)	24	18-Jan-16	30-Oct-14	17-Feb-16	
TPC31100	Excavation of Rock II/III (12,964m3)	115	14-Dec-15		11-May-16	
TPC31160	Forming road formation and temporary ground drainage works	11	11-May-16		26-May-16	
Site Formation - Slope TP_D & Associated Works		284	08-Sep-14	21-Aug-14	19-Jun-15	
Stage 3		284	08-Sep-14	21-Aug-14	19-Jun-15	
Tempoorry Works Design Submission and Approval		30	08-Sep-14	01-Sep-14	09-Oct-14	18-Nov-14
TPD21000	Haul road design submission	30	08-Sep-14	01-Sep-14	09-Oct-14	18-Nov-14
Method Statement Submission and Approval		30	23-Sep-14	18-Sep-14	23-Oct-14	21-Oct-14
TPD11050	Method Statement Submission and Approval for TP_D Slope Site Formation	30	23-Sep-14	18-Sep-14	23-Oct-14	21-Oct-14
Slope Feature - Slope TP_D		220	08-Sep-14	21-Aug-14	19-Jun-15	
TPD31000	Form Access Road	24	08-Sep-14	21-Aug-14	11-Oct-14	01-Oct-14
TPD31025	Site Clearance and Tree Felling	24	24-Nov-14	24-Nov-14	22-Dec-14	30-Nov-14
TPD31035	G.I works	17	22-Dec-14		14-Jan-15	
TPD31100	Excavation of Soil (4,570m3)	12	14-Jan-15		28-Jan-15	
TPD31150	Excavation of Rock Grade IV (999m3)	12	28-Jan-15		11-Feb-15	
TPD31200	Excavation of Rock II/III (12,196m3)	92	11-Feb-15		13-Jun-15	
TPD31250	Forming West Portal Formation and temporary ground drainage works	4	13-Jun-15		19-Jun-15	
Site Formation - Slope TP_E & Associated Works		1047	08-Sep-14	01-Sep-14	21-Jul-17	
Stage 3		1047	08-Sep-14	01-Sep-14	21-Jul-17	
Tempoorry Works Design Submission and Approval		30	08-Sep-14	01-Sep-14	09-Oct-14	18-Sep-14
TPE11000	Haul road design submission	30	08-Sep-14	01-Sep-14	09-Oct-14	18-Sep-14
Method Statement Submission and Approval		45	23-Sep-14	18-Sep-14	06-Nov-14	23-Oct-14



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

CRBC - Kaden JV

Programme & Progress

Figure 2.9a

Date	Revision	Checked	Approved
30-Nov-14	Draft		

HY/2013/12 TM-CLKL Northern Connection Toll Plaza and Associated Works

CRBC - KADEN Joint Venture

Activity ID	Activity Name	Original Duration	Planned Start	Actual Start	Planned Finish	Actual Finish
TPE21000	Method Statement Submission for TP_E Slope Site Formation	45	23-Sep-14	18-Sep-14	06-Nov-14	23-Oct-14
Slope Feature - Slope TP_E at Toll Control Building Area		804	09-Oct-14	01-Sep-14	21-Dec-16	
TPE31000	Form Access Road	72	09-Oct-14	01-Sep-14	07-Jan-15	23-Oct-14
TPE31050	Site Clearance, Tree Transplanting and Felling	72	11-Nov-14	12-Sep-14	06-Feb-15	23-Oct-14
TPE31100	Excavation of Soil (Max. 200m3/n/d; 13,958m3)	72	28-Jan-15	24-Oct-14	04-May-15	
TPE31150	Excavation of Rock Grade IV (55m3/n/d; 2,810m3)	44	13-Mar-15	25-Oct-14	12-May-15	
TPE31200	Excavation of Rock Grade III (45m3/n/d; 17,388m3)	129	12-May-15	31-Oct-14	29-Oct-15	
TPE31250	Excavation of Rock Grade II (35m3/n/d; 85,388m3)	337	24-Aug-15	01-Nov-14	04-Nov-16	
TPE31300	Hand Over of Portion D	13	08-Dec-16		21-Dec-16	
Slope Feature - Slope TP_E Remaing Section		779	18-Oct-14	02-Oct-14	21-Jul-17	
TPE41000	Preservation of Existing Pitcher Plants before Translocation	154	18-Oct-14	02-Oct-14	02-May-15	31-Oct-14
TPE41020	Translocation of Pitcher Plants	67	02-May-15		29-Jul-15	
TPE41100	Excavation of Soil (Max. 200m3/n/d; 12,159m3)	40	29-Jul-15		18-Sep-15	
TPE41150	Excavation of Rock Grade IV (55m3/n/d; 6,408m3)	60	18-Sep-15		04-Dec-15	
TPE41200	Excavation of Rock Grade III (45m3/n/d; 14,000m3)	160	04-Dec-15		29-Jun-16	
TPE41250	Excavation of Rock Grade II (35m3/n/d; 15,226m3)	250	29-Jun-16		19-May-17	
TPE41300	Construct Cascade C	48	19-May-17		21-Jul-17	
Site Formation - Slope Upgrading Works		1335	17-Dec-14	02-Oct-14	13-Aug-18	
Stage 3		1335	17-Dec-14	02-Oct-14	13-Aug-18	
Temporary Works Design Submission and Approval		30	17-Dec-14	02-Oct-14	17-Jan-15	06-Oct-14
SUW11000	General temporary works design for slope works	30	17-Dec-14	02-Oct-14	17-Jan-15	06-Oct-14
Method Statement Submission and Approval		45	17-Dec-14	02-Oct-14	31-Jan-15	06-Oct-14
SUW21000	General method statement for Slope Upgrading Works (soil nails, rock dowels, etc.)	45	17-Dec-14	02-Oct-14	31-Jan-15	06-Oct-14
Slope Feature - Slope 5SE-D/C170		117	06-Jan-15		02-May-15	
SUW31000	Implementation of TTA	14	06-Jan-15		19-Jan-15	
SUW31050	Site Clearance and Tree Felling	15	19-Jan-15		05-Feb-15	
SUW31100	Prepare Access Road	7	19-Jan-15		27-Jan-15	
SUW31150	Excavation of Soil (1,240m3)	14	31-Jan-15		17-Feb-15	
SUW31200	Excavation of Rock Grade IV (350m3)	9	17-Feb-15		03-Mar-15	
SUW31250	Slope Works (Recompaction; Soil Nail 45 nr) and Drainage System	45	03-Mar-15		02-May-15	
Other Slope Features		993	31-Jan-15		13-Aug-18	
SUW41000	Hydroseeding 5SE-D/C152	72	31-Jan-15		07-May-15	
SUW42000	Hydroseeding and Erosion Control Mat 5SE-D/C121	36	13-Jun-15		01-Aug-15	
SUW43000	Hydroseeding and Erosion Control Mat 5SE-D/C122	36	13-Jun-15		01-Aug-15	
SUW45000	Hydroseeding 5SE-D/C150	72	31-Jan-15		07-May-15	
SUW46000	Slope Modification Works 5SE-D/C14	72	29-Jul-17		02-Nov-17	
SUW47000	Hydroseeding 5SE-D/C151	72	31-Jan-15		07-May-15	
SUW47500	Re-compaction, Fill and Hydroseeding 5SE-D/C149, 150 and 152	72	31-Jan-15		07-May-15	
SUW48000	Rock Mapping and Stabilization 5SE-D/C115	72	31-Jan-15		07-May-15	
SUW49000	Hydroseeding and Erosion Control Mat 5SE-D/C18	136	25-May-17		18-Nov-17	
SUW50000	Hydroseeding and Erosion Control Mat 5SE-D/C117	148	26-Jun-17		03-Jan-18	
SUW51000	Slope Cut 5SE-D/C165 (1E - 50m3/n/d, 210m3; Soil Nail 47 nr., each 8m Long)	196	30-Mar-16		09-Dec-16	
SUW52000	Slope Modification Works D/C21	48	02-Nov-17		30-Dec-17	
SUW53000	Slope Modification Works D/C171	48	30-Dec-17		01-Mar-18	
SUW54000	Drainage Hydroseeding and Erosion Control Mat 5SE-D/C16	120	08-Mar-18		13-Aug-18	
SUW55000	Slope Re-compaction 5SE-D/F60	96	26-Oct-17		24-Feb-18	
SUW56000	Slope Modification Works D/C158	48	30-Dec-17		01-Mar-18	
SUW57000	Hydroseeding and Erosion Control Mat 5SE-D/C17	48	10-Apr-18		11-Jun-18	

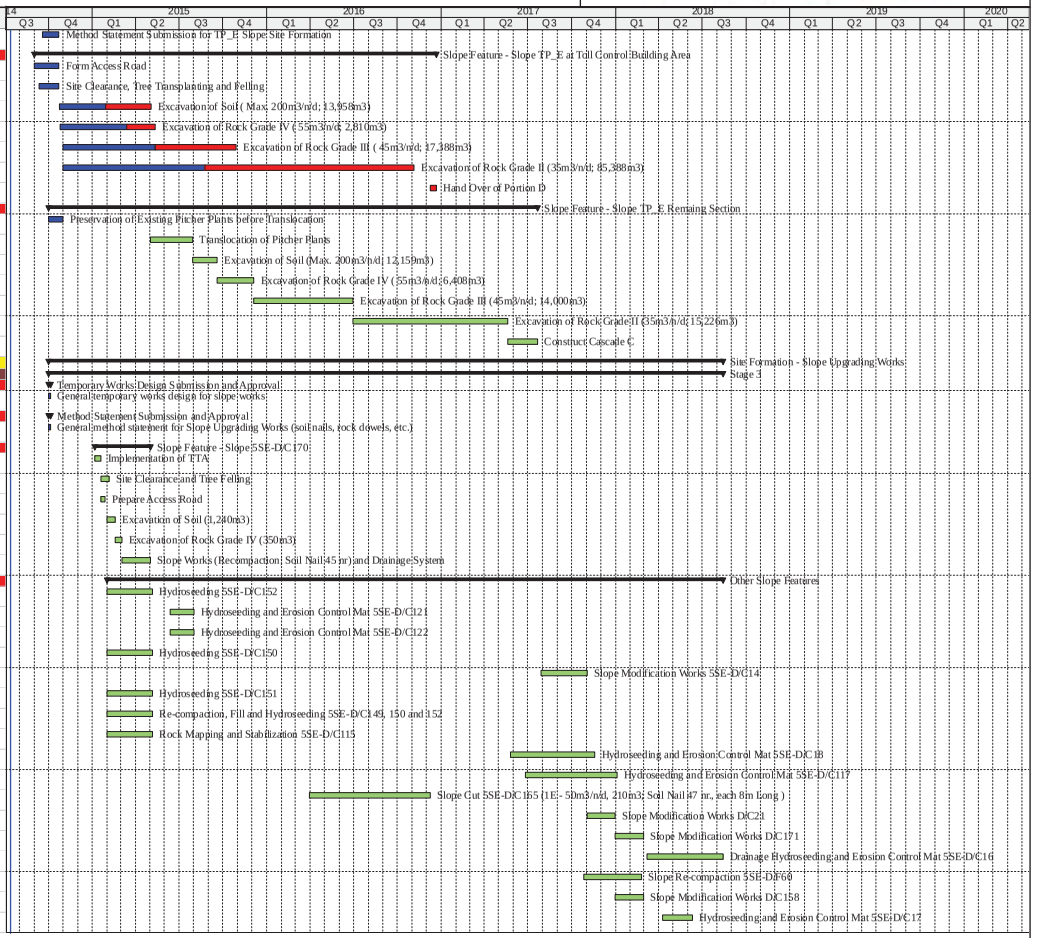
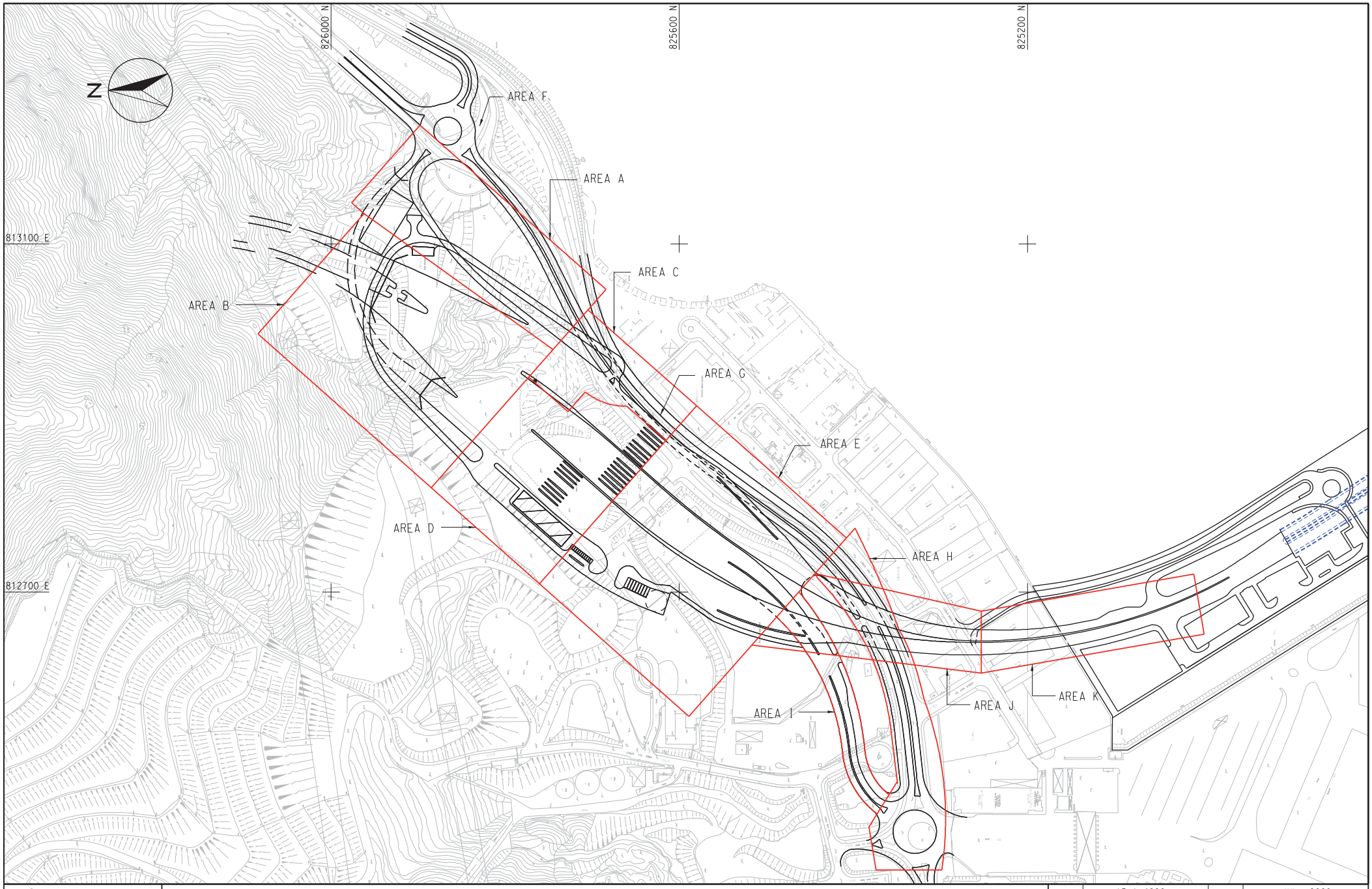


Figure 2.9 a



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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN – CHEK LAP KOK LINK – INVESTIGATION

PORTIONS OF WORKS IN TUEN MUN

SCALE	A3 1:4000	DATE	JUL. 2009
CHECK	--	DRAWN	HY
JOB No.	60044963	DRAWING No.	Fig 2.9c
			REV A

Plotting By: 2009-8-7
PLOT SCALE: 1:1016

p:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH3\FIGURE 3-9c.dgn

Figure 3.1 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 (oC):	
	Hi (in.):	
	Qsi (Std. m3):	
Final Flow Rate, Qsf	Pf (mmHg):	
	Tf (oC):	
	Hf (in.):	
	Qsf (Std. m3):	
Average Flow Rate (Std. m^3):		
Total Volume (Std. m3):		
Filter Identification No.:		
Initial Wt. of Filter (g):		
Final Wt. of Filter (g):		
Measured TSP Level ($\mu g/m^3$):		

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

LEGEND:

- SITE BOUNDARY
- MONITORING STATION (AIR QUALITY)
- EXISTING GRAVE

NOTES:

1. ALL COORDINATES ARE IN HONG KONG (1980) GRID SYSTEM UNLESS OTHERWISE SPECIFIED.
2. EXACT LOCATIONS OF MONITORING STATIONS ARE TO BE DETERMINED ON SITE. THE CONTRACTOR AND ENVIRONMENTAL TEAM (ET) SHALL AGREE WITH THE INDEPENDENT ENVIRONMENTAL CHECKER (IEC) AND THE ENVIRONMENTAL PROJECT OFFICE (ENPO) AND APPROVED BY THE SUPERVISING OFFICER FOR THE PROPOSED LOCATIONS OF THE MONITORING STATIONS.
3. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS STIPULATED IN THE EM&A MANUAL TO CONDUCT THE ENVIRONMENTAL MONITORING AND AUDIT WORKS.
4. ASR1 and ASR2 ARE THE AIR QUALITY MONITORING STATIONS REQUIRED UNDER THE EM&A MANUAL WHILE ASR3 TO ASSR ARE THE LOCATIONS OF THE STATIONS FOR ENHANCED TOTAL SUSPENDED PARTICULATES (TSP) LEVEL AT TUEN MUN AGREED BY ENPO AND EPD.

SETTING OUT CO-ORDINATES OF ENVIRONMENTAL MONITORING STATIONS

SETTING OUT POINT	COORDINATES	
	EASTING	NORTHING
ASR1	812706.00	824767.00
ASR5	812607.00	825291.00
AQMS1	812526.00	825550.00
AQMS2	812898.00	825553.00
ASR10	813488.00	826026.00

INSET A - EXISTING GRAVE 1
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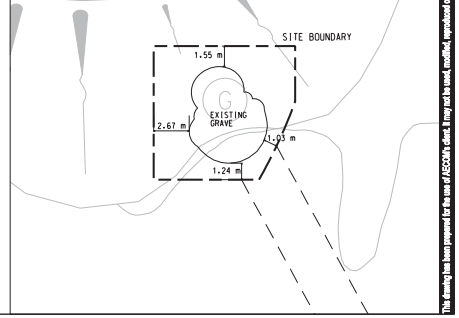

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

CONTRACT TITLE
TUEN MUN - CHEK LAP KOK LINK - NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS

CLIENT
HIGHWAYS DEPARTMENT
Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

VR	DATE	DESCRIPTION	CHK
-	JAN.14	TENDER DRAWING	CWN

STATUS

SCALE: A1 1 : 3000
DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60240249
CONTRACT NO.: HY/2013/12

SHEET TITLE
ENVIRONMENTAL MONITORING STATIONS AND EXISTING GRAVE

SHEET NUMBER
Drawing No.
Figure 3.2a

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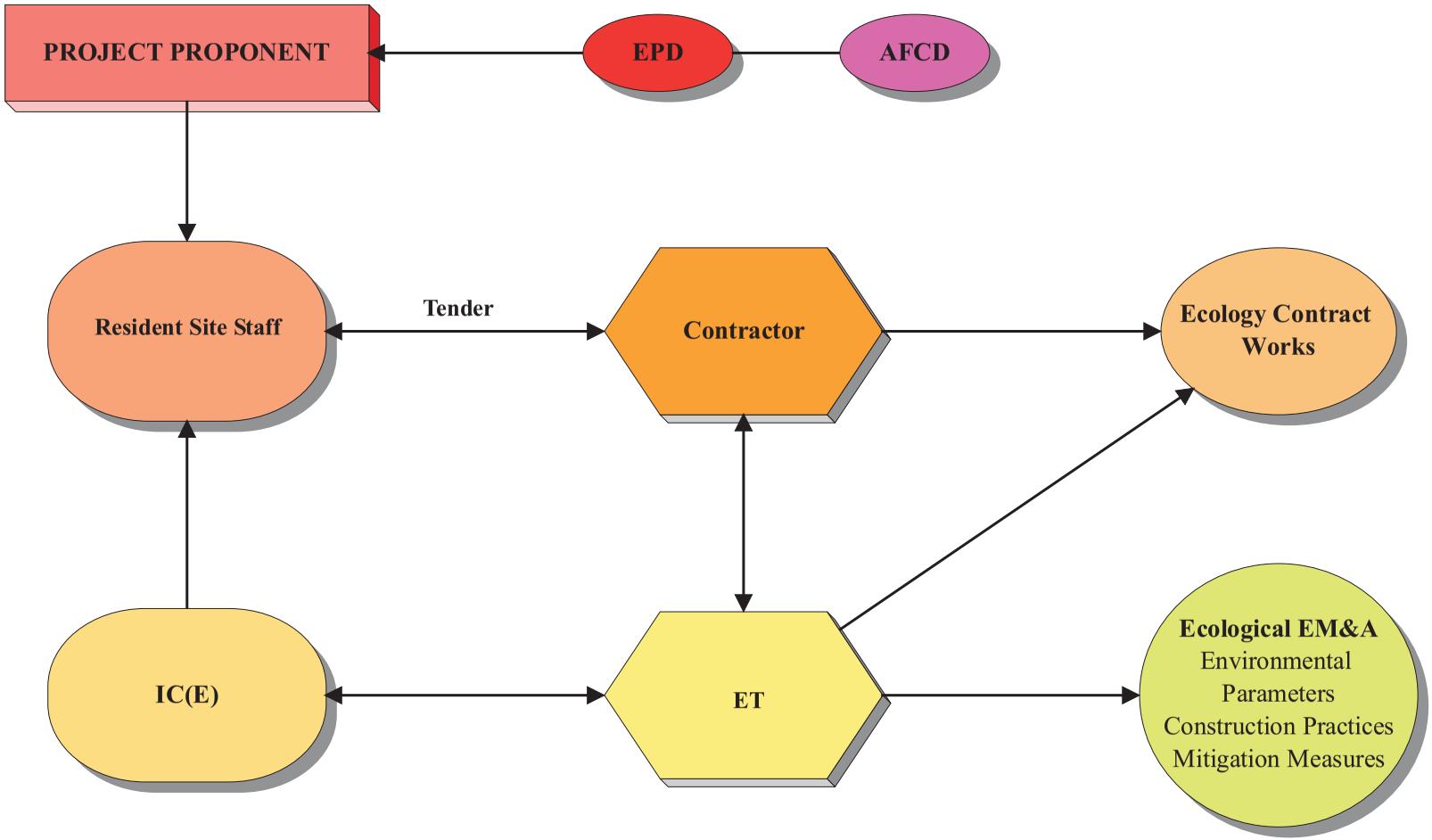
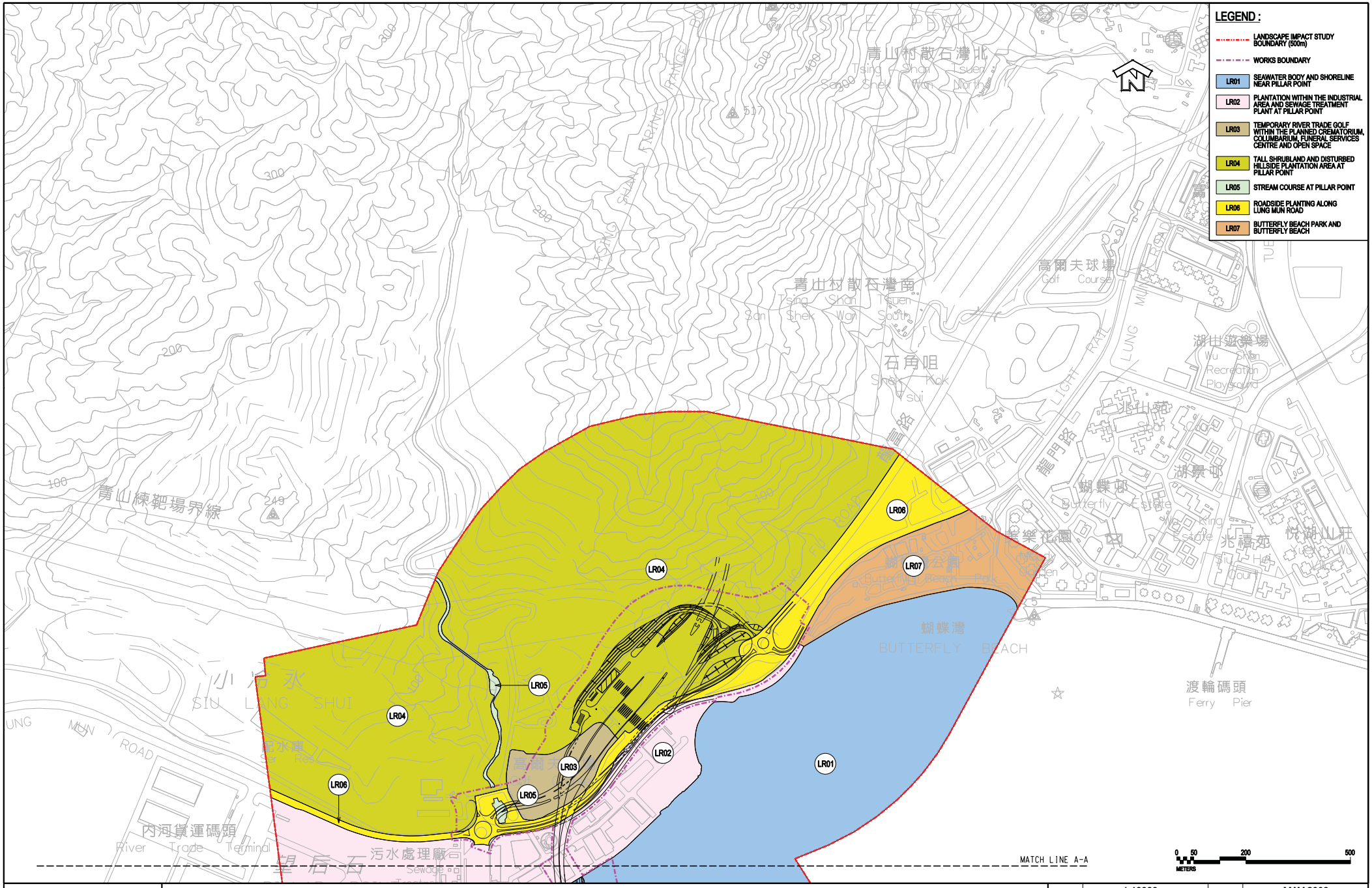


Construction Phase Ecological EM&A Procedure

Figure No. 6.1



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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

BASELINE LANDSCAPE RESOURCES WITH DEVELOPMENT PROPOSAL OVERLAID

SHEET 1 OF 5

SCALE	1:10000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.1.1.1
		REV	--

Plotting By: 21/7/2009
PLOT SCALE: 1=10

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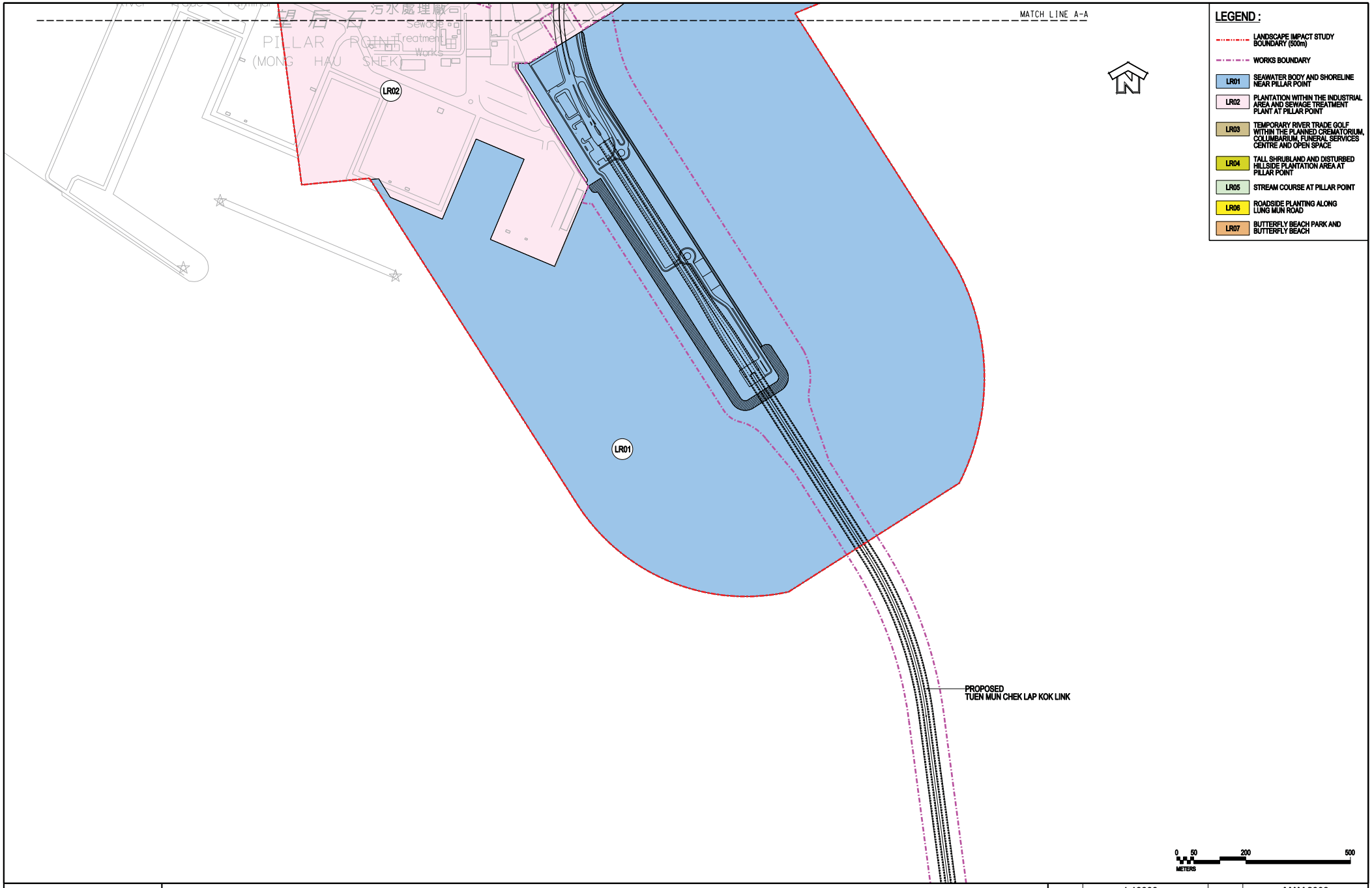

AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

BASELINE LANDSCAPE RESOURCES WITH DEVELOPMENT PROPOSAL OVERLAID

SHEET 2 OF 5

SCALE	1:10000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.1.1.2
		REV	--

Plotting By: 21/7/2009
PLOT SCALE: 1=10

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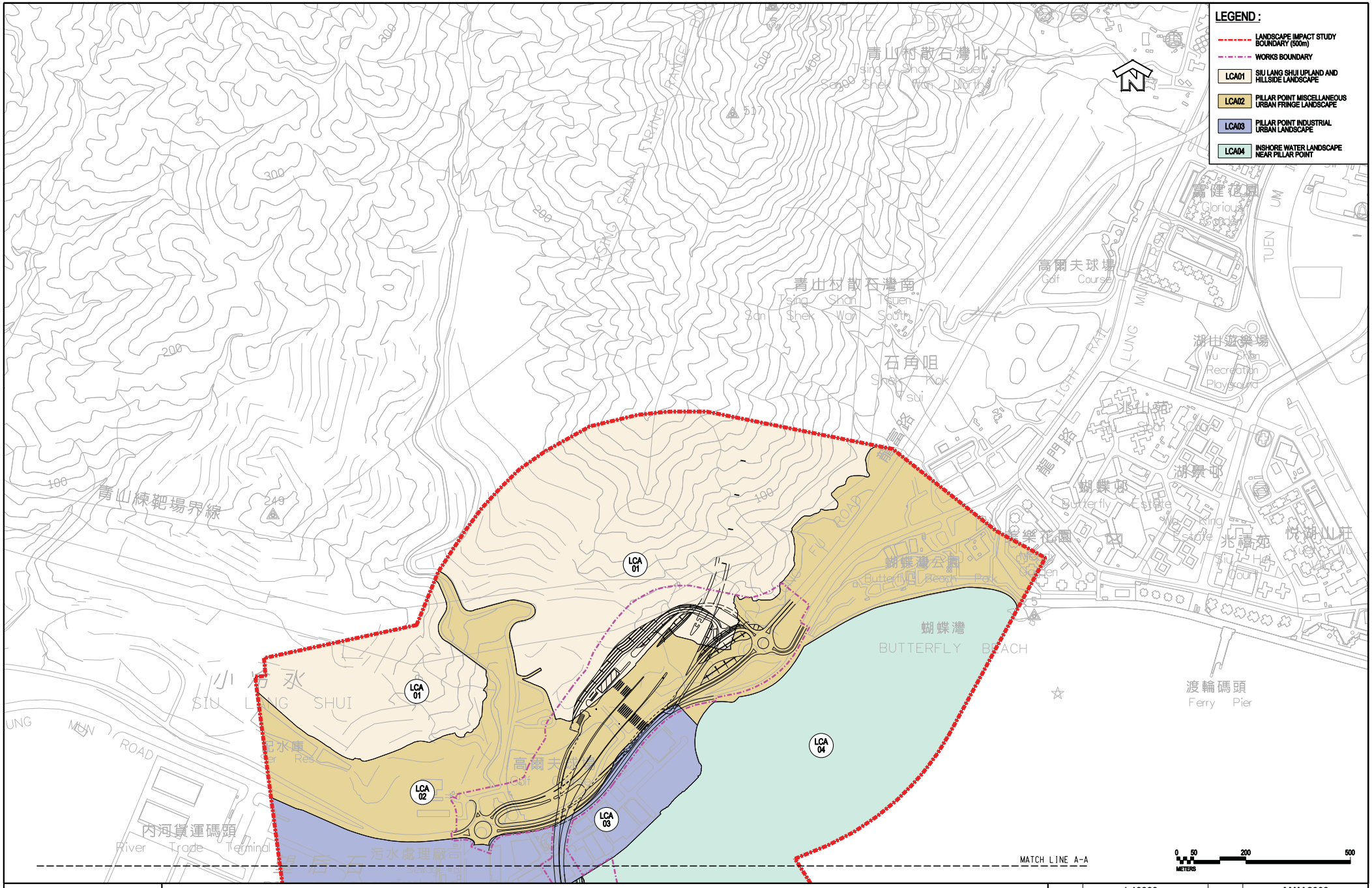

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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

BASELINE LANDSCAPE CHARACTER AREAS WITH DEVELOPMENT PROPOSAL OVERLAID

SHEET 1 OF 5

SCALE	1:10000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.2.1.1
		REV	--

Plotting By: 21/7/2009
PLOT SCALE: 1=10

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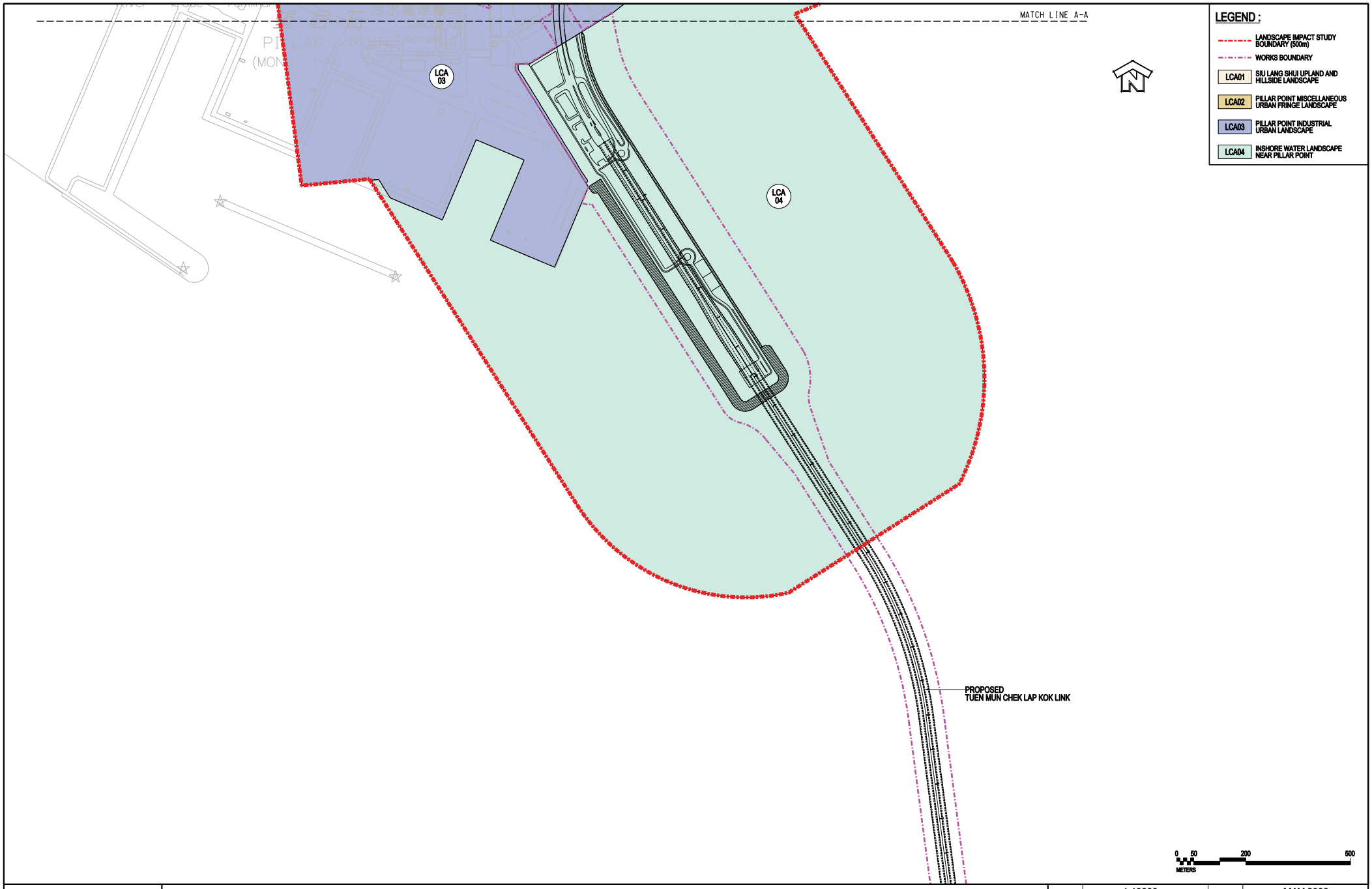

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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

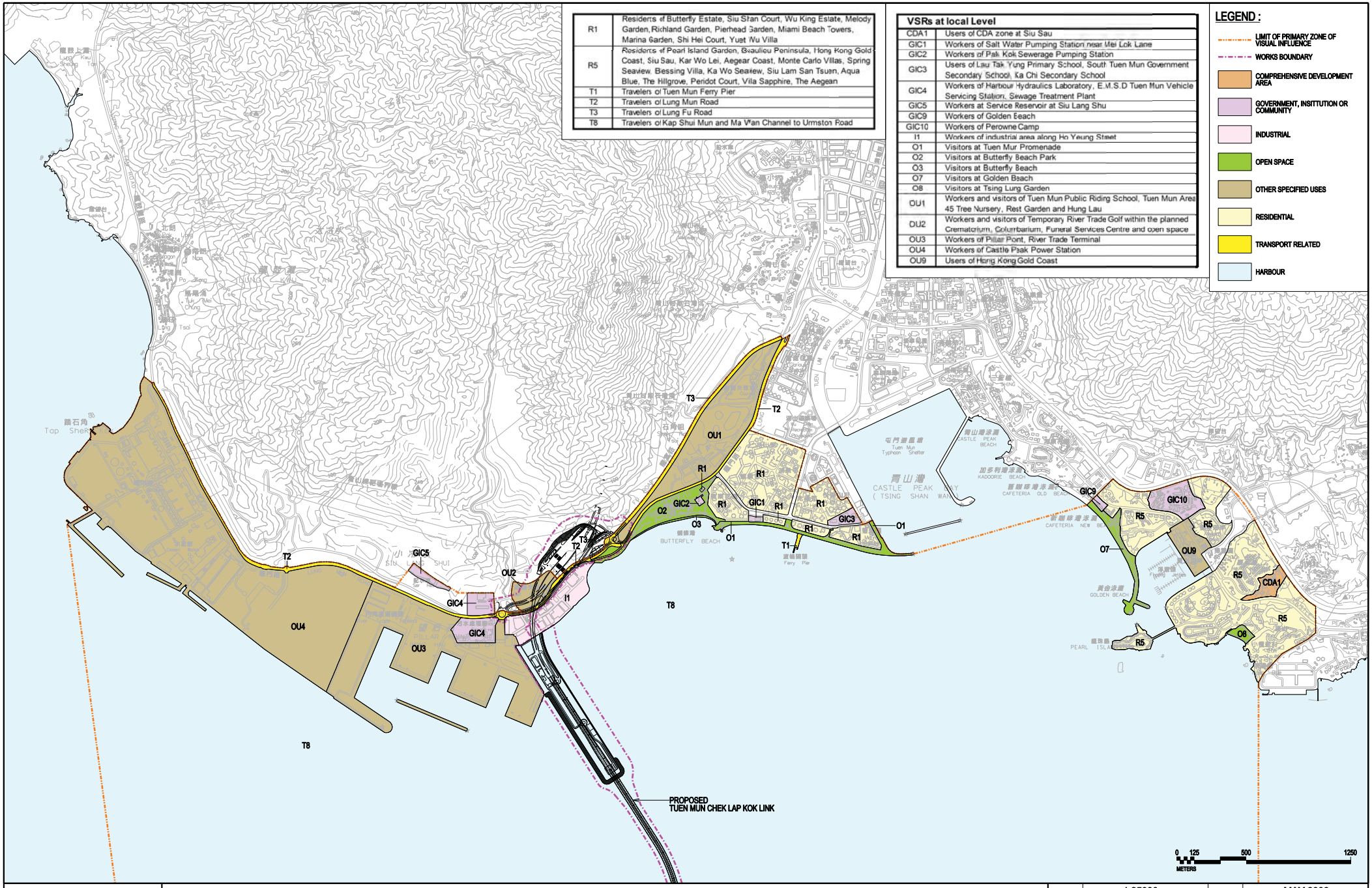
BASELINE LANDSCAPE CHARACTER AREAS WITH DEVELOPMENT PROPOSAL OVERLAID

SHEET 2 OF 5

SCALE	1:10000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.2.1.2
		REV	--

Plotting By: 21/7/2009
PLOT SCALE: 1=10

D:\2008278 TM-CLK\03CAD\3.1Sheets\LVIA-EMA\FIG-07-02-01-2.dgn



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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

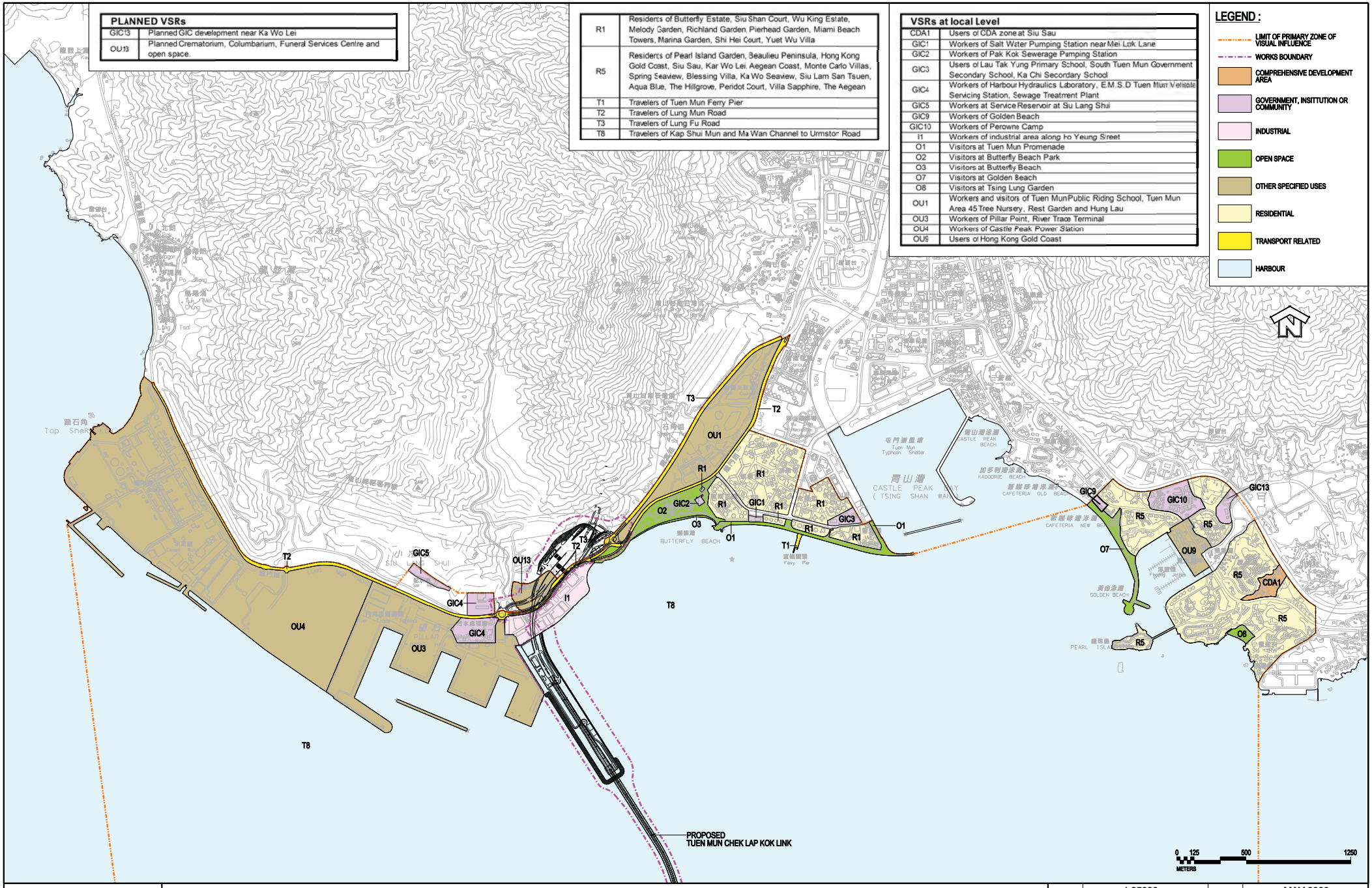
BASELINE KEY VSRs AND VIEWPOINTS AT LOCAL LEVEL WITH DEVELOPMENT PROPOSAL OVERLAID DURING CONSTRUCTION

SHEET 1 OF 2

SCALE	1:25000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.3.1.1
		REV	--

Plotting By:4/8/2009
PLOT SCALE:1:25

D:\2008278 TM-CLK\03CAD\3.1Sheets\LVIA-EMA\FIG-07-03-01-1.dgn



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AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

BASELINE KEY VSRs AND VIEWPOINTS AT LOCAL LEVEL WITH DEVELOPMENT PROPOSAL OVERLAID DURING OPERATION

SHEET 1 OF 2

SCALE	1:25000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.3.1.3
		REV	--

Plotting By: 4/8/2009
PLOT SCALE: 1:25

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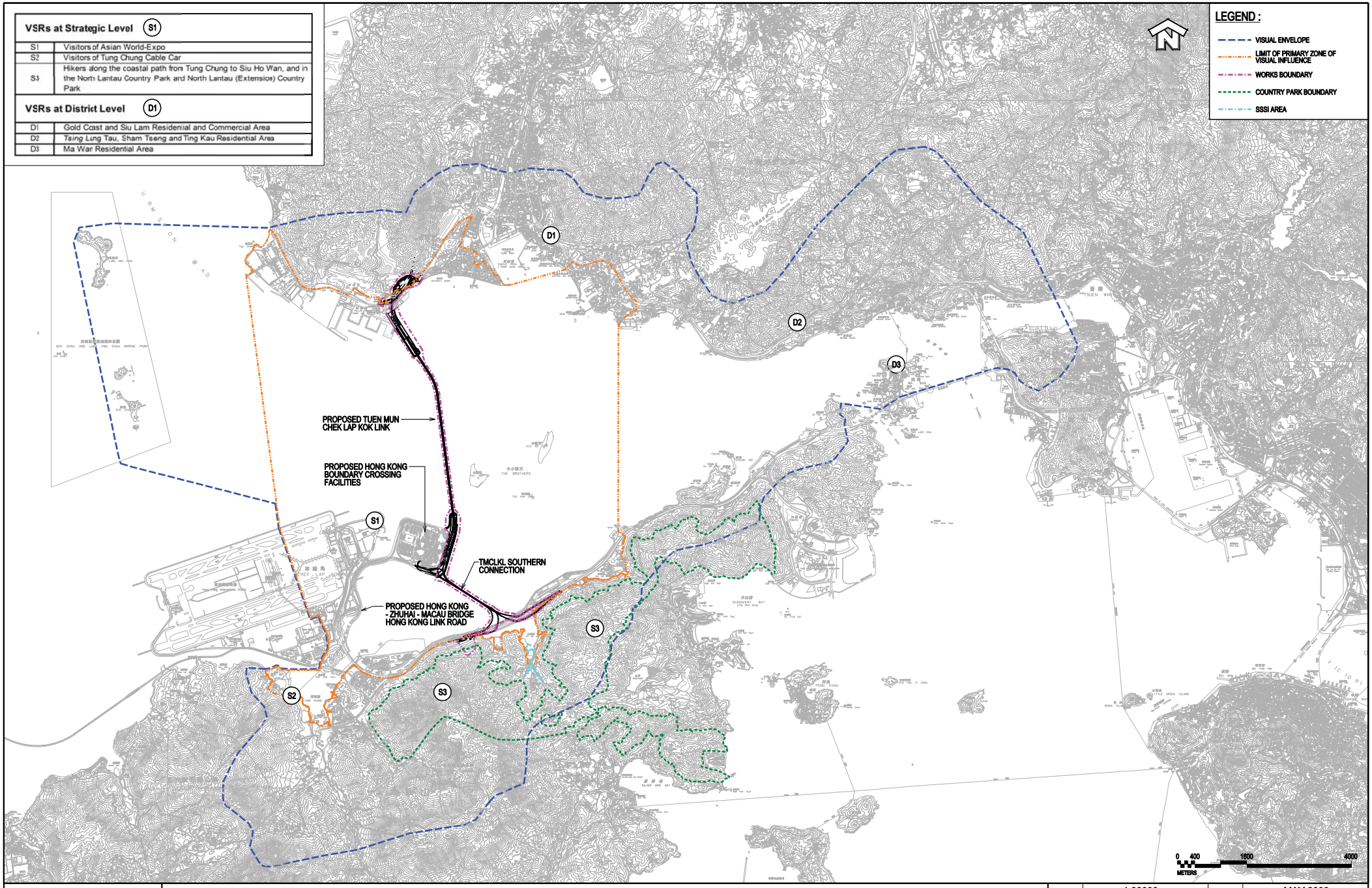

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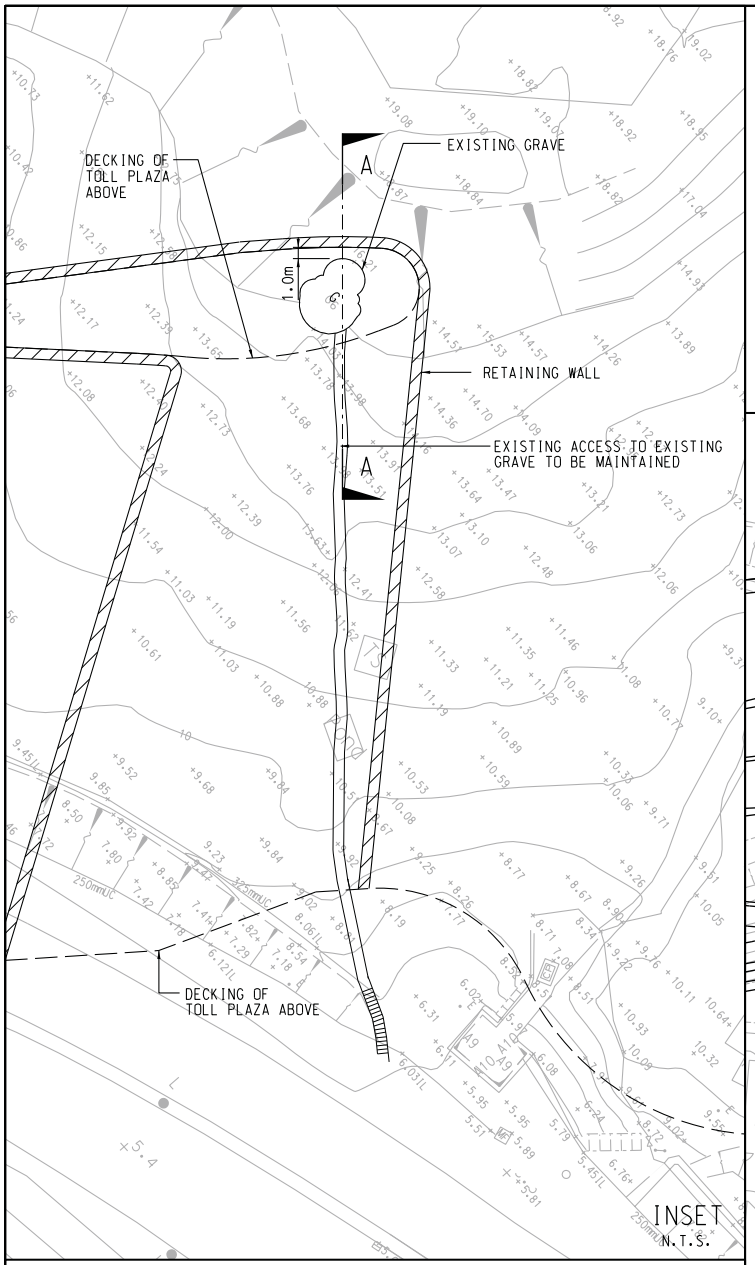
AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

BASELINE KEY VSRs AND VIEWPOINTS AT STRATEGIC AND DISTRICT LEVEL WITH DEVELOPMENT PROPOSAL OVERLAID

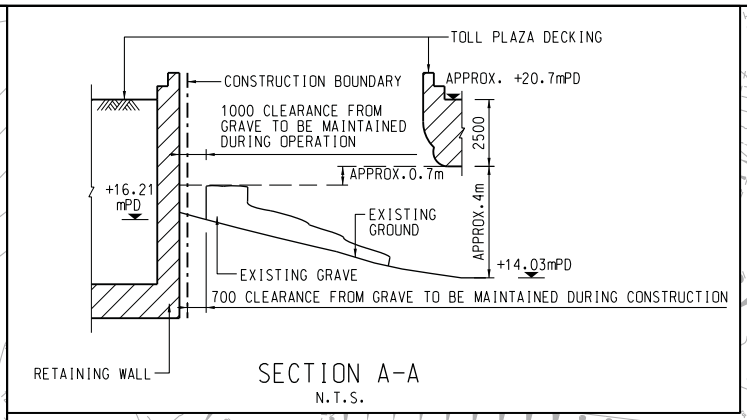
SCALE	1:80000	DATE	MAY 2009
CHECK	E.L.	DRAWN	F.L.
JOB No.	60044963	DRAWING No.	FIGURE 7.3.2.1
		REV	--

Plotting By: 21/7/2009
PLOT SCALE: 1:80

D:\2008278 TM-CLK\03CAD\3.1Sheets\LVIA-EMA\FIG-07-03-02-1.dgn



INSET
N.T.S.



SECTION A-A
N.T.S.

PLAN
SCALE 1:2000

NOTE:

1. ROAD DECKING OF TOLL PLAZA NOT SHOWN FOR CLARITY.

AECOM

AGREEMENT NO. CE 52/2007(HY)
TUEN MUN - CHEK LAP KOK LINK - INVESTIGATION

RETAINING WALLS ARRANGEMENT AT EXISTING GRAVE

SCALE	A3 AS SHOWN	DATE	JUL. 2009
CHECK	--	DRAWN	HY
JOB No.	60044963	DRAWING No.	FIG 9.1
			REV --

Plotting By: 2009-8-4
PLOT SCALE: 1:50.0

p:\PROJECTS\60044963\DRAWING\FIGURE\EIA REPORT\CH9\FIGURE 9-1.dgn

Figure 12.1 Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

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	

	Prepared by: Designation: Signature: Date:

Location Plan

Appendix A

Environmental Mitigation Implementation Schedules

CONTRACT NO. HY/2013/12
TUEN MUN – CHECK LAP KOK LINK – NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS
ENVIORNMENTAL MITIGATION AND ENHANCEMENT MEASURE IMPLEMENTATION SCHEDULE

Air Quality								
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
4.8.1	3.8	An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum;	All areas / throughout construction period	Contractor	TMEIA Avoid smoke impacts and disturbance		Y	
4.8.1	3.8	Watering of the construction sites in Lantau for 8 times/day and in Tuen Mun for 12 times/day to reduce dust emissions by 87.5% and 91.7% respectively and shall be undertaken.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	The Contractor shall not burn debris or other materials on the works areas.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	In hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet.	All unpaved haul roads / throughout construction period in hot, dry or windy weather	Contractor	TMEIA Avoid smoke impacts and disturbance		Y	
4.8.1	3.8	Where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards,	All areas / throughout construction period	Contractor	TMEIA Avoid dust		Y	

		and shall be dampened or covered before transport.			generation			
4.8.1	3.8	Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site.	construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	Areas of exposed soil shall be minimized to areas in which works have been completed shall be restored as soon as is practicable.	All exposed surfaces / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.8.1	3.8	All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y	
4.11	Section 3	EM&A in the form of 1 hour and 24 hour dust monitoring and site audit	All representative existing ASRs / throughout construction period	Contractor	EM&A Manual		Y	
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
11.8	Section 9	EM&A in the form of audit of the mitigation measures	All areas / throughout construction period	Highways Department	EIAO-TM		Y	
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
7.13#	6.3, 6.5#	Fencing or other physical barriers for protection of Pitcher Plant around Zones 8, 9 and 10 and the temporary nursery site	Tuen Mun Area 46 shrubland/ Detailed/ Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y	
7.13	6.5	Audit Pitcher Plant protection measures	Tuen Mun Area 46	Contractor	TMEIA		Y	

7.13	6.5	The loss of habitat shall be supplemented by enhancement planting in accordance with the landscape mitigation schedule.	All areas / As soon as accessible	Contractor	TMEIA		Y	
7.13	6.5	Spoil heaps shall be covered at all times.	All areas / Throughout construction period	Contractor	TMEIA		Y	
7.13	6.5	Avoid damage and disturbance to the remaining and surrounding natural habitat	All areas / Throughout construction period	Contractor	TMEIA		Y	
7.13	6.5	Placement of equipment in designated areas within the existing disturbed land	All areas / Throughout construction period	Contractor	TMEIA		Y	
7.13	6.5	Disturbed areas to be reinstated immediately after completion of the works.	All areas / Throughout construction period	Contractor	TMEIA		Y	
7.13	6.5	Construction activities should be restricted to the proposed works boundary	All areas / Throughout construction	Contractor	TMEIA		Y	
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
14.12.2	14.2	*Appointment of Safety Officer* Appoint a properly trained safety officer and provide with appropriate equipment to measure and monitor LFG hazard. The monitoring frequency and areas to be monitored should be set down prior to commencement of ground-works either by the Safety Officer or an approved and appropriately qualified person.	Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.2	-	*Safety Measures - Excavation* Staff should receive appropriate training on working in areas susceptible to landfill gas, fire and explosion hazards. Excavation procedures and code of practice should be implemented.	Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.2	-	*Safety Measures – Welding, Flame- Cutting and Hot*	Construction Stage	Contractor	EPD/TR8/97 -		Y	

		works Hot works should be confined to open areas away from any trench or excavation. Should hot works must be carried out in trenches or confined space, "permit to work" procedures should be followed.			Landfill Gas Hazard Assessment Guidance Note			
14.12.2	-	*Safety Measures – Enclosed Spaces* Site offices or buildings located within PPV Landfill Consultation Zone which have the capacity to accumulate landfill gas, then they should either be located in an area which has been proven to be free of landfill gas; or be raised clear of the ground by a minimum of 500mm.	Site office, building, tunnel, subway, confined area / Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.2	-	*Safety Measures – Electrical Equipment* Any electrical equipment, such as motors and extension cords, should be intrinsically safe.	Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.2	-	*Safety Measures – Piping* During piping assembly or conduiting construction, all valves/seals should be closed immediately after installation. As construction progresses, all valves/seals should be closed as installed to prevent the migration of gases through the pipeline/conduit. All piping/conduiting should be capped at the end of each working day.	Services & utilities / Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.2	-	*Safety Measures – Fire Safety* Adequate fire safety equipments should be provided on site. Workers and visitors should be notified of the potential fire hazards. Safety notices should be posted around the site warning the anger and potential hazards.	Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	
14.12.1	-	*Safety Measures – Confined Spaces* Precautionary measures should include ensuring that staff members are aware of the potential hazards of working in confined spaces, and that appropriate monitoring procedures are in place to prevent hazards	Confined space / Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	

		in confined spaces.						
14.12.1	-	*Monitoring* Periodically during ground-works within the Consultation Zone, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment. Depending on the results of the measurements, actions required will vary. As a minimum these should encompass those actions specified in Table 14.8 of the EIA Report or Table 14.1 of the EM&A Manual.	Construction Stage	Contractor	EPD/TR8/97 - Landfill Gas Hazard Assessment Guidance Note		Y	

EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
10.9	7.6	Existing trees on boundary of the Project Area shall be carefully protected during construction. 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. (Tree protection measures will be detailed at Tree Removal Application stage) (CM1)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Trees unavoidably affected by the works shall be transplanted where practical. Trees will be transplanted straight to their final receptor site and not held in a temporary nursery. A detailed Tree Transplanting Specification shall be provided in the Contract Specification. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme (CM2)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Hillside and roadside screen planting to	All areas/detailed design/	Design	TMEIA	Y	Y	

		proposed roads, associated structures and slope works (CM3)	during Construction/ post construction	Consultant/ Contractor				
10.9	7.6	Hydroseeding or sheeting of soil stockpiles with visually unobtrusive material (in earth tone) (CM4)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Control night-time lighting and glare by hooding all lights (CM6)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Recycle/Reuse all felled trees and vegetation, e.g. mulching (CM9)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Compensatory tree planting 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 Felling Application process under ETWBTC 3/2006 (CM10)	All areas/detailed design/ during Construction	Design Consultant/ Contractor	TMEIA	Y	Y	
10.9	7.6	Re-vegetation of affected woodland/shrubland with native species (OM1)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y
10.9	7.6	Tall buffer screen tree / shrub / climber planting where appropriate should be incorporated to soften hard engineering structures and facilities (OM2)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y

10.9	7.6	Streetscape elements (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the local context, and minimises potential negative landscape and visual impacts. Lighting units should be directional and minimize unnecessary light spill (OM3)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y
10.9	7.6	Structure, ornamental tree / shrub / climber planting should be provided along roadside amenity strips, central dividers and newly formed slopes to enhance the townscape quality and further greenery enhancement (OM4)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y
10.9	7.6	Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (OM6)	All areas/detailed design/ during Construction/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
12.6		The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation	Contractor	TMEIA		Y	
12.6		The Contractor shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. A recording system for the amount of waste generated, recycled and disposed (locations) should be established.	Contract mobilisation	Contractor	TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of		Y	

					Construction and Demolition Material			
12.6		The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y	
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling	Contract mobilisation	Contractor	TMEIA		Y	
12.6	8.1	The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimize the extent of cutting.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Inert C&D materials from the toll plaza cut slopes shall be reused for construction of the raised platform for the toll plaza where possible.	Tol Plaza / toll plaza construction period	Contractor	TMEIA		Y	
12.6	8.1	The site and surroundings shall be kept tidy and litter free.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	No waste shall be burnt on site.	All areas / throughout construction period	Contractor	TMEIA		Y	

12.6	8.1	The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/ plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	All falsework will be steel instead of wood.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Chemical waste producers should register with the	All areas / throughout	Contractor	TMEIA		Y	

		EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows: • suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; • Having a capacity of <450L unless the specifications have been approved by the EPD; and • Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations. • Clearly labelled and used solely for the storage of chemical wastes; • Enclosed with at least 3 sides; • Impermeable floor and bund with capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest; • Adequate ventilation; • Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and • Incompatible materials are adequately separated.	construction period					
12.6	8.1	Waste oils, chemicals or solvents shall not be disposed of to drain,	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Night soil should be regularly collected by licensed collectors.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the	All areas / throughout construction period	Contractor	TMEIA		Y	

		Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.						
12.6	8.1	All waste containers shall be in a secure area on hardstanding;	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y	
12.6	8.1	Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminum cans, plastic bottles, etc should be provided on-site.	Site Offices/ throughout construction period	Contractor	TMEIA		Y	
12.6	Section 8	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All areas / throughout construction period	Contractor	EM&A Manual		Y	
EIA reference	**EM&A Manual reference**	**Environmental Protection Measures**	**Location/ Timing**	**Implementation Agent**	**Relevant Standard or Requirement**	**Implementation Stages**		
						D	**C**	**O**
6.10	-	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Sewage effluent and discharges from onsite kitchen facilities shall be directed to Government sewer in accordance with the Requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels,	All areas/ throughout construction period	Contractor	TM-EIAO		Y	

		earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.						
6.10	-	Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	5.8	Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	All vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	

6.10	-	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y	
6.10	-	All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.	All areas/ throughout construction period	Contractor	TM-EIAO		Y	
6.10	Section 5	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All areas/ throughout construction period	Contractor	EM&A Manual		Y	

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

Appendix B

Environmental Proformas

COMPLAINT LOG **Ref:** _____

Log Ref.	Date / Location	Complainant/ Date of Contract	Details of Complaint	Investigation / Mitigation Action	File Closed

Filed by Environmental Team Leader _____ Date: _____

0 **IMPLEMENTATION SCHEDULE** **Ref:** _____

EIA Ref*	EM&A Log Ref	Environmental Protection Measures*	Location/ Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec

* *All recommendations and requirements resulted during the Course of EIA/EA Process, including ACE and / or accepted public comment to the proposed project*

** *Des- Design, C-Construction,O-Operation, Dec- Decommissioning*

Signed by Project Proponent: _____ Date: _____

IMPLEMENTATION STATUS PROFORMA **Ref:** _____

Ref**	Environmental Protection Measures*	Implementation Status

* *All recommendations and requirements resulted during the Course of EIA/EA Process, including ACE and / or accepted public comment to the proposed project*

** *EIA Ref / EM&A Log Ref / Design Document Ref*

Signed by Environmental Team Leader _____ Date: _____

Audited by Independent Environment Checker _____ Date: _____

SITE INSPECTION PROFORMA **Ref:** _____

Date	Location	Req=t Ref.*	Observation / Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

* *EIA Ref / EM&A Log Ref / Design Document Ref / Environmental Protection Contract Clause*

** *Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies*

*** *The required completion date to confirm the specified Environmental Protection Action*

This Proforma is an:
Environmental Protection Instruction for _____ Date: _____

Signed by Environmental Team Leader _____ Date: _____

Copy to Independent Environmental Checker

PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA **Ref:** _____

Ref*	Proposed Construction Method*	Location/ Working Period	Anticipated Impacts	Recommended Mitigation Measures

* *EIA Ref / EM&A Log Ref / Design Ref*

** *Details of equipment, vehicles, plants, processes, technologies for the option of construction method*

Signed by Environmental Team Leader _____ Date: _____

Audited by Independent Environment Checker _____ Date: _____

REGULATORY COMPLIANCE PROFORMA

Ref: _____

Ref*	Environmental License / Permit*	Control Area / Facility / Location	Effective Date

* *Name of Applicant, Business Corporation, relevant regulation and remark of license / permit conditions*

** *File reference of the licensee / permittee*

Signed by Environmental Team Leader _____ Date: _____

Audited by Independent Environment Checker _____ Date: _____

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

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	

Prepared by: _____

Designation: _____

Signature: _____

Date: _____

Appendix C

Summary of Changes for Contract Specific EM&A Manual

CONTRACT NO. HY/2013/12
TUEN MUN – CHECK LAP KOK LINK – NORTHERN CONNECTION TOLL PLAZA AND ASSOCIATED WORKS
Summary of Changes for Contract Specific EM&A Manual

Sections	Content
1.1	n/a
1.2	n/a
1.3	Table 1.1 is revised according to the works scope of Contract No. HY/2013/12
1.4	In S1.4.1.2 (b), scope of EM&A programme is revised according to the works scope of Contract No. HY/2013/12
1.5	In S1.5.1.2, mitigation/enhancement measures recommended by the TM-CLKL EIA during details design phase are updated according to the works scope of Contract No. HY/2013/12. In S1.5.1.5 and S1.5.1.6, irrelevant organization under Contract No. HY/2013/12 are removed from the paragraphs.
1.6	S.1.6.1.2 and S1.6.1.4 are updated according to the works scope of Contract No. HY/2013/12.
2.1	n/a
2.2	S2.2.1 and S2.2.2 are not used. In S2.2.3.12, Figure 2.4 is amended as Figures 2.4a and 2.4b.
2.3	Not used.
2.4	Not used.
2.5	Table 2.2 is revised according to the works scope of Contract No. HY/2013/12
2.6	Table 2.3 is revised according to the works scope of Contract No. HY/2013/12. S2.6.1.4 was removed since it is irrelevant to Contract No. HY/2013/12
2.7	In S2.7.1.1, commencement date for TM-CLKL, figure numberings and works activities are updated according to the works scope of Contract No. HY/2013/12. S2.7.12 to S2.7.1.5 are not used.
2.8	S2.8.1.1 is not used and S2.8.1.2 is revised as per the removal of S2.8.1.1. In S2.8.2.1, Figure 2.4 is amended as Figures 2.4a and 2.4b.
3	A new paragraph is added as per the Enhanced TSP Monitoring Plan submitted by Contract No. HY/2012/08 to EPD in accordance with Condition 2.4 of the EP of TM-CLKL.

3.1	n/a
3.2	n/a
3.3	n/a
3.4	S3.4.1.1 is updated based on the Enhanced TSP Monitoring Plan submitted by Contract No. HY/2012/08 to EPD in accordance with Condition 2.4 of the EP of TM-CLKL.
3.5	S3.5 is updated based on the Baseline Report submitted by Contract No. HY/2012/08
3.6	S3.6 is updated based on the Enhanced TSP Monitoring Plan submitted by Contract No. HY/2012/08 to EPD in accordance with Condition 2.4 of the EP of TM-CLKL.
3.7	S3.7 has updated based on the Baseline Report submitted by Contract No. HY/2012/08/. Table 3.3 is newly added based on the Baseline Report submitted by Contract No. HY/2012/08. In S3.7.1.2 and S3.7.1.3, Table 3.2 was amended to Table 3.4
3.8	n/a
4.1	S4.1 is amended according to the works scope of Contract No. HY/2013/12
4.2	Not used.
4.3	Not used.
4.4	Not used.
4.5	Not used.
4.6	Not used.
4.7	Not used.
4.8	n/a
5.1	S5.1 is amended according to the works scope of Contract No. HY/2013/12
5.2	S5.5.1.1 and S5.2.1.5 are not relevant to Contract No. HY/2013/12, thus removed.
5.3	Not used.

5.4	Not used.
5.5	Not used.
5.6	Not used.
5.7	Not used.
5.8	Not used.
5.9	Not used.
5.10	Not used.
5.11	Not used.
5.12	Not used.
6.1	n/a
6.2	S6.2.1.1 is not relevant to Contract No. HY/2013/12, thus removed.
6.3	Table 6-1 is revised according to the works scope of Contract No. HY/2013/12
6.4	S6.4.1.1 is updated according to the works scope of Contract No. HY/2013/12. S6.4.3 is updated according to the ecology survey for the TMWB EIA in late 2011 and baseline survey in 2013. S6.4.4 and 6.4.5 are not used.
6.5	First bullet point in S6.5.1.1 is updated. S6.5.2 is updated according to the proposed monitoring program for the survival of pitcher plant. Table number in S6.5.2.2 has been updated.
6.6	The mitigation measures are revised according to the works scope of Contract No. HY/2013/12.
7.1	Figure numbers mentioned in S7.1.1.2 are revised.
7.2	n/a
7.3	n/a
7.4	n/a
7.5	n/a

7.6	n/a
8.1	In S8.1.1, the variety of waste to be generated is revised according to the works scope of Contract No. HY/2013/12. S8.1.1.6 is updated according to the WMP of Contract no. HY/201312. S8.1.1.2 to S8.1.1.4, S8.1.1.7 to S8.1.1.8 mentioned about waste from marine works are removed. In S8.1.2.1, the mitigation measures are revised according to the works scope of Contract No. HY/2013/12.
8.2	n/a
8.3	n/a
9.1	n/a
9.2	S9.2.1.2 is removed as it is irrelevant to the Contract works
9.3	Table 9.1 is revised according to the monitoring requirement.
9.4	n/a
9.5	n/a
10.1	n/a
10.2	n/a
11.1	n/a
11.2	n/a
11.3	n/a
11.4	n/a
12.1	n/a
12.2	n/a
12.3	n/a
12.4	n/a

12.5	n/a
12.6	n/a
12.7	n/a
12.8	n/a
12.9	n/a
12.10	n/a
12.11	n/a

Figures	Content
Figure 1.1	Adopted
Figure 1.2	Adopted
Figure 2.1	Adopted
Figure 2.2a	Adopted
Figure 2.2b	Adopted
Figure 2.3a	X
Figure 2.3b	X
Figure 2.3c	X
Figure 2.4a	Adopted
Figure 2.4b	Adopted
Figure 2.4c	NEW
Figure 2.4d	NEW
Figure 2.4e	NEW

Figure 2.4f	NEW
Figure 2.5a	X
Figure 2.5b	X
Figure 2.5c	X
Figure 2.6a	X
Figure 2.6b	X
Figure 2.6c	X
Figure 2.7	X
Figure 2.8a	Adopted
Figure 2.8b	Adopted
Figure 2.9a	Amended
Figure 2.9b	X
Figure 2.9c	Adopted
Figure 2.9d	X
Figure 3.1	Adopted
Figure 3.2	X
Figure 3.2a	NEW
Figure 4.1	X
Figure 4.2	X
Figure 5.1	X
Figure 5.2	X
Figure 5.3	X

Figure 5.4	X
Figure 5.5a	X
Figure 5.5b	X
Figure 5.5c	X
Figure 5.6a	X
Figure 5.6b	X
Figure 5.6c	X
Figure 5.7	X
Figure 5.8	X
Figure 5.9	X
Figure 5.10	X
Figure 6.1	Adopted
Figure 6.2	X
Figure 6.3	X
Figure 6.4	X
Figure 7.1.1.1	Adopted
Figure 7.1.1.2	Adopted
Figure 7.1.1.3	X
Figure 7.1.1.4	X
Figure 7.1.1.5	X
Figure 7.2.1.1	Adopted
Figure 7.2.1.2	Adopted

Figure 7.2.1.3	X
Figure 7.2.1.4	X
Figure 7.2.1.5	X
Figure 7.3.1.1	Adopted
Figure 7.3.1.2	X
Figure 7.3.1.3	Adopted
Figure 7.3.1.4	X
Figure 7.3.2.1	Adopted
Figure 9.1	Adopted
Figure 12.1	Adopted