JOB NO.: TCS00744/14

TSW-C004 – OCEAN PARK TAI SHUE WAN DEVELOPMENT
SITE FORMATION AND FOUNDATION WORKS

MONTHLY ENVIRONMENTAL MONITORING AND AUDIT REPORT (NO.20) – 17 February 2017 to 16 March 2017

PREPARED FOR OCEAN PARK CORPORATION

Date	Reference No.	Prepared By	Certified By
3 April 2017	TCS00744/14/600/R0120	 Donald, K. H. Kwok (Assistant Environmental Consultant)	 Tam Tak Wing (Environmental Team Leader)

Version	Date	Remarks
1	24 March 2017	First Submission
2	31 March 2017	Amended against the IEC's comments on 30 March 2017
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Pursuant to Condition 3.4 of Environmental Permit No. EP-487/2014, the "Monthly Environmental Monitoring and Audit (EM&A) Report (no.20) – 17 February 2017 to 16 March 2017" was certified by the Environmental Team Leader (ETL) and verified by the Independent Environmental Checker (IEC).

Certified by:

Tam Tak Wing

Environmental Team Leader (ETL)
Action-United Environmental Services and Consulting (AUES)

Date 29 March 2017

Verified by:

Gerald Kam

Independent Environmental Checker (IEC)
Ove Arup and Partners Hong Kong Limited

Date 13 - April - 2017

EXECUTIVE SUMMARY

ES01 This is the **20th** monthly EM&A report presenting the monitoring results and inspection findings for the reporting period from **17 February 2017** to **16 March 2017** (hereinafter 'the Reporting Period').

ENVIRONMENTAL MONITORING AND AUDIT ACTIVITIES

ES02 Environmental monitoring activities under the EM&A programme in the Reporting Period are summarized in the following table.

Environmental Aspect	Environmental Monitoring Parameters / Inspection	Total Event
Construction Noise	$L_{eq(30min)}$ Daytime	**8**
Ecology	Site Inspection	**1**
landscape and Visual	Inspection of the mitigation measures implementation situation	**2**
Site Inspection / Audit	Environmental Team (ET), the Contractor and Project Management Representative (PMR) joint site Inspection and Auditing	**4**
	Independent Environmental Checker (IEC) joint site Inspection and Auditing	**1**

BREACH OF ACTION AND LIMIT (A/L) LEVELS

ES03 No noise complaint (i.e. Action Level) were received in the Reporting Period. No exceedance of construction noise measurement and no Notifications of Exceedances (NOEs) were issued to the PMR, IEC and the Contractor. The statistics of environmental exceedance, NOE issued and investigation of exceedance are summarized in the following table.

Environmental Aspect	Monitoring Parameters	Action Level	Limit Level	Event & Action		
				NOE Issued	Investigation	Corrective Actions
Construction Noise	$L_{eq(30min)}$ Daytime	0	0	0	0	0

ENVIRONMENTAL COMPLAINT

ES04 No public complaints were received by either the Ocean Park Corporation (OPC) or the Contractor in the Reporting Period.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

ES05 No environmental summons or successful prosecutions were recorded in the Reporting Period.

REPORTING CHANGE

ES06 No reporting changes were made in the Reporting Period.

SITE INSPECTION

ES07 In the Reporting Period, joint site inspections were undertaken by the PMR, ET and the Contractor on **20 & 27 February 2017** and **10 & 15 March 2017.** Furthermore, IEC performed the site inspection and audit on **10 March 2017.** During site inspection, no non-compliance was observed by ET and IEC.

FUTURE KEY ISSUES

ES08 Although the rainy season is over, however the contractor shall pay attention to prevent muddy water and other water pollutants via site surface runoff direct discharge into the sea due to rainy day may be to encounter the coming month. Water quality mitigation measures should be properly to implement in accordance with EMIS stipulation.

ES09 Furthermore, noise mitigation measures such as using quiet plants should be implemented in accordance with the EM&A requirement since construction noise is a key environmental issue during construction work of the Project.

ES10 During the dry and windy season, soil stockpile and temporary haul road should pay attention. Dust mitigation measures should be properly performed to avoid fugitive dust generated from the Project.

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Ocean Park Corporation is the Project Proponent and the Permit Holder of the *Ocean Park Tai Shue Wan Development* (hereinafter "the Project"), which is a Designated Project to be implemented under Environmental Permit number EP-487/2014 (hereinafter referred as "the EP-487/2014" or "the EP"). The Project will redevelop the existing theme park areas at Tai Shue Wan into a Water Park to enhance the attractiveness of Ocean Park into a world-class theme park and provide a must-see destination to visitors. The layout plan of the Project is shown in ***Appendix A***.

1.1.2 Site formation and foundation works as part of the Project is awarded by Paul Y. Construction Company Limited (hereinafter called "the Contractor") on 17 July 2015. To compliance with Environmental Permit requirement, the Contractor has been appointed Action-United Environmental Services & Consulting (AUES) as the Environmental Team (hereinafter referred as "the ET") to implement the relevant Environmental Monitoring and Audit (EM&A) programmes.

1.1.3 As part of the EM&A program, baseline monitoring for the required parameters including background noise, landscape & visual baseline review and baseline ardeid inspection were carried out between 24 October 2014 and 10 December 2014 by the environmental consultants of Ocean Park Corporation. Furthermore, the baseline monitoring report which verified by the previous IEC was submitted to EPD and endorsed in December 2014.

1.1.4 This is **20th** monthly EM&A report presenting the monitoring results and inspection findings for reporting period from **17 February 2017** to **16 March 2017**.

1.2 REPORT STRUCTURE

1.2.1 The Monthly Environmental Monitoring and Audit (EM&A) Report is structured into the following sections:-

Section 1 *Introduction*
Section 2 *Project Organization and Construction Progress*
Section 3 *Summary of Impact Monitoring Requirements*
Section 4 *Construction Noise*
Section 5 *Ecology*
Section 6 *Landscape & Visual*
Section 7 *Waste Management*
Section 8 *Site Inspections*
Section 9 *Environmental Complaints and Non-Compliance*
Section 10 *Implementation Status of Mitigation Measures*
Section 11 *Conclusions and Recommendations*

2 PROJECT ORGANIZATION AND CONSTRUCTION PROGRESS

2.1 PROJECT ORGANIZATION

2.1.1 The project organization is shown in ***Appendix B***. The responsibilities of respective parties are:

Ocean Park Corporation

2.1.2 Ocean Park Corporation is the Project Proponent and the Permit Holder of the EP for the development of the Project and will assume overall responsibility for the project. An Independent Environmental Checker (IEC) shall be employed by Ocean Park Corporation to audit the results of the EM&A works carried out by the ET.

Environmental Protection Department (EPD)

2.1.3 EPD is the statutory enforcement body for environmental protection matters in Hong Kong.

Project Management Representative (PMR) of Ocean Park Corporation

2.1.4 The PMR is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contract requirements. The duties and responsibilities of the ER with respect to EM&A are:

- Monitor the Contractors' compliance with contract specifications, including the implementation and operation of the environmental mitigation measures and their effectiveness
- Monitor Contractors's, ET's and IEC's compliance with the requirements in the Environmental Permit (EP) and EM&A Manual
- Facilitate ET's implementation of the EM&A programme
- Participate in joint site inspection by the ET and IEC
- Oversee the implementation of the agreed Event / Action Plan in the event of any exceedance
- Adhere to the procedures for carrying out complaint investigation
- Liaison with the related government departments, ET, IEC, the Contractor and the other Contractors of the Project discussing regarding the cumulative impact issues.

The Contractor

2.1.5 The duties and responsibilities of the Contractor are:

- Comply with the relevant contract conditions and specifications on environmental protection
- Employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of EM &A Facilitate ET's monitoring and site inspection activities
- Participate in the site inspections by the ET and IEC, and undertake any corrective actions
- Provide information / advice to the ET regarding works programme and activities which may contribute to the generation of adverse environmental impacts
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event / Action Plans
- Implement measures to reduce impact where Action and Limit levels are exceeded
- Adhere to the procedures for carrying out complaint investigation

Environmental Team (ET)

2.1.6 The ET should be employed by the Contractor to conduct the EM&A programme. The ET should be managed by the ET Leader. ET Leader should have relevant professional qualifications in environmental control and possess at least 7 years' experience in EM&A. Suitably qualified professional and technical staff should be included in the ET, and resources for the implementation of the EM&A programme should be allocated in the time under the Contract, to enable fulfilment of the Project's EM&A requirements as specified in the EM&A Manual during construction of the Project. The ET shall include qualified botanist/ecologist for the ecological service and a Registered Landscape Architect for review of implementation of landscape and

visual mitigation measures. The ET should report to the OPC and the duties should include:

- to monitor and audit various environmental parameters as required in the Approved EM&A Manual;
- to analyse the EM&A data, review the success of EM&A programme and the adequacy of mitigation measures implemented, confirm the validity of the EIA predictions and identify any adverse environmental impacts arising;
- to monitor compliance with conditions in the EP, environmental protection, pollution prevention and control regulations and contract specifications;
- to audit environmental conditions on site;
- to report on the EM&A results to EPD, the ER, the IEC and Contractor or their delegated representatives;
- to recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- to liaise with the IEC on all environmental performance matters, and ensure timely submission of all relevant EM&A pro forma for IEC's approval;
- to provide advice to the Contractor on environmental improvement, awareness and enhancement matters, etc on site;
- to adhere to the procedures for carrying out complaint investigation;
- to prepare reports on the environmental monitoring data and the site environmental conditions;
- to submit the EM&A report to Director of Environmental Protection (DEP) timely;
- to review proposals of mitigation measures from the Contractor in case of exceedance of Action and Limit levels, in accordance with the Event and Action Plan; and
- to carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and mitigation measures.

Independent Environmental Checker (IEC)

2.1.7 The IEC is empowered to audit the environmental performance of construction, but is independent from the management of construction works. As such, the IEC should not be in any way an associated body of the Contractor or the ET for the Project. The IEC should be employed by OPC prior to the commencement of the construction of the Project. The IEC should be a person who has relevant professional qualifications in environmental control and at least 7 years' experience in EM&A and environmental management. The duties and responsibilities of the IEC are:

- to provide proactive advice to the ER and OPC on EM&A matters related to the project;
- to review and verify the monitoring data and all submissions in connection with the EP and EM&A Manual submitted by the ET;
- to arrange and conduct regular, at least monthly site inspections of the works during the construction phase, and to carry out ad hoc inspections if significant environmental problems are identified;
- to check compliance with the agreed Event and Action Plan in the event of any exceedance;
- to check compliance with the procedures for carrying out complaint investigation;
- to check the effectiveness of corrective measures;
- to feedback audit results to the ET by signing off relevant EM&A pro forma;
- to check that mitigation measures are effectively implemented;
- to report the works conducted, and the findings, recommendations and improvements of the site inspections, after reviewing ET's and Contractor's works, the ER and OPC on a monthly basis;
- to verify the investigation result of the environmental complaint cases and the effectiveness of corrective measures;
- to verify EM&A report that has been certified by ET leader; and
- to audit EIA recommendations and requirements against the status of implementation of environmental mitigation measures on site.

2.2 CONSTRUCTION PROGRESS

2.2.1 The master construction program is enclosed in ***Appendix C***. In the Reporting Period, the major construction activity conducted under the Contract is summarized in below:

- Site surveying
- UU detection
- Site clearance
- Excavation of footings
- Site formation works and slope stabilization works
- Construction of sloping EVA
- Drainage works like catch pit, intake, stepped channel and pipe laying
- Construction of Raft B and Package 2, 3, 4, 5 & 6 footings
- Construction of de-aeration chamber
- ELS for pipe jacking pits
- Installation of traffic signs

2.3 SUMMARY OF ENVIRONMENTAL SUBMISSIONS

2.3.1 Summaries of validity permits, licenses, and/or notifications on environmental protection for the Project are presented in ***Table 2-1***.

Table 2-1 Status of Environmental Licenses and Permits of the Project

No.	Type of Permit/ License	Submission Date	Reference/ License No.	Date of Issue	Date of Expiry
1	Air pollution Control (Construction Dust) Regulation	Submitted to EPD on 27/07/2015	392566	07/09/2015	N/A
2	Chemical Waste Producer Registration - Waste Producers	04-08-2015	5213-176-P2781-21	25/08/2015	N/A
3	Water Pollution Control Ordinance - Discharge License	Application was on 25/08/2015	WT00022680-2015	14/10/2015	31/10/2020
4	Waste Disposal Regulation - Billing Account for Disposal of Construction Waste	22-07-2015	7022926	06-08-2015	N/A
5	Construction Noise Permit	19-12-2016	GW-RS1304-16	30/12/2016	29/06/2017

2.3.2 To according with the EP stipulation, the required documents has been submitted to EPD for retention as listed below:

- Project Layout Plans
- Management Organization of Main Construction Companies
- Detailed Vegetation Survey Report
- Woodland Compensation Plan
- Ardeid Inspection Report
- Short-nosed Fruit Bat Inspection Report
- Baseline Monitoring Report Revision A of the Project

3 SUMMARY OF IMPACT MONITORING REQUIREMENTS

3.1 GENERAL

3.1.1 The Environmental Monitoring and Audit requirements are set out in the Approved EM&A Manual. During the construction phase of the Project, construction noise is identified a key Environmental issue. Moreover, Landscape & Visual and Ecology monitoring are also required during the construction phase in accordance with the Approved EM&A Manual.

3.1.2 A summary of construction phase EM&A requirements are presented in the sub-sections below.

3.2 MONITORING PARAMETERS

3.2.1 The EM&A program of construction phase monitoring shall cover the following environmental issues:

- Construction noise;
- Landscape & Visual; and
- Ecology

3.2.2 A summary of the monitoring parameters is presented in ***Table 3-1.***

Table 3-1 Summary of EM&A Requirements

Environmental Issue	Parameters
Noise	• $L_{eq(30min)}$ in normal working days (Monday to Saturday) 07:00-19:00 except public holiday; • 3 sets of consecutive $L_{eq(5min)}$ on restricted hours i.e. 19:00 to 07:00 next day, and whole day of public holiday or Sunday when applicable, and • Supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.
Landscape & Visual	• Site inspection, monitoring and Audit
Ecology	• Site inspection and monitoring

3.3 MONITORING LOCATIONS

3.3.1 The designated noise monitoring locations as recommended in the *EM&A Manual* is shown in ***Appendix D***. During baseline monitoring, the designated monitoring location NM1 was denied by the owner, so the previous ETL proposed alternative location NM1A. The proposal was verified by the previous IEC and agreed by EPD. ***Table 3-2*** and ***Appendix E*** respectively list and show the construction noise monitoring locations for the Project.

Table 3-2 Impact Monitoring Stations - Construction Noise

Station ID	Description
NM1A	Slope near Victoria Shanghai Academy (VSA) to replace NM1 of the VSA
NM2	Hong Kong Juvenile Care Centre (HKJCC)

3.4 MONITORING FREQUENCY AND PERIOD

3.4.1 Measurement of $L_{eq(30min)}$ between 0700-1900 hours on normal weekdays and once every week during course of works. If construction work necessary to carry out at other time periods, i.e. restricted time period (19:00 to 07:00 the next morning and whole day on public holidays) (hereinafter referred as "the restricted hours"), 3 consecutive $L_{eq(5min)}$ measurement will depended Control Noise Permit (CNP) requirements to undertake. Supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.

3.5 MONITORING EQUIPMENT

3.5.1 Sound level meter in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. The sound level meter shall be checked using an acoustic calibrator. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m s-1.

3.5.2 Noise monitoring equipment to be used for monitoring is listed in ***Table 3-3***.

Table 3-3 Construction Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	B&K Type 2238 / Rion NL-52
Calibrator	B&K Type 4231 / Rion NC-73
Portable Wind Speed Indicator	Testo Anemometer

3.5.3 Sound level meter listed above comply with the *International Electrotechnical Commission Publications 651: 1979 (Type 1)* and *804: 1985 (Type 1)* specifications, as recommended in TM issued under the NCO. The acoustic calibrator and sound level meter to be used in the impact monitoring will be calibrated yearly.

3.6 MONITORING METHODOLOGY

3.6.1 Noise measurements were taken in terms of the A-weighted equivalent sound pressure level (L_{eq}) measured in decibels (dB). Supplementary statistical results (L_{10} and L_{90}) were also obtained for reference.

3.6.2 During the monitoring, all noise measurements would be performed with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (L_{eq}). $Leq_{(30min)}$ as the monitoring parameter for the time period between 0700-1900 hours on weekdays; and also $Leq_{(15min)}$ in three consecutive $Leq_{(5min)}$ measurements would be used as monitoring parameter for other time periods (e.g. during restricted hours), if necessary.

3.6.3 Prior of noise measurement, the accuracy of the sound level meter is checked using an acoustic calibrator generating a known sound pressure level at a known frequency. The checking is performed before and after the noise measurement.

3.7 EQUIPMENT CALIBRATION

3.7.1 The sound level meter and calibrator are calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme at yearly basis.

3.7.2 The calibration certificates of sound level meter and calibrator used for impact monitoring program in the Reporting Period are attached in ***Appendix F***.

3.8 METEOROLOGICAL INFORMATION

3.8.1 Meteorological information was extracted from "the Hong Kong Observatory Wong Chuk Hang Station". For Wong Chuk Hang Station, it is situated nearby the Project site and can provide the humidity, rainfall, and air pressure and temperature etc. meteorological information.

3.9 DERIVATION OF ACTION/LIMIT (A/L) LEVELS

3.9.1 The baseline results form the basis for determining the environmental acceptance criteria for the impact monitoring. According to the approved Environmental Monitoring and Audit Manual with baseline monitoring results, construction noise criterion, namely Action and Limit levels proposed are listed in ***Table 3-4***.

Table 3-4 Action and Limit Levels for Construction Noise

Monitoring Location	Action Level	Limit Level in dB(A)
	Time Period: 0700-1900 hours on normal weekdays	
NM1A and NM2	When one or more documented complaints are received	70 dB(A)[Note 1 and Note 2]

Note 1: Acceptable Noise Levels for school should be reduced to 65 dB(A) during examination period
Note 2: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the NCA have to be followed.

3.9.2 Should non-compliance of the environmental quality criteria occurs, remedial actions will be triggered according to the Event and Action Plan which presented in ***Appendix G.***

3.10 DATA MANAGEMENT AND DATA QA/QC CONTROL

3.10.1 All monitoring data will be handled by the ET's in-house data recording and management system. The monitoring data recorded in the equipment will be downloaded directly from the equipment at the end of each monitoring day. The downloaded monitoring data will input into a computerized database properly maintained by the ET.

4 CONSTRUCTION NOISE MONITORING

4.1 GENERAL

4.1.1 In the Reporting Period, a total of 8 occasions of noise monitoring were carried out at the two (2) noise monitoring locations.

4.1.2 The noise monitoring schedule is presented in ***Appendix H*** and the monitoring results are summarized in the following sub-sections.

4.2 NOISE MONITORING RESULTS IN REPORTING MONTH

4.2.1 The noise monitoring results measured at the designated locations are summarized in ***Table 4-1.*** The detailed noise monitoring data are presented in ***Appendix I*** and the relevant graphical plots are shown in ***Appendix J***.

Table 4-1 Summary of Construction Noise Monitoring Results, dB(A)

Date	Time		(*)NM1A		Limit Level Note 1
	Start	Finish	($L_{eq30min}$)	Correction	
20-Feb-17	9:43	10:13	61	64	70
3-Mar-17	13:02	13:32	61	64	70
9-Mar-17	13:59	14:29	63	66	70
15-Mar-17	10:13	10:43	63	66	70

Date	Time		NM2 ($L_{eq30min}$)	Limit Level Note 1
	Start	Finish		
20-Feb-17	10:36	11:06	62	70
3-Mar-17	13:47	14:17	60	65
9-Mar-17	13:14	13:44	63	65
15-Mar-17	9:19	9:49	62	70

Remarks:

(*) *Sound level meter set at NM1A is made free-field measurement, façade correction (+3dB(A)) is therefore added according to acoustical principles and EPD guidelines.*

Note 1: Acceptable Noise Levels for school should be reduced to 65 dB(A) during examination period

4.2.2 In this reporting period, no school examination or assessment examination was undertaken from at Victoria Shanghai Academy (NM1A). However, school examination was carried out at Hong Kong Juvenile Care Centre (NM2) from 24th Feb 2017 to 10th Mar 2017. No Limit Level exceedance was recorded during the school examination period. Furthermore, Victoria Shanghai Academy will have school examination from 1st to 31st May 2017.

4.2.3 As shown in ***Table 4-1***, rest of the results of noise measurement are below 70dB(A) or 65dB(A) during the examination period of the acceptance criteria. Furthermore, there were no noise complaints (Action Level exceedance) received by the PMR, Contractor or EPD in the Reporting Period. Therefore, no Action Level exceedance was triggered nor corrective action was therefore required.

4.2.4 The meteorological data during the impact monitoring days are summarized in ***Appendix K***.

5 ECOLOGY MONITORING

5.1 GENERAL

5.1.1 As required under the ***Section 8.3.2*** of the approved EM&A Manual, the implementation of ecological mitigation measures as detailed in the ***Section 15*** of the EIA report and ***Appendix C*** of the approved EM&A Manual shall be routinely audited during the routine environmental audit; and any observations and recommendations shall be reported in periodic EM&A reports.

5.1.2 Among those mitigation measures recommended to avoid or minimize the disturbance to any plants of conservation interest (EM&A reference 8.3.1.1), nested ardeids (EM&A reference 8.3.1.2) and roosted short-nosed fruit bat (EM&A reference 8.3.1.3), the required inspection has already been undertaken in August/September 2014 with the results presented in the submitted respective baseline report. Therefore, the following sections only address those applicable to this stage of the project, i.e., Section 8.3.2 of the approved EM&A Manual.

5.2 MONITORING REQUIREMENT

Monitoring of Plants of Conservation Interest (Platycondon grandiflorus)

5.2.1 The Detailed Vegetation Survey Report (DVSR) has located two groups of the protected *Platycodon grandiflorus* and recommended that the plants should be protected with temporary protective fencing to avoid potential impact from construction activities (such as material storage), and monitor the identified *Platycodon grandiflorus* on a monthly basis throughout the construction phase to make sure that they are not affected by the construction works of the Project. Accordingly, the following monitoring parameters will be undertaken on a monthly basis during the construction period.

i. Effective implementation of the protection measures as recommended in the Section 4.1 of the DVSR
ii. Monitoring of the two groups of *Platycodon grandiflorus* identified during the detailed vegetation survey to make sure that they are not affected by the construction works

Monitoring of Nesting Activities of Ardeids in Breeding Season

5.2.2 The project area should be checked monthly in breeding season (April to July) for any potential breeding and nesting activities, and if required suitably sized buffer area will be recommended to avoid human or machinery disturbance until the nest is abandoned.

Monitoring of Roosting Activities of Ardeids in Peak Wintering Season

5.2.3 The existing ardeid night roost within the project area should be monitored monthly during peak wintering season (November to March) during the construction phase using direct observation from a vantage point (i.e., point count method) at evening time from an hour before sunset, and last until the nightfall.

Compensation for Ardeid roosting Site

5.2.4 An enhancement area provided as an alternative roosting site for ardeids should be developed during the first phase of the construction.

Compensation of Woodland Habitat

5.2.5 Mitigation measures recommended in the approved Woodland Compensation Plan should be fully and properly implemented, including but not limited to the creation of 0.84 ha woodland compensation on-site and 0.78 ha on-site woodland reinstatement, to mitigate for permanent loss of woodland habitat.

5.3 INSPECTION FINDINGS

5.3.1 The ecological inspection was undertaken on ***13th March 2017*** by the qualified ecologist. The inspection findings are presented below.

Plants of Conservation Interest (Platycondon grandiflorus)

5.3.2 *Platycodon grandiflorus* is a perennial herb and often appear in thicket in sunny habitats; its stem ranged from 20 to 120m in height and rarely branched above. The stems of the two groups of *Platycodon grandiflorus* (see *Figure 1* of ***Appendix L*** for their location**s)** recorded in the 2015s' growing season within the fenced area were both wilting during the site inspection (see ***Photos 1 and 2*** of ***Appendix L*** of this report), which is a natural growing pattern of this perennial species and new shoots would expected to emerge from the underground part in the next growing season.

5.3.3 On the other hand, the preventive mitigation measures, i.e., erecting of temporary protective fencing and sign post, are found to be effectively implemented (see ***Photo 3*** of ***Appendix L*** of this report), and there is no signs or evidence (e.g. dust coating of plant) to suggest that the on-going construction activities within the Project Area has affected the health condition of the *Platycodon grandiflorus*.

Nesting Activities of Ardeids in Breeding Season

5.3.4 This monitoring parameter only required during the breeding season of ardeids, i.e., from April to July, and the last monitoring event for nesting activities of Ardeids in the 2016's breeding season was undertaken on 9th July 2016, and such monitoring would not be required for the reporting period.

Roosting Activities of Ardeids in Peak Wintering Season

5.3.5 Monitoring of roosting activities of Ardeids has been carried out on by direct observation at 2 vantage points within the project area on 13th March 2017, and covered the evening time from an hour before sunset and last until nightfall, i.e., 1710 to 1840. The location of vantage points has shown in Figure 2 of ***Appendix L.***

5.3.6 Moreover, no ardeids were noted within or in the vicinity of the project area during the monitoring period.

Compensation for Ardeid roosting Site

5.3.7 To be implemented.

Compensation of Woodland Habitat

5.3.8 To be implemented.

5.4 CONCLUSION

5.4.1 The implementation of the mitigation measures for the plant species of conservation interest, i.e., the *Platycodon grandiflorus,* was found to be effective during the reporting period and no sign of activities related to construction work was noted within or in proximity of the fenced up area. The stem wilting after flowering is part of the natural life cycle of this perennial herbaceous species, and new shoots would expect to emerge from the underground part in the next growing season.

5.4.2 On the other hand, roosting activities of ardeids have not been observed within the project area during the monitoring.

5.4.3 The tentative ecology inspection and monitoring in the next reporting period (17th March 2017 to 16th April 2017) is scheduled on ***13th April 2017***.

6 LANDSCAPE & VISUAL MONITORING

6.1 GENERAL

6.1.1 According to the EM&A Manual requirements, a Registered Landscape Architect (RLA) would be responsible for monitoring the implementation of landscape and visual mitigation measures during the construction.

6.1.2 Landscape and visual mitigation measures for the construction phase are listed in the Approved EM&A Manual ***Table 9.1***.

6.1.3 The design, implementation and maintenance of landscape and visual mitigation measures shall be checked bi-weekly to ensure that they are fully realized during the construction phase. The scope of the site audit during construction shall be included the following:

a) The extent of the agreed works areas should be regularly checked. No construction activities or storage shall be undertaken outside the limit of the works;
b) The progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;
c) All landscaping works are carried out in accordance with the specifications; and
d) All new planting are carried out properly and within the right season.

6.1.4 Any potential conflicts between the proposed landscape and visual mitigation measures and any other project works or operational requirements shall be recorded for the Contractor to resolve in an early stage, without compromising the intention of the mitigation measures.

6.2 INSPECTION FINDINGS

6.2.1 In the Reporting Period, two occasions of landscape and visual site inspection were conducted on ***25th February 2017*** and ***15th March 2017.***

6.2.2 According to two occasions of site inspection, it was observed that the Contractor complied with the intended aims of the mitigation measures, such as no construction activities or materials storage conducted and placed outside of the working site boundary.

6.2.3 The Contractor was advised to improve and maintain the tree protection zone.

7 WASTE MANAGEMENT

7.1 GENERAL WASTE MANAGEMENT

7.1.1 Waste management was carried out by an on-site Environmental Officer or an Environmental Supervisor from time to time.

7.2 RECORDS OF WASTE QUANTITIES

7.2.1 All types of waste arising from the construction work are classified into the following:

- Construction & Demolition (C&D) Material;
- Chemical Waste;
- General Refuse; and
- Excavated Soil.

7.2.2 The quantities of waste for disposal in this Reporting Period are summarized in ***Tables 7-1*** and ***7-2***.

Table 7-1 Summary of Quantities of Inert C&D Materials

Type of Waste	Quantity	Disposal Location
C&D Materials (Inert) (tonne)	8337.55	-
Mixed Waste to Sorting Facility (tonne)	0	-
Reused in this Contract (Inert) (tonne)	0	-
Reused in other Projects (Inert) (tonne)	0	MTR SIL 904
Disposal as Public Fill (Inert) tonne)	8337.55	Chai Wan Barging Point and TKO137

Table 7-2 Summary of Quantities of C&D Wastes

Type of Waste	Quantity	Disposal Location
Recycled Metal (tonne)	6.83	Recycling Company
Recycled Paper / Cardboard Packing (tonne)	0	-
Recycled Plastic (tonne)	0	-
Chemical Wastes (tonne)	0	-
General Refuses (tonne)	15.22	SENT Landfill

Remark: Total quantity of the recycled metal for the previous reporting period (No. 16 Report) has been updated. Please refer to the latest vision of the "Waste Flow Table" in Appendix M.

7.2.3 Monthly Summary Waste Flow Table provided by the Contractor shows in ***Appendix M***. Whenever possible, materials were reused on-site as far as practicable

8 SITE INSPECTION

8.1 REQUIREMENTS

8.1.1 According to the approved EM&A Manual, the environmental site inspection shall be formulation by ET Leader. Weekly environmental site inspections should carry out to confirm the environmental performance.

8.2 FINDINGS / DEFICIENCIES DURING THE REPORTING MONTH

8.2.1 In the Reporting Period, joint site inspections were undertaken by the PMR, ET and the Contractor on **20 & 27 February 2017** and **10 & 15 March 2017.** Furthermore, IEC performed the site inspection and audit on **10 March 2017.** During site inspection, no non-compliance was observed by ET and IEC.

8.2.2 During site inspections, no non-compliance was observed by ET and IEC. However, ***six*** reminders and ***four*** observations were recorded in the Reporting Period. The findings / deficiencies of the Project that observed during the weekly site inspection are listed in ***Table 8-1***.

Table 8-1 Site Observations of the Project

Date	Findings / Deficiencies	Follow-Up Status
20 Feb 2017	• Accumulative water in U-channel was observed, the Contractor should clean up the U-channel and maintain the U-channel is functional.	• The stagnant water in the U-channel was cleaned out.
	• It was reminded that water spraying should be provided during the rock breaking.	Reminder Only
27 Feb 2017	• Shelter should be provided for the grouting works to reduce dust impact.	• Shelter is installed for the grouting works.
	• Dust control measures should be provided for breaking works to reduce dust generation.	• Water spraying is provided for the breaking works.
10 Mar 2017	• Housekeeping should be regularly maintained.	Reminder Only
	• All plants used on site should be regularly checked and maintained.	Reminder Only
	• If soil stockpile is over than 50m3, mitigation measures shall be follow EMIS requirements.	Reminder Only
	• All haul road shall be provided with water spraying to prevent dust emission.	Reminder Only
	• If any water retained in open channel, mitigation measures such as mosquito breeding control should be provided.	Reminder Only
15 Mar 2017	• Dry haul road was observed on-site, the Contractor should provide water spraying for the haul road to minimize dust generation.	• Water spraying was provided and the haul road was wet.

8.2.3 For the above deficiencies found in Reporting Period, the Contractor has rectified immediately or within deadline. So, environmental performance of the Project managed by the Contractor with OPC was considered satisfactory.

8.2.4 Specially, mitigation measures prevent runoff flow to public area and the sea shall paid attention and properly implement.

8.2.5 General reminded that dust mitigation measures should be provided to prevent fugitive dust from haul road, stockpile materials and construction activities; and the site housekeeping should be maintained. Furthermore, all chemical materials after using shall be stored at the designated area.

8.2.6 Additionally, the Contractor has reported a discovery of dark materials to OPC on 9th January 2017 in letter format (ref.: TSW-C004/030/09/L/2707s). Relevant follow-up action, such as preliminary assessment test on the dark materials, had been carried out by the Contractor for clear classification on the dark materials before the off-site disposal. As provided by the Contractor, the supplementary information about the dark clay materials is attached in ***Appendix O***. It is reminded that the disposal of waste generating from the project site shall comply with the Waste Disposal Ordinance.

9 ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

9.1 ENVIRONMENTAL COMPLAINT, SUMMONS AND PROSECUTION

9.1.1 No environmental complaint, summons and prosecution was received in the Reporting Period. The statistical summary table of environmental complaint is presented in ***Tables 9-1, 9-2*** and ***9-3***.

Table 9-1 Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
17 Feb 2017 to 16 Mar 2017	0	0	NA

Table 9-2 Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	Cumulative	Complaint Nature
17 Feb 2017 to 16 Mar 2017	0	0	NA

Table 9-3 Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	Cumulative	Complaint Nature
17 Feb 2017 to 16 Mar 2017	0	0	NA

10 IMPLEMENTATION STATUS OF MITIGATION MEASURES

10.1 GENERAL REQUIREMENTS

10.1.1 The environmental mitigation measures that recommended in the Implementation Schedule for Environmental Mitigation Measures (ISEMM) in the approved EM&A Manual covered the issues of dust, noise, water and waste and they are summarized presented in ***Appendix N.***

10.1.2 The Project shall be implementing the required environmental mitigation measures according to the approved EM&A Manual as subject to the site condition. Environmental mitigation measures generally implemented by the Contractor in this Reporting Month are summarized in ***Table 10-1***.

Table 10-1 Environmental Mitigation Measures

Issues	Environmental Mitigation Measures
Construction Noise	• Shut down construction equipment when not using
Ecology	• Wire fencing provided for temporary protect the identified flora species of conservation concern • Undertake site inspection of the flora species of conservation and the Ardeid of breeding and nesting activities
Landscape & Visual	• Good site management
Air Quality	• Good site management to reduce air quality impact • Main temporary access road paved with concrete • Prior to any loading or transfer operation, all dusty materials has sprayed with water to keep its wet • Any debris has covered entirely by impervious sheeting • Before debris dumped into a chute, water has sprayed onto the debris to make its wet • Vehicles has covered with tarpaulin during transporting dusty materials • When vehicles leaving the construction site, any vehicles loaded dusty materials covered with clean impervious sheeting as prevent fugitive dusty materials emission • The speed of the trucks passing site areas was controlled to below 10 km/hour • Water spray has been provided for soil-nailing work
Water Quality	• Portable chemical toilets has provided on site • A licensed collector has employed to collect effluent and off-site dispose.
Waste and Chemical Management	• A temporary container which located far away from sea shore and drainage channel, has provided for chemical materials and waste storage • Drip tray is provided for chemical materials which use on the working areas • Has provided a waste skip for general refuse disposal
General	• The site was generally kept tidy and clean

10.2 TENTATIVE CONSTRUCTION ACTIVITIES IN THE COMING MONTH

10.2.1 Construction activities as undertaken in the coming month for the Project lists below:

- Site surveying
- UU detection
- Site clearance
- Site formation works and slope stabilization works
- Construction of sloping EVA
- Drainage works like catch pit, intake, stepped channel and pipe laying
- Construction of Raft B and Package 2, 3, 5 & 6 footings
- Construction of de-aeration chamber
- ELS for pipe jacking pits and pipe jacking works

10.3 KEY ISSUES FOR THE COMING MONTH

10.3.1 Based on construction activities as undertaken in the coming month, key environment issues consider to be included:

- Potential fugitive dust impact due to the dry/loose/exposure soil surface/dusty material;
- Potential water quality impact due to surface runoff;
- Implement dust suppression measures at the all times;
- Ensure noise and dust mitigation measures are implemented properly;
- Sediment catch-pits and silt removal facilities should be regularly maintained;
- Site effluent discharge shall be fulfilled the discharge license requirements;
- Management of chemical wastes properly implement;
- Follow-up of improvement on general waste management issues; and
- Implementation of construction noise preventative control measures.

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 CONCLUSIONS

11.1.1 This is the **20th** monthly EM&A report presenting the monitoring results and inspection findings for the reporting period from **17 February 2017** to **16 March 2017**.

11.1.2 A total of eight (8) occasions of noise monitoring were conducted in the Reporting Period. All noise monitoring results recorded at NM1a and NM2 were compliance construction noise criteria. Furthermore, no noise complaint (which is an Action Level exceedance) was received by the EPD, PMR and the Contractor. No NoEs or the associated corrective actions were therefore issued.

11.1.3 The ecological inspection was undertaken ***13th March 2017*** and the implementation of the mitigation measures for the plant species of conservation interest, i.e.,the *Platycodon grandiflorus*, was found to be effectively during the reporting period and the noted wilting of stem after flowering is part of the natural life cycle of this perennial herbaceous species and new shoots would expect to emerge from underground part in next growing season. In addition, monitoring of roosting activities by ardeids have also be undertaken at the reporting month but there was no sighting of ardeids within the Project Area at the evening hour during the monitoring period.

11.1.4 Landscape and visual site inspection were conducted on ***25th February 2017*** and ***15th March 2017*** in the Reporting Period. According to two occasions of site inspection, it was observed that the Contractor complied with the intended aims of the mitigation measures.

11.1.5 No documented complaint, notification of summons or successful prosecution was received by Ocean Park Corporation and the Contractor.

11.1.6 Weekly joint site inspection by PMR, ET and the Contractor was undertaken on **20 & 27 February 2017** and **10 & 15 March 2017** in which IEC joined that site inspection on **10 March 2017**. During the site inspections, no non-compliance was observed, however 4 deficiencies observation with 6 reminders were recorded in the Reporting Period. Overall, all deficiencies were immediately rectified or within a deadline. So, the Project environmental performance was considered satisfactory.

11.2 RECOMMENDATIONS

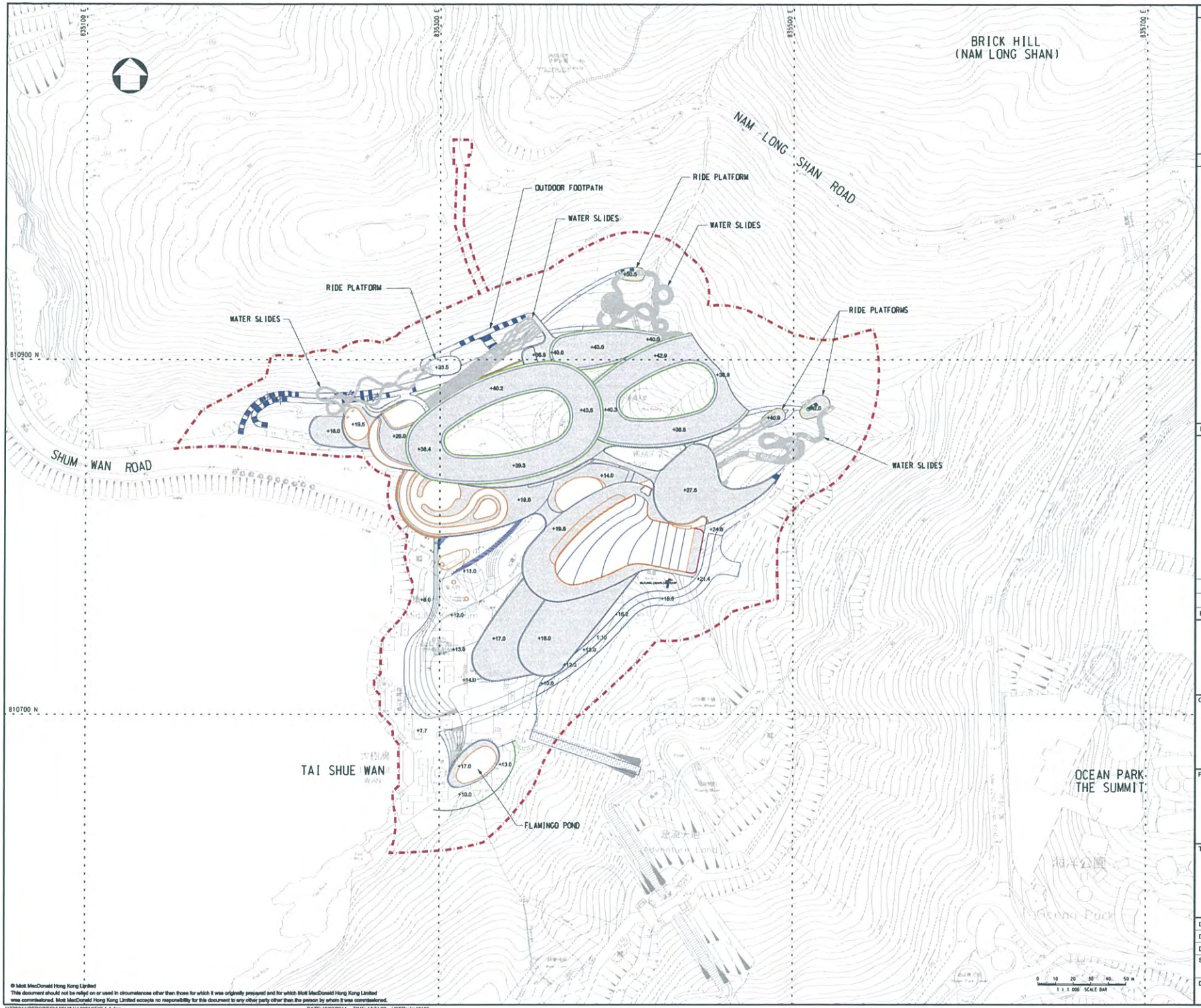
11.2.1 Although the rainy seasonal is over, however the contractor shall pay attention to prevent muddy water and other water pollutants via site surface runoff direct discharge into the sea due to rainy day may be to encounter the coming month. Water quality mitigation measures should be properly to implement in accordance with EMIS stipulation.

11.2.2 Furthermore, noise mitigation measures such as using quiet plants should be implemented in accordance with the EM&A requirement since construction noise is a key environmental issue during construction work of the Project.

11.2.3 During the dry and windy season, soil stockpile and temporary haul road should pay attention. Dust mitigation measures should be properly performed to avoid fugitive dust generated from the Project.

Appendix A

Layout Plan of the Project



Notes

Key to symbols

PROJECT BOUNDARY

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	MAR 14	MING	GENERAL REVISION	HY	AFK
P1	FEB 14	MING	FIRST ISSUE	HY	AFK

Mott MacDonald

20/F Two Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
T +852 2828 5757
F +852 2827 1823
W www.mottmac.com.hk

Client

Ocean Park Hong Kong

Project

TAI SHUE WAN DEVELOPMENT AT OCEAN PARK

Title

PROJECT LAYOUT PLAN

Designed	HY		Eng check	FW	
Drawn	MING		Coordination	FW	
Dwg check	HY		Approved	AFK	
Scale at A1 1:1000		Status PRE		Rev P2	

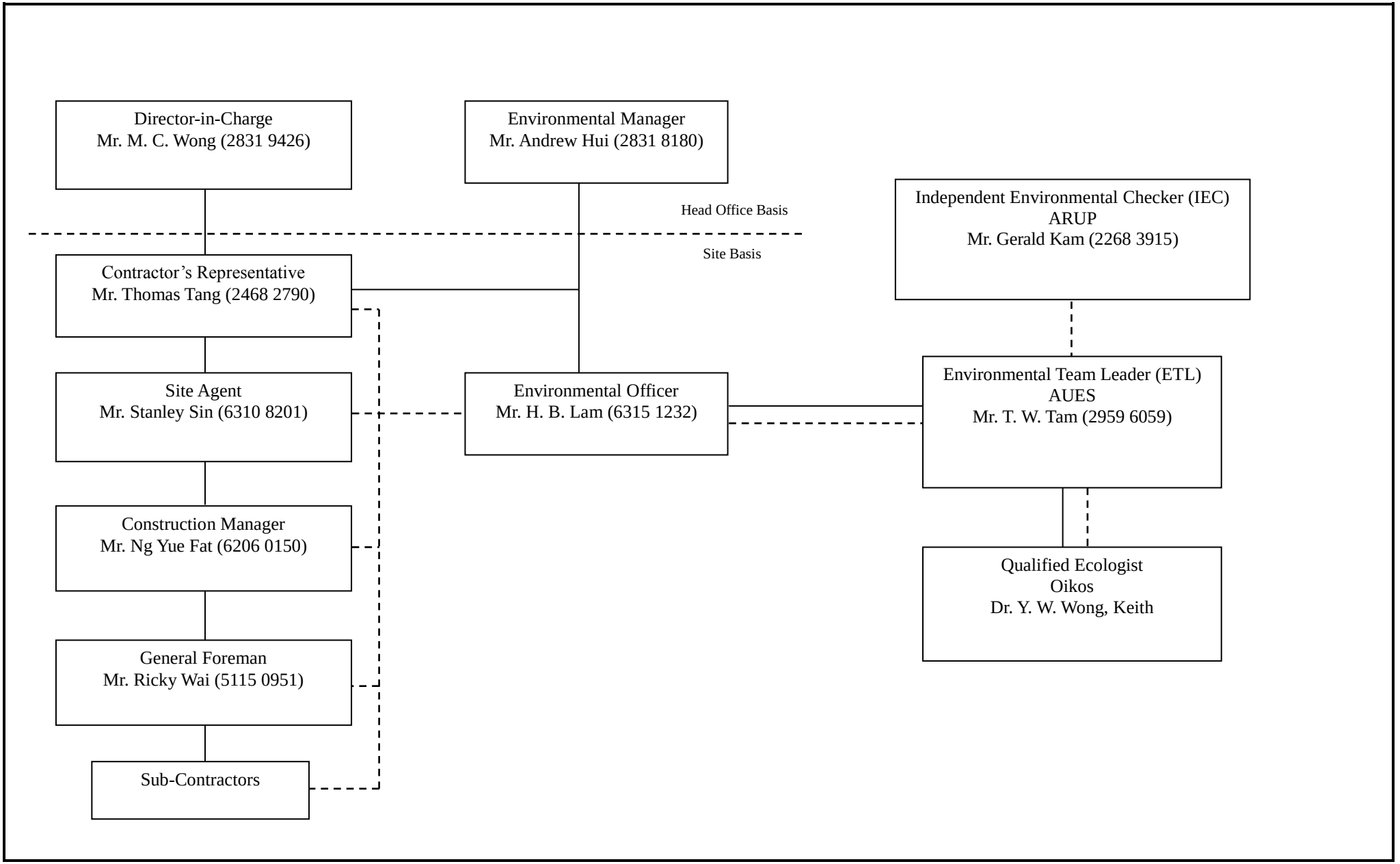
Drawing Number

FIGURE 1.1

J:\328011\REPORT\ENVEMBA\140311FIG 1-1.dgn DATE: 19/03/2014 TIME: 14:31:00 USER: ylm42169

Appendix B

Organization Chart


Director-in-Charge
Mr. M. C. Wong (2831 9426)
Environmental Manager
Mr. Andrew Hui (2831 8180)
Head Office Basis
Site Basis
Independent Environmental Checker (IEC)
ARUP
Mr. Gerald Kam (2268 3915)
Contractor's Representative
Mr. Thomas Tang (2468 2790)
Site Agent
Mr. Stanley Sin (6310 8201)
Environmental Officer
Mr. H. B. Lam (6315 1232)
Environmental Team Leader (ETL)
AUES
Mr. T. W. Tam (2959 6059)
Construction Manager
Mr. Ng Yue Fat (6206 0150)
Qualified Ecologist
Oikos
Dr. Y. W. Wong, Keith
General Foreman
Mr. Ricky Wai (5115 0951)
Sub-Contractors

Contact Details of Key Personnel

Organization	Project Role	Name of Key Staff	Tel No.	Fax No.
Project Proponent : Ocean Park Corporation				
OPC	(*) Project Management Representative / Resident Engineer (Planning)	Mr. Tsoi Mau Chui	2870 6121	2814 0179
Arup	Independent Environmental Checker	Mr. Gerald Kam	2268 3915	2268 3950
Paul Y	Project Director of Contractor	Mr. Thomas Tang	2468 2790	2833 5604
Paul Y	Site Agent of Contractor	Mr. Stanley S.C. Sin	2831 8282	2833 5604
Paul Y	Construction Manager of Contractor	Mr. Ng Yue Fat	6206 0150	2833 5604
Paul Y	Environmental Officer of Contractor	Mr. Lam Ho Ben	2831 8282	2833 5604
AUES	Environmental Team Leader	Mr. T. W. Tam	2959 6059	2959 6079
AUES	Environmental Consultant	Ms. Nicola Hon	2959 6059	2959 6079
AUES	Environmental Consultant	Mr. Ben Tam	2959 6059	2959 6079
Oikos	Qualified Ecologist	Dr. Keith Wong	9421 2016	2542 3411

Noted: After April 2016, Mr. Thomas Tong is replaced Mr. Edmond Chan

Legend:

OPC – Ocean Park Corporation

Arup – Ove Arup & Partners Hong Kong Ltd

Paul Y – Paul Y. Construction Company, Limited

AUES – Action-United Environmental Services & Consulting

Oikos – Oikos Consulting Limited

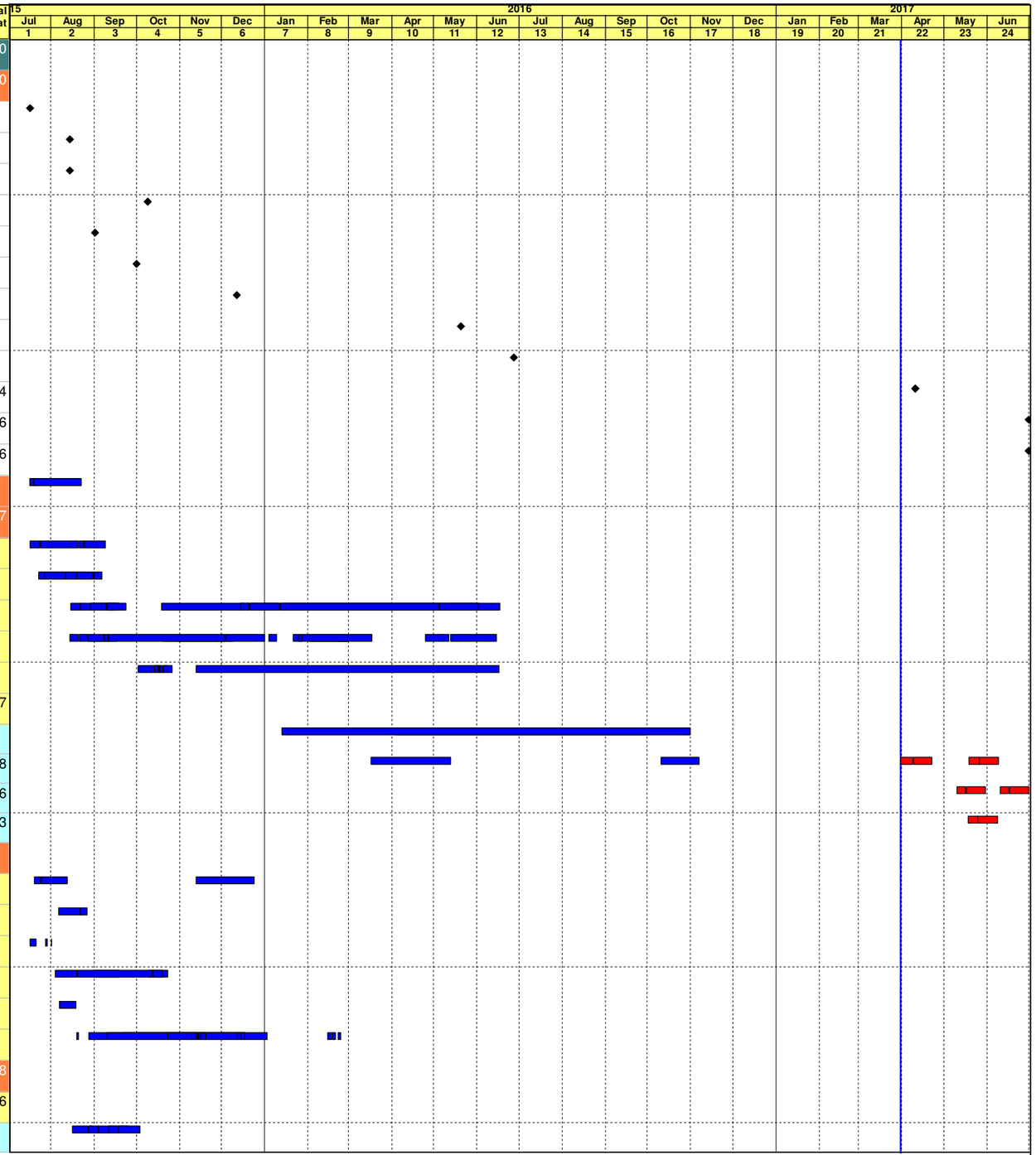
Remarks:

(*) - Acting

Appendix C

Master Construction Programme – Formation and Foundation Works

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
OPC-Works Programme (as of Mar-17) also same as per BEN		565	02-Jan-15 A	30-Jun-17	0
Key Dates& Programme Dates		715	17-Jul-15 A	30-Jun-17	0
KD10000	Commencement Date	0	17-Jul-15 A		
KD10010	Instruct Optional Works - FS Pipes	0	14-Aug-15 A		
KD10020	Instruct Optional Works - Additional slope works	0	14-Aug-15 A		
KD10025	Instruct VO - Site Formation for Ride P2, P4	0	09-Oct-15 A		
KD10035	Instruct VO - Site Formation for Ride P3	0	01-Sep-15 A		
KD10050	Instruct VO - Raft A Foundation Amendment	0	01-Oct-15 A		
KD10060	HEC 22kV cable - EVA (Flat Section) Access Date	0	12-Dec-15 A		
KD10070	HEC 22kV cable - North of Site Access Date	0	20-May-16 A		
KD10075	HEC 22kV cable - EVA (Covered and Sloping Section) Access Date	0	27-Jun-16 A		
KD10080	Access the designated part of the Site for other Contractor	0		10-Apr-17*	-334
KD10085	Contract Completion	0		30-Jun-17*	-296
KD10090	Programme Completion	0		30-Jun-17*	-296
Permit Application		37	17-Jul-15 A	22-Aug-15 A	
BD Submission		565	17-Jul-15 A	30-Jun-17	-237
BD Submission for Site Formation Works		54	17-Jul-15 A	08-Sep-15 A	
Miscellaneous		46	23-Jul-15 A	06-Sep-15 A	
BD Submission for Drainage Works		427	15-Aug-15 A	17-Jun-16 A	
BD Submission for Foundation Works		333	14-Aug-15 A	14-Jun-16 A	
BD Submission for Demolition Works		53	02-Oct-15 A	16-Jun-16 A	
BA14		341	13-Jan-16 A	30-Jun-17	-237
BA14 for Demolition Works		19	13-Jan-16 A	31-Oct-16 A	
BA14 for Site Formation Works		53	17-Mar-16 A	09-Jun-17	-218
BA14 for Drainage Works		52	10-May-17	30-Jun-17	-296
BA14 for Foundation Works		21	18-May-17	08-Jun-17	-273
Preliminary Works		255	17-Jul-15 A	24-Feb-16 A	
Site Accommodation		73	20-Jul-15 A	24-Dec-15 A	
Hoarding		18	06-Aug-15 A	26-Aug-15 A	
Hammer Head		14	17-Jul-15 A	01-Aug-15 A	
UU detection and CCTV		240	04-Aug-15 A	23-Oct-15 A	
Tree Protection		10	07-Aug-15 A	18-Aug-15 A	
GI Works		121	19-Aug-15 A	24-Feb-16 A	
Main Construction Work		539	02-Jan-15 A	09-Jun-17	18
Site Formation Work		489	16-Aug-15 A	08-Apr-17	56
Temporary Haul Road		39	16-Aug-15 A	03-Oct-15 A	



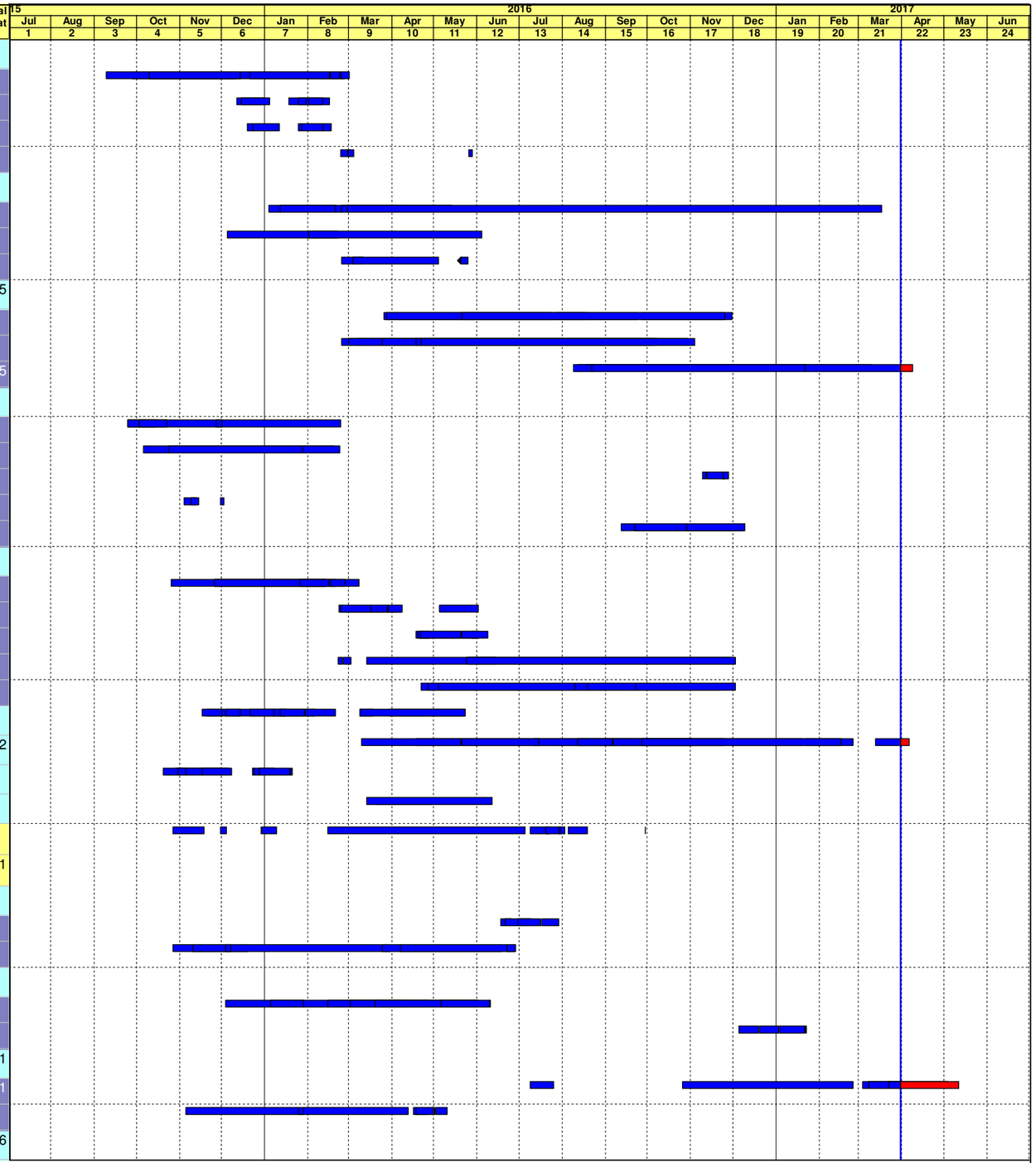
Ocean Park Tai Shue Wan Development

Site Formation and Foundation Works

Completion Works Programme

Date	Revision	Checked	Approved
17-May-16	-	TF	TT
30-Mar-17	Update		

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
	Slope Stabilization, North of Site (Phase I)	188	09-Sep-15 A	28-May-16 A	
	S9	113	09-Sep-15 A	01-Mar-16 A	
	S8	41	12-Dec-15 A	16-Feb-16 A	
	S10	47	19-Dec-15 A	17-Feb-16 A	
	S17	11	24-Feb-16 A	28-May-16 A	
	Thoroughfare	130	05-Dec-15 A	17-Mar-17 A	
	Excavation at North (Work Front 2)	59	04-Jan-16 A	17-Mar-17 A	
	Excavation near site Entrance (Work Front 1)	59	05-Dec-15 A	04-Jun-16 A	
	HEC Cable	73	25-Feb-16 A	25-May-16 A	
	Slope Stabilization, North of Site (Phase II)	185	25-Feb-16 A	08-Apr-17	-215
	S12	167	26-Mar-16 A	30-Nov-16 A	
	S5,7	53	25-Feb-16 A	03-Nov-16 A	
	S4, S6, S13, S14, S15	74	09-Aug-16 A	08-Apr-17	-215
	Slope Stabilization, South-East of Site	425	25-Sep-15 A	09-Dec-16 A	
	S34,36	32	25-Sep-15 A	24-Feb-16 A	
	S41	87	06-Oct-15 A	23-Feb-16 A	
	S40	14	09-Nov-16 A	27-Nov-16 A	
	S30	21	04-Nov-15 A	02-Dec-15 A	
	S32	128	12-Sep-16 A	09-Dec-16 A	
	Slope Stabilization, North-East of Site	274	26-Oct-15 A	02-Dec-16 A	
	S19	123	26-Oct-15 A	08-Mar-16 A	
	S23	145	23-Feb-16 A	01-Jun-16 A	
	S20	39	18-Apr-16 A	08-Jun-16 A	
	S17	64	22-Feb-16 A	02-Dec-16 A	
	S25	128	22-Apr-16 A	02-Dec-16 A	
	Upgrading Slope Features	244	17-Nov-15 A	24-May-16 A	
	Site Formation, Main Site Area	341	10-Mar-16 A	06-Apr-17	-202
	Ride Platform P3(Variation)	76	20-Oct-15 A	20-Jan-16 A	
	Rides Platform P2 and P4 (Variation)	35	14-Mar-16 A	11-Jun-16 A	
	Demolition Works/Abandoning Works	277	27-Oct-15 A	29-Sep-16 A	
	Foundations	482	27-Oct-15 A	19-May-17	-211
	Basement Water Tank & Sewage Tank (Package 6)	236	27-Oct-15 A	29-Jul-16 A	
	Basement Water Tank	68	18-Jun-16 A	29-Jul-16 A	
	Sewage Tank	176	27-Oct-15 A	28-Jun-16 A	
	Raft A (Package 4)	426	04-Dec-15 A	22-Jan-17 A	
	Raft A, Phase I	141	04-Dec-15 A	10-Jun-16 A	
	Raft A, Phase II	88	05-Dec-16 A	22-Jan-17 A	
	Raft B (Package 5)	469	05-Nov-15 A	11-May-17	-211
	Raft B, Phase II	76	09-Jul-16 A	11-May-17	-211
	Raft B, Phase I	261	05-Nov-15 A	10-May-16 A	
	Footings, North-East of Site (Package 2)	256	16-May-16 A	17-May-17	-216



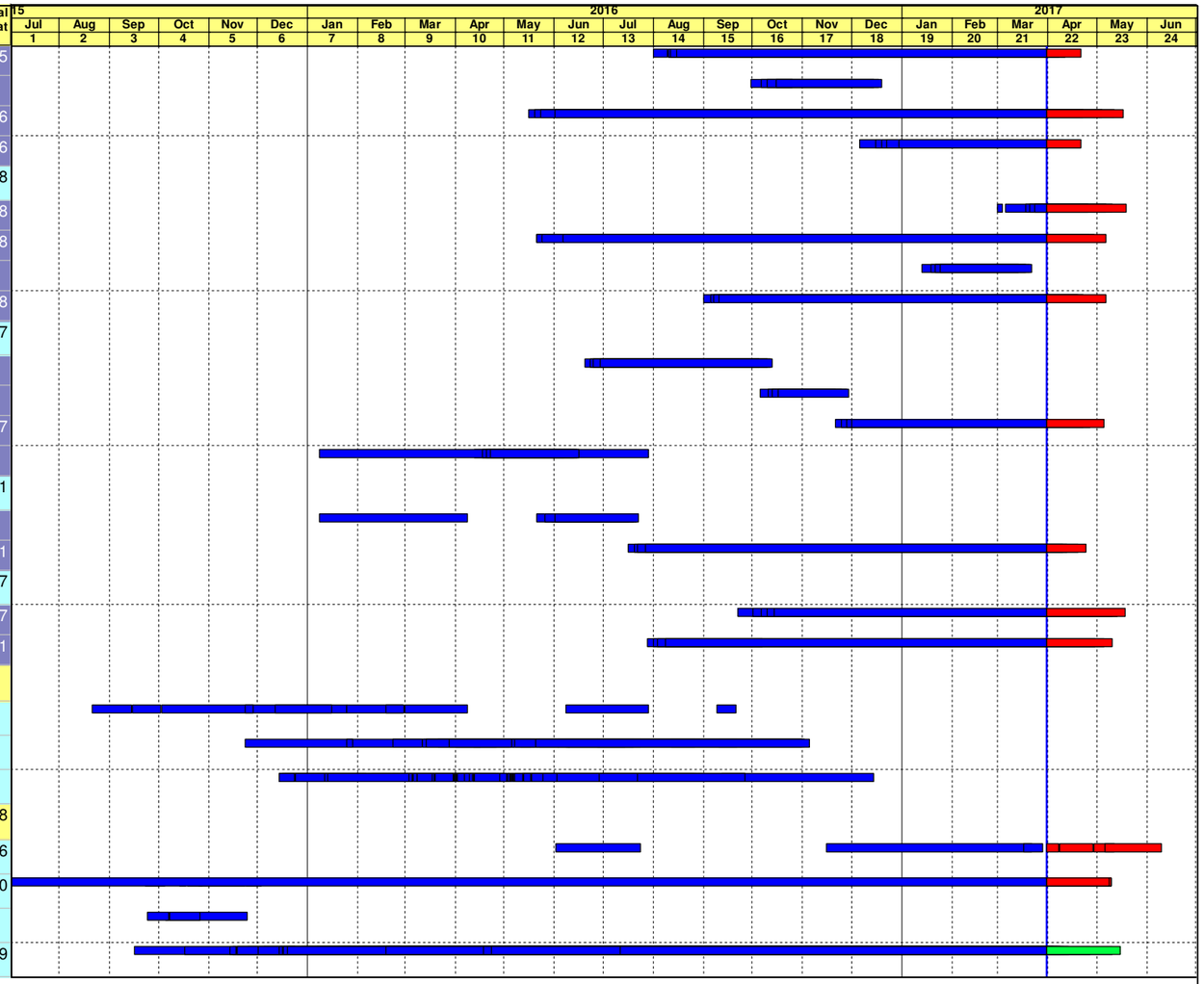
Ocean Park Tai Shue Wan Development

Site Formation and Foundation Works

Completion Works Programme

Date	Revision	Checked	Approved
17-May-16	-	TF	TT
30-Mar-17	Update		

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
	Footings between intakes	94	01-Aug-16 A	21-Apr-17	-215
	Footings near S30	146	30-Sep-16 A	19-Dec-16 A	
	Footing at North east Site (Part II)	69	16-May-16 A	17-May-17	-216
	Footing at North east Site (Part I)	53	06-Dec-16 A	21-Apr-17	-216
	Footings, North of Site (Package 2)	279	21-May-16 A	19-May-17	-218
	Footings at toe of North Site (Part I)	43	01-Mar-17 A	19-May-17	-218
	Footing at Temp. Haul Road (Part I)	59	21-May-16 A	06-May-17	-218
	Footings at toe of North Site (Part II)	35	13-Jan-17 A	22-Mar-17 A	
	Footing at Temp. Haul Road (Part II)	49	01-Sep-16 A	06-May-17	-218
	Footings, South of Site (Package 2 &3)	379	08-Jan-16 A	05-May-17	-207
	Footings, South of Site (Phase II)	52	20-Jun-16 A	13-Oct-16 A	
	Footings, South of Site (Phase III)	205	06-Oct-16 A	29-Nov-16 A	
	Footings, South of Site (Phase IV)	57	21-Nov-16 A	05-May-17	-207
	Footings, South of Site (Phase I)	78	08-Jan-16 A	28-Jul-16 A	
	Footings, Stream Area (Package 2 &3)	182	08-Jan-16 A	24-Apr-17	-191
	Footings, Stream Area (Part I)	182	08-Jan-16 A	22-Jul-16 A	
	Footings, Stream Area (Part II)	49	16-Jul-16 A	24-Apr-17	-191
	Footings, Existing EVA (Package 2 &3 &5)	50	28-Jul-16 A	18-May-17	-217
	Footings, Existing EVA (Part I)	45	22-Sep-16 A	18-May-17	-217
	Footings, Existing EVA (Part II)	46	28-Jul-16 A	10-May-17	-211
	Construction of New EVA	308	21-Aug-15 A	14-Dec-16 A	
	Flat EVA Section	306	21-Aug-15 A	20-Sep-16 A	
	Covered EVA Structure Section	230	23-Nov-15 A	05-Nov-16 A	
	Sloping EVA Section	214	14-Dec-15 A	14-Dec-16 A	
	Drainage Works	490	02-Jan-15 A	09-Jun-17	18
	1.2 m dia. Drainage under existing escalator	239	02-Jun-16 A	09-Jun-17	-236
	Sewage System Construction	464	02-Jan-15 A	09-May-17	-210
	Temporary Storm Drainage Diversion	37	24-Sep-15 A	24-Nov-15 A	
	Storm Drainage Construction	427	16-Sep-15 A	15-May-17	39



Ocean Park Tai Shue Wan Development

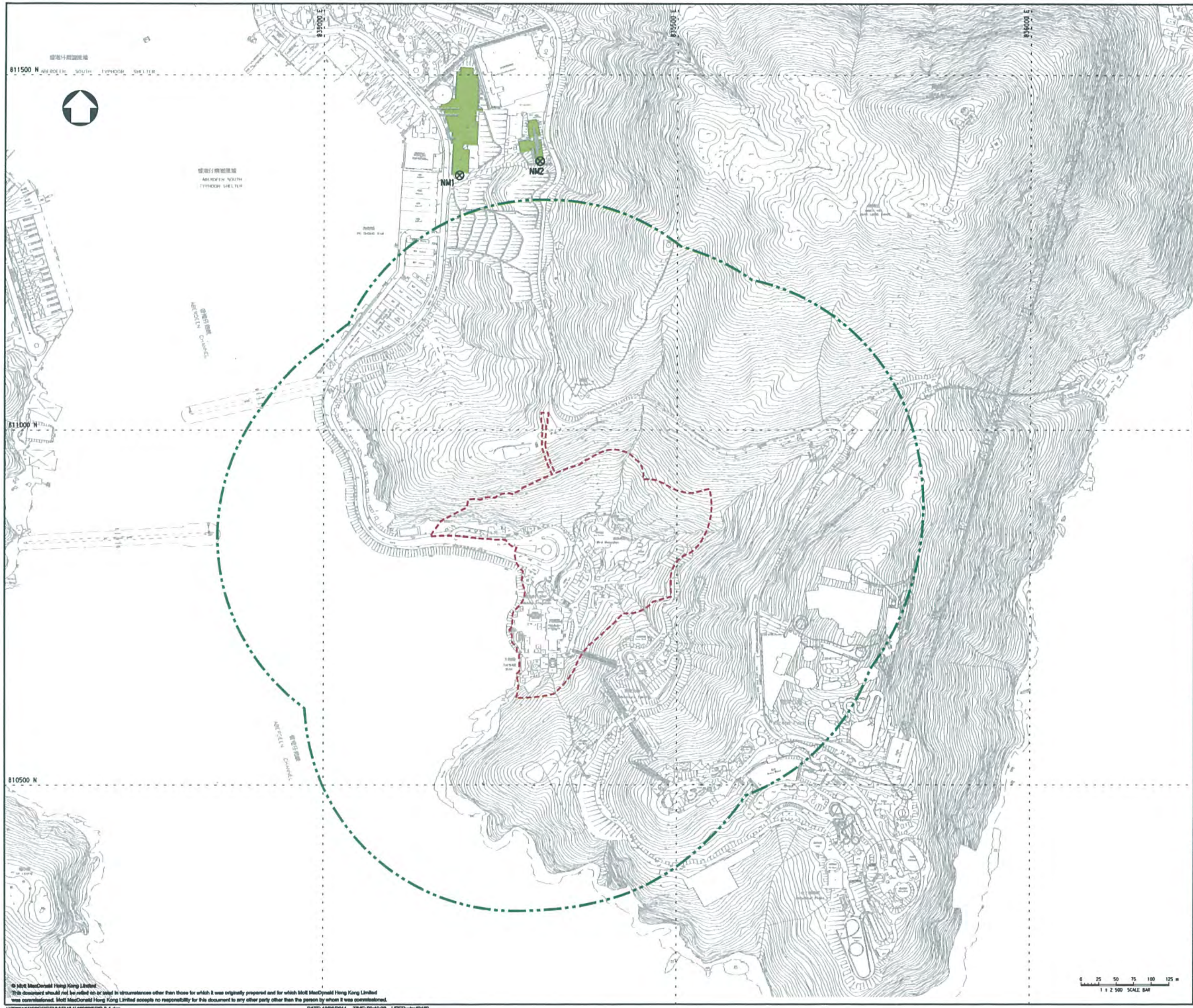
Site Formation and Foundation Works

Completion Works Programme

Date	Revision	Checked	Approved
17-May-16	-	TF	TT
30-Mar-17	Update		

Appendix D

Designated Monitoring Locations as Recommended in the Approved EM&A Manual



Notes

Key to symbols

300m ASSESSMENT AREA
PROJECT BOUNDARY
⊗ CONSTRUCTION NOISE MONITORING STATION

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P3	MAY 14	MING	GENERAL REVISION	FX	AFK
P2	MAR 14	MING	GENERAL REVISION	AM	AFK
P1	FEB 14	MING	FIRST ISSUE	AM	AFK

Mott MacDonald
20/F Two Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
T +852 2828 5757
F +852 2827 1823
W www.mottmac.com.hk

Client
Ocean Park Hong Kong

Project
TAI SHUE WAN DEVELOPMENT AT OCEAN PARK

Title
PROPOSED LOCATIONS OF CONSTRUCTION NOISE MONITORING STATIONS

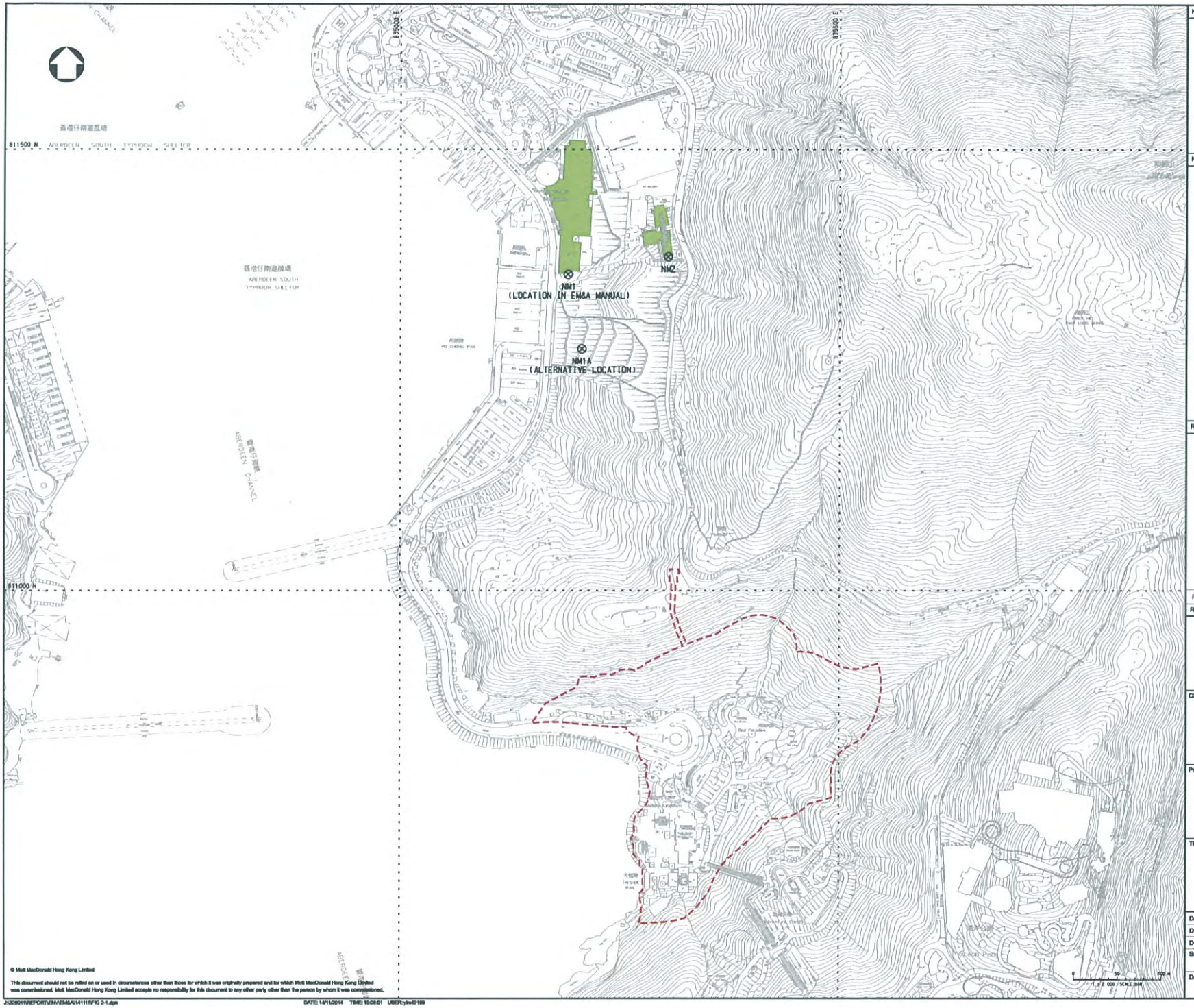
Designed	AM		Eng check	FW
Drawn	MING		Coordination	FW
Dwg check	AM		Approved	AFK
Scale at A1: 1:2500		Status: PRE		Rev: P3

Drawing Number
FIGURE 3.1

J:\328801\REPORT\EIA\M&A\160808\FIG 3-1.dgn DATE: 12/05/2014 TIME: 09:19:32 USER: ylm42169

Appendix E

Actual Locations of Impact Monitoring



Notes

Key to symbols

PROJECT BOUNDARY

CONSTRUCTION NOISE MONITORING STATION

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	NOV 14	MING	FIRST ISSUE	BW	AFK

Mott MacDonald

28/F AIA Kowloon Tower
Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
T +852 2828 5757
F +852 2827 1823
W www.mottmac.com.hk

Client

Ocean Park Hong Kong

Project

TAI SHUE WAN DEVELOPMENT AT OCEAN PARK

Title

LOCATIONS OF CONSTRUCTION NOISE MONITORING STATIONS

Designed	BW		Eng check	FW	
Drawn	MING		Coordination	FW	
Dwg check	BW		Approved	AFK	
Scale at A1	1:2000	Status	PRE	Rev	P1

Drawing Number

FIGURE 2.1

Appendix F

Calibration Certificate of Monitoring Equipment

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C161796
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-0662) Date of Receipt / 收件日期 : 22 March 2016

Description / 儀器名稱 : Sound Level Meter (EQ015)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 00142581
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 6 April 2016

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : H T Wong, Technical Officer

Certified By 核證 : K C Lee, Project Engineer

Date of Issue 簽發日期 : 7 April 2016

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C161796
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C160077
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.4	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L_A	A	Fast	94.00	1	94.4 (Ref.)
				104.00		104.4
				114.00		114.4

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.4	Ref.
			Slow			94.4	± 0.3

Certificate of Calibration
校正證書

Certificate No. : C161796
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_A	A	Fast	94.00	63 Hz	68.1	-26.2 ± 1.5
					125 Hz	78.2	-16.1 ± 1.5
					250 Hz	85.7	-8.6 ± 1.4
					500 Hz	91.1	-3.2 ± 1.4
					1 kHz	94.4	Ref.
					2 kHz	95.6	+1.2 ± 1.6
					4 kHz	95.4	+1.0 ± 1.6
					8 kHz	93.3	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_C	C	Fast	94.00	63 Hz	93.5	-0.8 ± 1.5
					125 Hz	94.2	-0.2 ± 1.5
					250 Hz	94.3	0.0 ± 1.4
					500 Hz	94.4	0.0 ± 1.4
					1 kHz	94.4	Ref.
					2 kHz	94.2	-0.2 ± 1.6
					4 kHz	93.6	-0.8 ± 1.6
					8 kHz	91.4	-3.0 (+2.1 ; -3.1)
					12.5 kHz	88.0	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 06015

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB :	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C162996
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-0843)

Date of Receipt / 收件日期 : 26 May 2016

Description / 儀器名稱 : Integrating Sound Level Meter (EQ065)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2337676
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C
Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 2 June 2016

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

Tested By 測試 : H T Wong, Technical Officer

Certified By 核證 : K C Lee, Project Engineer

Date of Issue 簽發日期 : 6 June 2016

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C162996
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C160077
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L_{AFP}	A	F	94.00	1	94.3

6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L_{AFP}	A	F	94.00	1	94.0	± 0.7

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L_{AFP}	A	F	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C162996
證書編號

6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L_{AFP}	A	F	94.00	1	94.0	Ref.
	L_{ASP}		S			94.1	± 0.1
	L_{AIP}		I			94.1	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L_{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L_{AFMax}				200 ms	105.0	-1.0 ± 1.0
	L_{ASP}		S		Continuous	106.0	Ref.
	L_{ASMax}				500 ms	102.0	-4.1 ± 1.0

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L_{AFP}	A	F	94.00	31.5 Hz	54.9	-39.4 ± 1.5
					63 Hz	67.9	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.0
					250 Hz	85.4	-8.6 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.8	-4.3 (+3.0 ; -6.0)

Certificate of Calibration
校正證書

Certificate No. : C162996
證書編號

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L_{CFP}	C	F	94.00	31.5 Hz	91.2	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.0	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
30 - 110	L_{Aeq}	A	10 sec.	4	1	1/10	110.0	100	100.2	± 0.5
						$1/10^2$		90	90.1	± 0.5
			60 sec.			$1/10^3$		80	79.8	± 1.0
			5 min.			$1/10^4$		70	69.8	± 1.0

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2812708

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB	: 31.5 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB : 1 kHz		: ± 0.10 dB (Ref. 94 dB)
114 dB : 1 kHz		: ± 0.10 dB (Ref. 94 dB)
Burst equivalent level		: ± 0.2 dB (Ref. 110 dB continuous sound level)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C162438
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-0843) Date of Receipt / 收件日期 : 5 May 2016

Description / 儀器名稱 : Acoustical Calibrator (EQ081)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 2326408
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 10 May 2016

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : H T Wong
Technical Officer

Certified By 核證 : K C Lee
Project Engineer

Date of Issue 簽發日期 : 11 May 2016

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C162438
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C153519
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.0		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C164098
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-0843) Date of Receipt / 收件日期 : 15 July 2016

Description / 儀器名稱 : Sound Level Calibrator (EQ085)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-73
Serial No. / 編號 : 10655561
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration

DATE OF TEST / 測試日期 : 27 July 2016

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification & user's specified acceptance criteria. (after adjustment)
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : H T Wong, Technical Officer

Certified By 核證 : K C Lee, Project Engineer

Date of Issue 簽發日期 : 28 July 2016

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C164098
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C163709
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

5.1.1 Before Adjustment

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	* 93.4	± 0.5	± 0.2

* Out of Mfr's Spec.

5.1.2 After Adjustment

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.5	± 0.2

5.2 Frequency Accuracy

5.2.1 Before Adjustment

UUT Nominal Value (kHz)	Measured Value (kHz)	User's Spec.	Uncertainty of Measured Value (Hz)
1	0.955	1 kHz ± 6 %	± 1

5.2.2 After Adjustment

UUT Nominal Value (kHz)	Measured Value (kHz)	User's Spec.	Uncertainty of Measured Value (Hz)
1	0.954	1 kHz ± 6 %	± 1

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C164098
證書編號

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Appendix G

Event and Action Plan

Event and Action Plan for Construction Noise

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action Level	1. Notify ER, IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the IEC and Contractor on remedial measures required; 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the investigation results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Advise the ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures.	1. Submit noise mitigation proposals to IEC and ER; 2. Implement noise mitigation proposals.
Limit Level	1. Inform IEC, ER, Contractor and EPD; 2. Repeat measurements to confirm findings; 3. Increase monitoring frequency; 4. Identify source and investigate the cause of exceedance; 5. Carry out analysis of Contractor's working procedures; 6. Discuss with the IEC, Contractor and ER on remedial measures required; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures; 5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC and ER within 3 working days of notification; 3. Implement the agreed proposals; 4. Submit further proposal if problem still not under control; 5. Stop the relevant portion of works as instructed by the ER until the exceedance is abated.

Event and Action Plan for Landscape and Visual Impact during Construction Phase

Action Level	Environmental Team Leader (ETL)	Independent Environmental Checker (IEC)	Engineer's Representative (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 action until rectification has been completed	1. Check report 2. Check the Contractor's working method 3. Discuss with the ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake remedial measures or any necessary replacement
Repeated Non-conformity	1. Identify source 2. Inform the IEC and the ER 3. Increase monitoring (site audit) frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If exceedance stops, cease additional monitoring (site audit)	1. Check report 2. Check the Contractor's working method 3. Discuss with the ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures	1. Notify the Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake remedial measures or any necessary replacement

Appendix H

Impact Monitoring Schedule

A. Impact Monitoring Schedule for the Reporting Month

Date		Noise Monitoring	Ecology Inspection	Landscape & Visual Inspection
Fri	17-Feb-17			
Sat	18-Feb-17			
Sun	19-Feb-17			
Mon	20-Feb-17	✓		
Tue	21-Feb-17			
Wed	22-Feb-17			
Thu	23-Feb-17			
Fri	24-Feb-17			
Sat	25-Feb-17			✓
Sun	26-Feb-17			
Mon	27-Feb-17			
Tue	28-Feb-17			
Wed	1-Mar-17			
Thu	2-Mar-17			
Fri	3-Mar-17	✓		
Sat	4-Mar-17			
Sun	5-Mar-17			
Mon	6-Mar-17			
Tue	7-Mar-17			
Wed	8-Mar-17			
Thu	9-Mar-17	✓		
Fri	10-Mar-17			
Sat	11-Mar-17			
Sun	12-Mar-17			
Mon	13-Mar-17		✓	
Tue	14-Mar-17			
Wed	15-Mar-17	✓		✓
Thu	16-Mar-17			
Fri	17-Mar-17			

Notes:

	Sunday or Public Holiday

B. Predicted Impact Monitoring Schedule for next Reporting Month

Date		Noise Monitoring	Ecology Inspection	Landscape & Visual Inspection
Sat	18-Mar-17			
Sun	19-Mar-17			
Mon	20-Mar-17			
Tue	21-Mar-17	✓		
Wed	22-Mar-17			
Thu	23-Mar-17			
Fri	24-Mar-17			
Sat	25-Mar-17			
Sun	26-Mar-17			
Mon	27-Mar-17	✓		
Tue	28-Mar-17			
Wed	29-Mar-17			
Thu	30-Mar-17			✓
Fri	31-Mar-17			
Sat	1-Apr-17			
Sun	2-Apr-17			
Mon	3-Apr-17			
Tue	4-Apr-17			
Wed	5-Apr-17			
Thu	6-Apr-17			
Fri	7-Apr-17	✓		
Sat	8-Apr-17			
Sun	9-Apr-17			
Mon	10-Apr-17			
Tue	11-Apr-17			
Wed	12-Apr-17			
Thu	13-Apr-17	✓	✓	✓
Fri	14-Apr-17			
Sat	15-Apr-17			
Sun	16-Apr-17			

	Sunday or Public Holiday

Appendix I

Database of Monitoring Result

NM1A - Slope near Victoria Shanghai Academy (VSA)					
Date	**Time**		**Construction Noise Monitoring Results (dB(A)**		
	Start	**Finish**	***Correction $L_{eq30min}$**	***Correction L10**	***Correction L90**
20-Feb-17	9:43	10:13	64.0	66.0	60.0
3-Mar-17	13:02	13:32	64.0	67.0	54.5
9-Mar-17	13:59	14:29	66.1	69.0	55.0
15-Mar-17	10:13	10:43	66.0	68.0	56.0

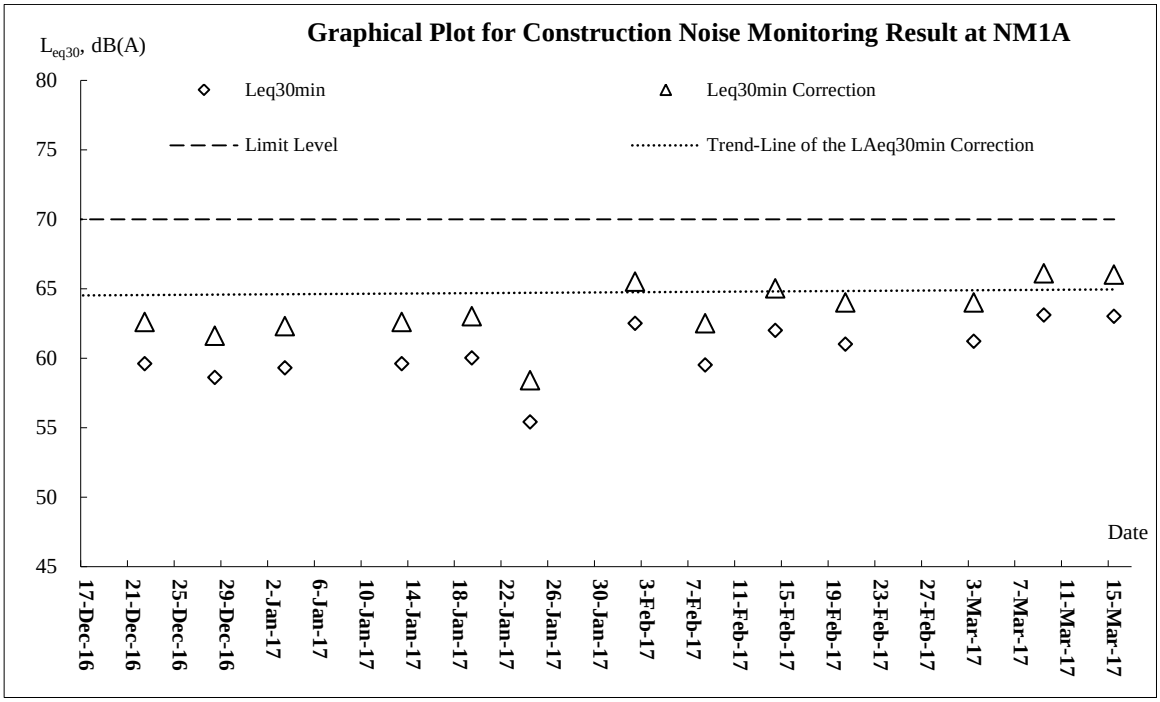
(*) A façade correction of +3dB(A) has been added according to acoustical principles and EPD guidelines
(#) Acceptable Noise Levels for school should be reduced to 65 dB(A) during examination period

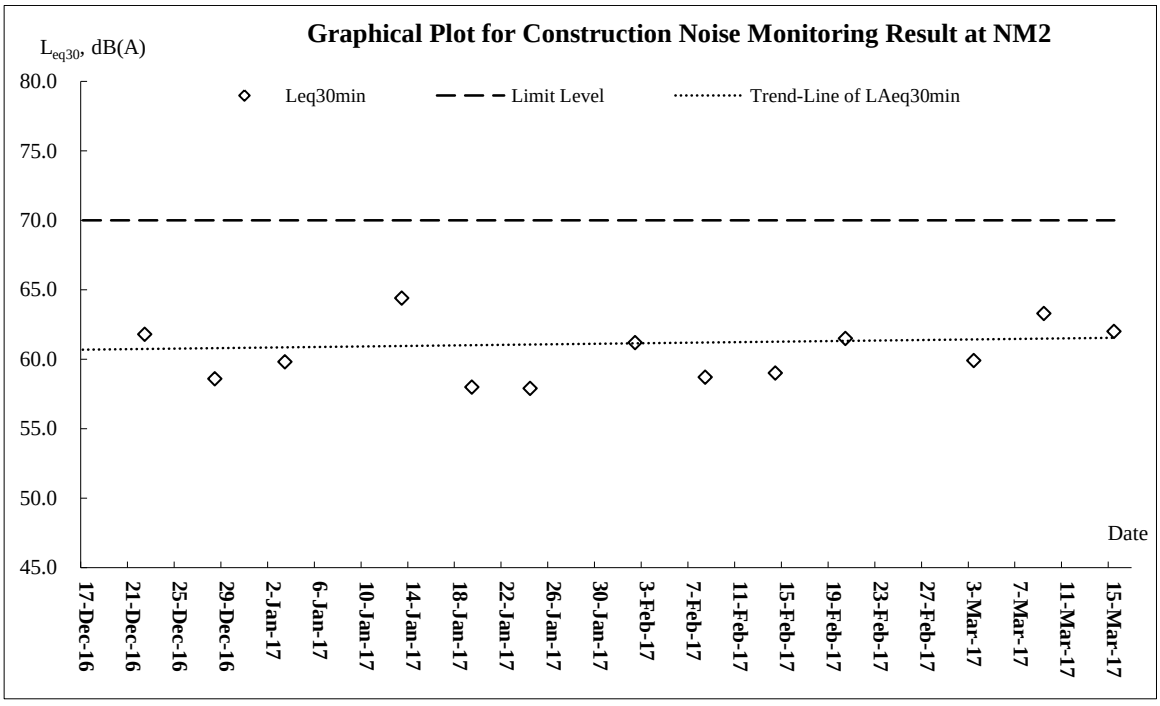
NM2 - Hong Kong Juvenile Care Centre (HKJCC)					
Date	**Time**		**Construction Noise Monitoring Results (dB(A)**		
	Start	**Finish**	**$L_{eq30min}$**	**L10**	**L90**
20-Feb-17	10:36	11:06	61.5	63.6	59.0
3-Mar-17 #	13:47	14:17	59.9	63.0	54.0
9-Mar-17 #	13:14	13:44	63.3	66.0	54.0
15-Mar-17	9:19	9:49	62.0	65.0	53.5

(#) Acceptable Noise Levels for school should be reduced to 65 dB(A) during examination period

Appendix J

Graphical Plots for Monitoring Result


Graphical Plot for Construction Noise Monitoring Result at NM1A
L_{eq30}, dB(A)
Leq30min
Leq30min Correction
Limit Level
Trend-Line of the LAeq30min Correction
80
75
70
65
60
55
50
45
Date
17-Dec-16
21-Dec-16
25-Dec-16
29-Dec-16
2-Jan-17
6-Jan-17
10-Jan-17
14-Jan-17
18-Jan-17
22-Jan-17
26-Jan-17
30-Jan-17
3-Feb-17
7-Feb-17
11-Feb-17
15-Feb-17
19-Feb-17
23-Feb-17
27-Feb-17
3-Mar-17
7-Mar-17
11-Mar-17
15-Mar-17


Graphical Plot for Construction Noise Monitoring Result at NM2
L_{eq30}, dB(A)
Leq30min
Limit Level
Trend-Line of LAeq30min
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
Date
17-Dec-16
21-Dec-16
25-Dec-16
29-Dec-16
2-Jan-17
6-Jan-17
10-Jan-17
14-Jan-17
18-Jan-17
22-Jan-17
26-Jan-17
30-Jan-17
3-Feb-17
7-Feb-17
11-Feb-17
15-Feb-17
19-Feb-17
23-Feb-17
27-Feb-17
3-Mar-17
7-Mar-17
11-Mar-17
15-Mar-17

Appendix K

Meteorological Data

Weather Conditions in this Reporting Month (17 February 2017 to 16 March 2017)

Date		Total Rainfall (mm)	Wong Chuk Hang Station			
			Mean Air Temp. (°C)	Wind Speed (km/h)	Mean Relative Humidity (%)	Wind Direction
Fri	17-Feb-17	0	18.7	7.4	71.2	W/SW
Sat	18-Feb-17	0	19.1	8.6	70.8	E/NE
Sun	19-Feb-17	0.3	17.4	5.4	77.5	E/NE
Mon	20-Feb-17	Trace	21.4	6.1	77.2	W/SW
Tue	21-Feb-17	4.6	18.8	12.2	82.2	E/NE
Wed	22-Feb-17	8	19.6	7.2	85.5	E/NE
Thu	23-Feb-17	Trace	17.7	8.2	82.5	N/NW
Fri	24-Feb-17	Trace	13.4	7.9	78.2	W/NW
Sat	25-Feb-17	0.7	12.2	5.8	70.8	E/SE
Sun	26-Feb-17	1.4	13.7	4.5	66.7	E/SE
Mon	27-Feb-17	0	17	11.7	55	E/NE
Tue	28-Feb-17	0	17.9	7.5	59.5	E/NE
Wed	1-Mar-17	0	18.5	6.5	61.7	E/SE
Thu	2-Mar-17	0	19	11.8	58	W/SW
Fri	3-Mar-17	0	17.3	9.9	56	E/NE
Sat	4-Mar-17	0	19.7	7.8	67	E/SE
Sun	5-Mar-17	0	21.1	5	83	E/SE
Mon	6-Mar-17	Trace	19.9	7	79.7	E/SE
Tue	7-Mar-17	Trace	18.7	10	65.7	E/NE
Wed	8-Mar-17	2.8	16	6	78.7	E/NE
Thu	9-Mar-17	Trace	17.2	10.7	66.2	E/NE
Fri	10-Mar-17	Trace	19.8	6.1	82	E/NE
Sat	11-Mar-17	Trace	17.8	7.5	84.6	E/NE
Sun	12-Mar-17	1	19.2	6.6	84.7	E/NE
Mon	13-Mar-17	0	21.8	8.5	83	E/SE
Tue	14-Mar-17	8.5	19.2	10.6	83.5	E/NE
Wed	15-Mar-17	Trace	16.7	9.8	63	E/NE
Thu	16-Mar-17	Trace	Maintenance	7.1	Maintenance	E/NE

Appendix L

Ecological Inspection Records

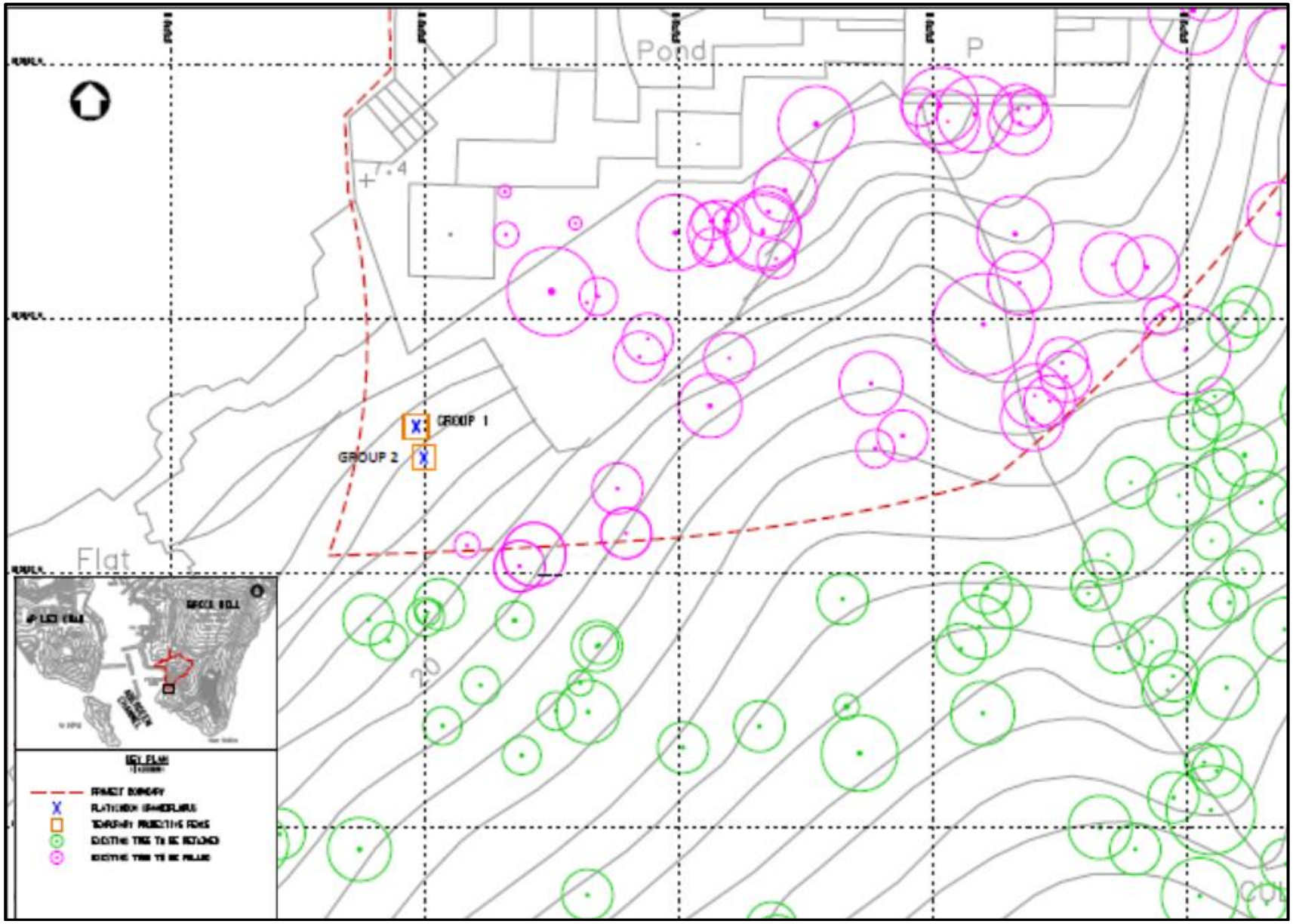
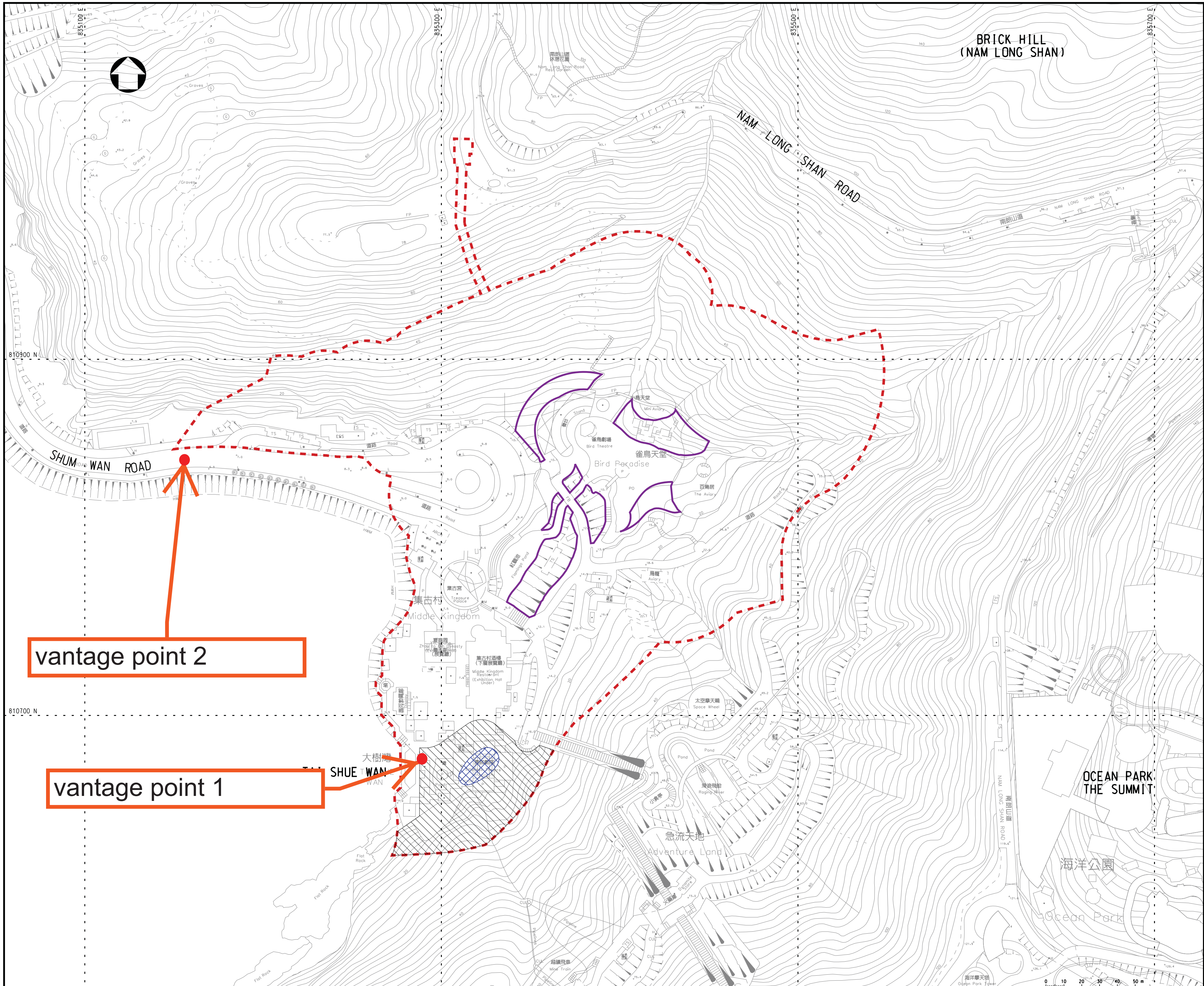


Figure 1 - Location of Two Groups of Platycodon Grandiflorus



Notes

Key to symbols

- PROJECT BOUNDARY
- INDICATIVE BOUNDARY OF ROOSTING SITES OF ARDEIDS
- PROPOSED ENHANCEMENT AREA (INDICATIVE)
- PROPOSED FLAMINGO POND
- VANTAGE POINT

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd

Client

Project

TAI SHUE WAN DEVELOPMENT AT OCEAN PARK

Title

LOCATION OF OBSERVATION POINT

Designed		Eng check	
Drawn		Coordination	
Dwg check		Approved	
Scale at A1: 1:1000	Status: PRE	Rev	

Drawing Number

FIGURE 2

J:\328011\REPORT\ENV\EM&A\150508\FIG 8-1.dgn DATE: 08/05/2014 TIME: 10:02:21 USER: ylm42169

	**Photo 1 - Group 1 of *Platycondon grandifloras***
	**Photo 2 – Group 2 of *Platycondon grandifloras***
	**Photo 3 – Currently Situation of Protective Fencing and Warning Sign**

Appendix M

Waste Flow Table

Paul Y. Construction Company, Limited

Contract No.: TSW-C004

Billing Account: 7022926

Month	Total Inert Waste Disposed to Public Fill (tonne)	Total Inert Waste Disposed to MTR SIL 904 (tonne)	Total Inert Waste Disposed to HY/2009/18 (tonne)	Mixed Waste to Sorting Facility (tonne)	Total Non-inert Waste Disposed Landfill (tonne)	Total Waste Paper Recycled (tonne)	Total Waste Plastic Recycled (tonne)	Total Waste Metal Recycled (tonne)
17/07/2015 to 16/08/2015	0.00	0.00	0.00	0.00	0.00	0.137	0.000	0.000
17/08/2015 to 16/09/2015	2298.12	0.00	0.00	0.00	3.89	0.000	0.000	17.415
17/09/2015 to 16/10/2015	1872.90	0.00	0.00	24.21	0.00	0.000	0.000	0.356
17/10/2015 to 16/11/2015	17731.23	1158.30	0.00	0.00	22.19	0.000	0.000	5.900
17/11/2015 to 16/12/2015	27042.16	1539.70	0.00	0.00	12.14	0.000	0.000	35.275
17/12/2015 to 16/01/2016	34694.02	1035.20	4506.70	0.00	16.02	0.000	0.000	17.321
17/01/2016 to 16/02/2016	35778.17	645.00	0.00	0.00	13.99	0.000	0.000	7.460
17/02/2016 to 16/03/2016	42710.92	554.70	0.00	0.00	15.23	0.000	0.000	13.660
17/03/2016 to 16/04/2016	26213.23	11.50	0.00	0.00	7.63	0.000	0.000	0.000
17/04/2016 to 16/05/2016	10010.87	28.60	0.00	0.00	23.87	0.000	0.000	18.877
17/05/2016 to 16/06/2016	13142.59	0.00	0.00	0.00	26.63	0.000	0.000	11.800
17/06/2016 to 16/07/2016	20374.94	0.00	0.00	0.00	23.58	0.000	0.000	50.450
17/07/2016 to 16/08/2016	21231.29	0.00	0.00	0.00	22.46	0.000	0.000	0.114
17/08/2016 to 16/09/2016	15477.89	0.00	0.00	0.00	42.15	0.000	0.000	0.000
17/09/2016 to 16/10/2016	57268.65	0.00	0.00	0.00	40.31	0.000	0.000	44.850
17/10/2016 to 16/11/2016	49856.60	0.00	0.00	0.00	75.25	0.000	0.000	3.970
17/11/2016 to 16/12/2016	19799.51	0.00	0.00	0.00	54.68	0.000	0.000	16.620
17/12/2016 to 16/01/2017	21431.39	0.00	0.00	0.00	40.40	0.000	0.000	5.260
17/01/2017 to 16/02/2017	10765.54	0.00	0.00	0.00	27.59	0.000	0.000	0.000
17/02/2017 to 16/03/2017	8337.55	0.00	0.00	0.00	15.22	0.000	0.000	6.830
Total:	**436037.57**	**4973.00**	**4506.70**	**24.21**	**483.23**	**0.137**	**0.000**	**256.158**
	tonne	tonne	tonne	tonne	tonne	tonne	tonne	tonne

Disposal weight was revised, weight of the truck itself was taken out

Appendix N

Implementation Schedule for Environmental Mitigation Measures

Appendix C. Implementation Schedule for Environmental Mitigation Measures

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1]				Relevant Legislation & Guidelines
					Des	Con	Op	Dec	
Cat.1 Key/specific proposed mitigation measure									
Noise Impact (Construction)									
5.7	3.2	**Selecting Quiet Plant** The actual SWL of quiet plant is less than the value specified in GW-TM for the same piece of equipment. It should be noted that the silenced PME taken from EPD's Quality Powered Mechanical Equipment (QPME) Inventory.	Within Project area / Duration of the construction phase / Prior to commencement of operation	Contractor appointed by OPC		✓			EIAO and Noise Control Ordinance
5.7	3.2	**Use of Movable Barriers** Movable noise barriers can be very effective in screening noise from particular items of plant when constructing the Project. Noise barriers located along the active works area close to the noise generating component of a PME could produce at least 10 dB(A) screening for stationary plant and 5 dB(A) for mobile plant provided that the direct line of sight between the PME and the NSRs is blocked.	Within Project area / Duration of the construction phase / Prior to commencement of operation	Contractor appointed by OPC		✓			EIAO and Noise Control Ordinance
Ecological Impact									
10.7	8.3	**Inspection of Active Ardeid Nest** Prior to site clearance works at the planting area abandoned for ardeid breeding, the area around the boundary of the ardeids roosting site as indicatively shown in Figure 8.1 should be inspected to confirm no active ardeid nest is present. If any active ardeid nest is observed, suitably sized buffer area should be established to avoid human or machinery disturbance until the nest is abandoned.	Indicative boundary of the ardeids roosting site within Project construction site (location indicated in Figure 8.1) / For once / Before site clearance	Qualified ecologist appointed by OPC	✓				EIAO-TM; HK Ordinance Cap. 170
10.7	8.3	**Inspection of Short-nosed Fruit Bat** As precautionary measure, prior to any proposed arboricultural works of the trees (particularly the Chinese Fan-palms), daytime	Project construction site / For once / Before arboricultural works of	ET appointed by OPC	✓	✓			EIAO-TM; HK Ordinance Cap. 170

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1]				Relevant Legislation & Guidelines
					Des	Con	Op	Dec	
		inspection should be carried out to confirm no Short-nosed Fruit Bat is present. If any Short-nosed Fruit Bat is observed roosting, suitably sized buffer area should be established around the tree to minimise human or machinery disturbance until the bat has left.	the trees						
10.7	8.3	**In-situ Preservation of Plant Species of Conservation Interest** During construction phase, protective fence for the identified flora species of conservation concern shall be erected and maintained.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			EIAO-TM
10.7	8.3	**Inspection of Ardeid Nest during breeding season** After commencement of construction phase, the Site should be monitored monthly in breeding season (April to July) to check for any potential breeding and nesting activities.	Project construction site / Throughout construction stage / Until completion of all construction activities	Qualified ecologist appointed by OPC		✓			EIAO-TM
10.7	8.2	**Timing of site clearance and tree felling works** Site clearance and tree felling works at the existing ardeid night roost location as shown in Figure 8.1 should be avoided during the peak wintering season of ardeids, i.e. between November and March.	Indicative boundary of the ardeids roosting site within Project construction site (location indicated in Figure 8.1) / Throughout construction stage / Until completion of site clearance and tree felling works within the boundary	Contractor appointed by OPC		✓			EIAO-TM
10.7	8.3	**Compensation for Ardeid Roosting Site** An enhancement area with following features should be provided as an alternative roosting site for ardeids. ▪ The location is at southern part of the Project area (location indicated in Figure 8.1) ▪ The enhancement area shall include a Flamingo Pond ▪ Native tree species *Macaranga tanarius* and *Celtis sinensis* and tree species which was used by ardeids for roosting *Mallotus paniculatus, Ficus hispida* and *Cratoxylum cochinchinense* shall be considered in the plan. ▪ Heavy standard sized trees shall be considered for planting to allow early establishment of the trees around the Flamingo	Southern part of Project construction site (location indicated in Figure 8.1) / Before and throughout construction stage / Until completion of Flamingo Pond construction and tree planting activities at that area	Qualified ecologist and Contractor appointed by OPC	✓	✓	✓		EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		Pond.							
10.7	8.3	**Compensation for Woodland Habitat** ▪ Provision of a Woodland Area of about 1.62 ha, which includes 0.84 ha woodland compensation on-site and 0.78 ha on-site woodland reinstatement, to mitigate for permanent loss of woodland habitat. ▪ In the woodland compensation area, whips should be planted with predominately native tree species similar to the affected woodland, such as *Celtis sinensis*, *Cratoxylum cochinchinense*, *Polyspora axillaris* and *Sterculia lanceolata*.	Location of Woodland Compensation Area indicated in Figure 8.2/ Before and throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓	✓		EIAO-TM
Landscape and Visual Impact (Construction)									
Table 12.13 (CP07)	Table 9.1 (CP07)	**Temporary Tree Nurseries** Temporary tree nurseries may be set up within the Project area at an early stage to allow small trees to grow during the construction period. By the time these trees are needed for landscape planting at the end of the construction phase, they will have grown larger, require minimal pruning and suffer much less damage during transplanting, as the moving distance from an on-site rather than off-site nursery will be much smaller. The temporary tree nurseries can also temporarily hold the existing trees to be transplanted if direct transplantation from their original locations to the final recipient location is impracticable. The locations of the temporary tree nurseries should be carefully selected so that the trees can also act as screen planting to block the views of the Project area from the VSRs during the construction phase, if practicable.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Table 12.13 (CP08)	Table 9.1 (CP08)	**Advance Planting** Advance planting should be undertaken at the earliest possible stage of the construction phase of the project. Plant species, preferably native ones, should be carefully selected to blend in with the existing preserved vegetation. Landscape planting in movable planters should also be considered as a temporary greening measure for the Project area.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Landscape and Visual Impact (Operation)									
Table 12.14 (OP04)	Table 9.2 (OP04)	**Green Roofs and Vertical Greening** Green Roofs and Vertical Greening should be provided where feasible and appropriate to screen and soften the hard edges of	Project building rooftops / During design stage / Throughout operation	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		building structures.	phase						
Table 12.14 (OP05)	Table 9.2 (OP05)	**Reprovision of Flamingo Pond** A pond is recommended to replace the demolished Flamingo Pond as compensation for the loss of semi-natural ponds, where wildlife, such as birds, can utilise.	Project area / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM
Table 12.14 (OP07)	Table 9.2 (OP07)	**Woodland Compensation** 1.53ha of affected woodland is recommended to be reinstated / compensated by 1.62ha of whip tree planting adjacent to the existing unaffected woodland and tall shrubland. Native species should be proposed as far as practicable to re-create a native landscape, restore the ecological habitats and blend in with the existing native vegetation.	Project area / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM
Cat. 2 Submission required post EIA stage									
Sewerage and Sewage Treatment Implications									
7.7	5.2	**Detailed Sewerage Design Report** In order to prevent septicity problems during operation phase, a detailed sewerage design report should be submitted to DSD for approval prior to installation of the rising mains.	Rising mains site / During design stage	Design Engineer	✓				Sewerage Manual Part 1
Ecological Impact (Construction)									
10.7	8.3	**Vegetation Survey for Plant Species of Conservation Interest** For precautionary purposes and to further ensure no flora species of conservation interest to be affected, a detailed vegetation survey need to conduct to the exact locations, number and condition of individuals of *Platycodon grandiflorus*.	Project construction site / For once / Before site clearance	Qualified botanist/ecologist of the ET appointed by OPC	✓				EIAO-TM; Hong Kong Ordinance Cap. 96
10.7	8.3	**Woodland Compensation Plan** A Woodland Compensation Plan shall be prepared and submitted to AFCD for approval no later than one month prior to commencement of site clearance. The plan shall include but not limited to the following: ▪ Timing of planting works ▪ Planting location ▪ Species, size and number of trees ▪ Monitoring methodology	Location of Woodland Compensation Area indicated in Figure 8.2/ Before construction stage / No later than one month prior to commencement of site clearance	Qualified botanist/ecologist of the ET appointed by OPC	✓				EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		▪ Action Plan							
Landscape and Visual Impact (Construction)									
Table 12.13 (CP05)	Table 9.1 (CP05)	**Transplantation of Existing Trees** Trees which are in direct conflict with the development proposals and suitable for transplantation should be transplanted as far as practicable. A tree transplantation proposal should be submitted together with the tree removal application. Trees proposed to be transplanted should preferably be transplanted from their original locations directly to their final recipient locations in one go. If this is infeasible, the trees should be held in a temporary tree nursery, preferably within the Project area, where the trees will be properly maintained.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM; LAO PN No. 07/2007
Landscape and Visual Impact (Operation)									
Table 12.14 (OP02)	Table 9.2 (OP02)	**Compensatory Tree Planting** Existing trees to be felled should be compensated as far as practicable. Native species should be proposed as far as practicable to re-create a native landscape, restore the ecological habitats and blend in with the existing native vegetation. A compensatory tree planting proposal should be submitted together with the tree removal application for approval by relevant authorities in accordance with LAO Practice Note No. 7/2007. It is recommended that approximately 608 heavy standard trees and approximately 18,202 whip trees could be planted on-site. The availability of off-site compensatory tree planting area is still subject to further investigation and agreement with relevant authorities.	Project area / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM; LAO PN No. 07/2007
Cat. 3 Good site practice/housekeeping measures under EM&A mechanism									
Air Quality Impact (Construction)									
3.9.1	2.2	**Dust Control Measures** To achieve compliance with the FSP, RSP and TSP criteria during the construction phase, good practices for dust control should be implemented to reduce dust impacts. The dust control measures are detailed as follows: ▪ Use of regular water spraying (once every 2.5 hours or 4 times per day) to reduce dust emissions from heavy construction activities (including ground excavation, earth moving, etc.) at all active works area exposed site surfaces and unpaved	Project construction site / Duration of the construction phase / Prior to commencement of operation	Contractor appointed by OPC		✓			EIA Recommendation and Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		roads, particularly during dry weather. ▪ Covering 80% of stockpiling area by impervious sheets and spraying all dusty material with water immediately prior to any loading transfer operations to keep the dusty materials wet during material handling at the stockpile areas Relevant dust control practices as stipulated in the Air Pollution Control (Construction Dust) Regulation should be adopted: Good Site Management ▪ Good site management is important to help reduce potential air quality impact down to an acceptable level. As a general guide, the Contractor should maintain high standards of housekeeping to prevent emissions of fugitive dust. Loading, unloading, handling and storage of raw materials, wastes or by-products should be carried out in a manner so as to minimise the release of visible dust emission. Any piles of materials accumulated on or around the work areas should be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas should be carried out in a manner minimising generation of fugitive dust emissions. The material should be handled properly to prevent fugitive dust emission before cleaning. Disturbed Parts of the Roads ▪ Main temporary access points should be paved with concrete, bituminous hardcore materials or metal plates and be kept clear of dusty materials; or ▪ Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet. Exposed Earth ▪ Exposed earth should be properly treated by compaction, hydroseeding, vegetation planting or seating with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies. Loading, Unloading or Transfer of Dusty Materials ▪ All dusty materials should be sprayed with water immediately prior to any loading or transfer operation so as							

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		to keep the dusty material wet. Debris Handling ▪ Any debris should be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides. ▪ Before debris is dumped into a chute, water should be sprayed onto the debris so that it remains wet when it is dumped. Transport of Dusty Materials ▪ Vehicles used for transporting dusty materials/spoils should be covered with tarpaulin or similar material. The cover should extend over the edges of the sides and tailboards. Wheel washing ▪ Vehicle wheel washing facilities should be provided at each construction site exit. Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels. Use of vehicles ▪ The speed of the trucks within the site should be controlled to about 10 km/hour in order to reduce adverse dust impacts and secure the safe movement around the site. ▪ Immediately before leaving the construction site, every vehicle should be washed to remove any dusty materials from its body and wheels. ▪ Where a vehicle leaving the construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle. Site hoarding ▪ Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground level should be provided along the entire length of that portion of the site boundary except for a site entrance or exit							
Noise Impact (Construction)									

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
5.7	3.2	**Good Site Practice** Good site practice and noise management can significantly reduce the impact of construction site activities on nearby NSRs. ▪ only well-maintained plant to be operated on-site and plant should be serviced regularly during the construction works; ▪ machines and plant that may be in intermittent use to be shut down between work periods or should be throttled down to a minimum; ▪ plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from the NSRs; ▪ mobile plant should be sited as far away from NSRs as possible; and ▪ material stockpiles and other structures to be effectively utilised, where practicable, to screen noise from on-site construction activities.	Project construction site / Duration of the construction phase / Prior to commencement of operation	Contractor appointed by OPC		✓			EIAO and Noise Control Ordinance
Noise Impact (Operation)									
5.7	3.3.2	**Fixed Plant Noise** With the adoption of the proposed maximum allowable SWLs, all representative NSRs is expected to comply with the relevant noise criteria for the daytime and evening time periods. No adverse fixed plant noise impact is anticipated. It is also recommended that the following noise reduction measures should be considered as far as practicable during design stage: ▪ choose quiet plant such as those which have been effectively silenced; ▪ include noise levels specification when ordering new plant (including chiller and E&M equipment); ▪ locate fixed plant / louvre away from any NSRs as far as practicable; ▪ locate fixed plant in walled plant rooms or in specially designed enclosures; ▪ locate noisy machine in a basement or a completely separate building;	Within Project area / Prior to operation phase / Duration of the operation phase / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓	✓	✓		EIAO and Noise Control Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		▪ install direct noise mitigation measures including silencers, acoustic louvres and acoustic enclosure where necessary; and ▪ develop and implement a regularly scheduled plant maintenance programme so that equipment is properly operated and serviced in order to maintain a controlled level of noise. Prior to the operation of the Project, noise commissioning tests for all major fixed noise sources should be conducted.							
5.7	3.3.2	**Open Air Entertainment Noise** With the adoption of the proposed maximum allowable SWLs, all representative NSRs is expected to comply with the relevant noise criteria for the daytime and evening periods, the following measures should be considered as far as practicable during stage: ▪ use small clusters of small power loudspeakers rather than a few large power loudspeakers; and ▪ loudspeakers should be pointed away from nearby NSRs.	Within Project area / Duration of the operation phase / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓	✓			EIAO and Noise Control Ordinance
Water Quality Impact (Construction)									
6.7	4.2	**Construction Site Runoff** The site practices outlined in ProPECC Note PN 1/94 should be followed as far as practicable in order to minimise surface runoff and erosion. The following measures are recommended to protect water quality of the inland areas: ▪ At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels, earth bunds or sand bag barriers should be provided on site to direct storm water to silt removal facilities. The design of the temporary on-site drainage system should be undertaken by the Contractors prior to the commencement of construction; ▪ Sand/ silt removal facilities such as sand/silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the TM standards under the WPCO. The design of efficient silt removal facilities should be based on the guidelines in	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			EIAO-TM; ProPECC Note PN 1/94; WPCO; TM-DSS

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		Appendix A1 of ProPECC Note PN 1/94. Sizes may vary depending upon the flow rate. The detailed design of the sand/silt traps should be undertaken by the Contractors prior to the commencement of construction; ▪ All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit should be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times; ▪ Measures should be taken to minimise the ingress of site drainage into excavations. If excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from site formation excavations should be discharged into storm drains via silt removal facilities; ▪ All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facility should be provided at construction site exit where practicable. Wash-water should have sand and silt settled out and removed regularly to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains; ▪ Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system; ▪ Manholes (including newly constructed ones) should be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and stormwater runoff being directed into foul sewers; ▪ Precautions should be taken at any time of the year when								

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		rainstorms are likely. Actions should be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC Note PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes; and, ▪ Bentonite slurries used on site should be reconditioned and reused wherever practicable. Temporary enclosed storage locations should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC Note PN 1/94 should be adhered to in the handling and disposal of bentonite slurries. The Contractor would be required to obtain a license from EPD under the WPCO for discharge to the public drainage system or the marine environment. Construction site discharge should be collected by the temporary drainage system installed by the Contractor and treated or desilted on-site to fulfil the WPCO discharge license requirements before discharge.							
6.7	4.2	**General Construction Activities** Best Management Practices (BMPs) should be implemented at the construction site, including proper handling, sorting and storage of construction solid waste, debris and refuse generated on-site prior to disposal. Stockpiles of cement and other construction materials should be kept covered when not being used. The Contractor should also follow the guidelines set in the "Pesticides Used for Outdoor Mosquito Control", published by AFCD in 2010, for mosquito control on site.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			EIAO-TM; ProPECC Note PN 1/94
6.7	4.2	**Expansion of Existing Storm U-Channel** Guidelines and measures summarised in ProPECC PN 1/94 for trenching activities should be implemented.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94
6.7	4.2	**Interception of Natural Streams** Guidelines and measures summarised in ProPECC PN 1/94 for excavation and stockpiling activities should be implemented.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94
6.7	4.2	**Site Formation Works** The construction programme should be properly planned to minimise excavation works during the wet season (April to September), temporarily exposed slope/soil surfaces should be	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		covered by a tarpaulin or other means, as far as practicable. Interception channels should be provided (e.g. along the crest/edge of the excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm. Measures will be taken to minimise water ingress into the excavation. Diverting any water from the excavated areas to on-site wastewater treatment facilities for treatment prior to discharge should also be performed. Other measures that need to be implemented before, during and after rainstorms are summarised in ProPECC PN 1/94.							
6.7	4.2	**Construction of Sewage Sump Pit and Rising Mains** Measures for excavation works summarised for site formation works should also be implemented during construction of the sewage sump pit. During the laying of rising mains, guidelines and measures summarised in ProPECC PN 1/94 for trenching activities should be performed. Concrete water generated from the construction of the concrete support should be collected and treated with the wastewater treatment facilities prior to discharge.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94
6.7	4.2	**Accidental Spillage** The Contractor should register as a chemical waste producer if chemical wastes are produced from construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes. This will prevent contamination of top soil and water pollution due to construction site runoff. Maintenance of vehicles and equipment, involving activities with potential for leakage and spillage, should only be undertaken within areas appropriately equipped to control these discharges. Oils and fuels should only be stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to any nearby storm water drain, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94; Waste Disposal Ordinance (Cap 354); Waste Disposal (Chemical Waste) (General) Regulation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows: ▪ Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. ▪ Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents. ▪ Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area.							
6.7	4.2	**Sewage Effluent from the Construction Workforce** The Contractor should provide temporary sanitary facilities, such as portable chemical toilets within the construction site to handle sewage from the workforce. The Contractor has the responsibility to ensure that chemical toilets are used and properly maintained, and that licensed Contractors are employed to collect and dispose of the waste off-site at approved locations.	Project construction site / Duration of the construction phase	Contractor appointed by OPC		✓			ProPECC Note PN 1/94
Water Quality Impact (Operation)									
6.7	4.2	**Runoff from Road Surfaces** Road drainage system design has already included silt traps in the gully inlets to remove silt and grit before the runoff enters the public storm water drainage system. Silt traps should be regularly checked and maintained to ensure efficient operation.	Within Project area / During operation phase	OPC/Operator appointed by OPC			✓		EIAO-TM; WPCO
6.7	4.2	**Runoff from On-site Planting Area** Watering of plants on site should always be performed before application of pesticides, herbicides and fertilizers. Regular training should also be provided to frontline staff on the appropriate treatment and disposal of pesticides, herbicides and fertilizers.	Within Project area / During operation phase	OPC/Operator appointed by OPC			✓		EIAO-TM; WPCO; TM-DSS
Waste Management Implications (Construction)									
8.5.1.1	6.2	**Good Site Practice**	Project construction site / Throughout construction	Contractor		✓			Waste Disposal Ordinance; Waste

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		Recommendations for good site practices during the construction activities include: ▪ Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site ▪ Training of site personnel in proper waste management and chemical handling procedures ▪ Provision of sufficient waste disposal points and regular collection of waste ▪ Appropriate measures to minimise windblown litter and dust/ odour during transportation of waste by either covering trucks or by transporting wastes in enclosed containers ▪ Stockpiles of C&D materials should be kept covered by impervious sheets to avoid wind-blown dust ▪ All dusty materials including C&D materials should be sprayed with water immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling at the stockpile areas ▪ Provision of wheel washing facilities before the trucks leaving the works area so as to minimise dust introduction to public roads ▪ Well planned delivery programme for offsite disposal such that adverse environmental impact from transporting the inert or non-inert C&D materials is not anticipated	stage / Until completion of all construction activities	appointed by OPC					Disposal (Chemical Wastes) (General) Regulation; and ETWB Technical Circular (Works) No. 19/2005 Environmental Management on Construction Site
8.5.1.2	6.2	**Waste Reduction Measures** Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include: ▪ Sort inert C&D materials to recover any recyclable portions such as metals ▪ Segregation and storage of different types of waste in different containers or skips to enhance reuse or recycling of	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		materials and their proper disposal ▪ Encourage collection of recyclable waste such as waste paper and aluminium cans by providing separate labelled bins to enable such waste to be segregated from other general refuse generated by the work force ▪ Proper site practices to minimise the potential for damage or contamination of inert C&D materials ▪ Plan the use of construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste							
8.5.1.3	6.2	**Inert and Non-inert C&D materials** In order to minimise impacts resulting from collection and transportation of inert C&D materials for off-site disposal, the inert C&D materials should be reused on-site as fill material as far as practicable. In addition, inert C&D materials generated from excavation works could be reused as fill materials in local projects that require public fill for reclamation. The surplus inert C&D materials will be disposed of at the Government's PFRFs for beneficial use by other projects in Hong Kong. The C&D materials generated from general site clearance should be sorted on site to segregate any inert materials for reuse or disposal of at PFRFs whereas the non-inert materials will be disposed of at the designated landfill site. In order to monitor the disposal of inert and non-inert C&D materials at respectively PFRFs and the designated landfill site, and to control fly-tipping, it is recommended that the Contractor should follow the DEVB Technical Circular (Works) No.6/2010 for Trip Ticket System for Disposal of Construction & Demolition Materials issued by Development Bureau. In addition, it is also recommended that the Contractor should prepare and implement a Waste Management Plan detailing their various waste arising and waste management practices in accordance with the relevant requirements of the ETWB Technical Circular (Works) No. 19/2005 Environmental Management on Construction Site.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			Waste Disposal Ordinance ; DEVB Technical Circular (Works) No.6/2010 for Trip Ticket System for Disposal of Construction & Demolition Materials; and ETWB Technical Circular (Works) No. 19/2005 Environmental Management on Construction Site
8.5.1.4	6.2	**Chemical Waste** If chemical wastes are produced at the construction site, the	Project construction site / Throughout construction	Contractor appointed by OPC		✓			Code of Practice on the Packaging

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		Contractor will be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the "Code of Practice on the Packaging Labelling and Storage of Chemical Wastes". Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidising, irritant, toxic, harmful, corrosive, etc. The Contractor should use a licensed collector to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. Potential environmental impacts arising from the handling activities (including storage, collection, transportation and disposal of chemical waste) are expected to be minimal with the implementation of appropriate mitigation measures as recommended.	stage / Until completion of all construction activities						Labelling and Storage of Chemical Wastes; Waste Disposal (Chemical Waste) (General) Regulation
8.5.1.5	6.2	**General Refuse** General refuse should be stored in enclosed bins or compaction units separated from inert C&D materials. A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from inert C&D materials. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			Waste Disposal Ordinance and Public Health and Municipal Services Ordinance - Public Cleansing and Prevention of Nuisances Regulation
8.5.1.6	6.2	**Floating Refuse** Provide general refuse collection points on site can minimise the refuse contaminate the marine environment. The construction contractors will be required to regularly check and clean any refuse trapped or accumulated along the artificial seawall. Such refuse will then be stored and disposed of together with the general refuse.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			Waste Disposal Ordinance
Waste Management Implications (Operation)									
8.5.2.1	6.2	**General Refuse** General refuse should be collected on daily basis and delivered	Project area / On a regular basis /	Contractor appointed by OPC			✓		Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		to the refuse collection point accordingly. A reputable waste collector should be employed to remove general refuse regularly to avoid odour nuisance or pest/vermin problem. Sufficient recycling containers are recommended to be provided at suitable locations of the Project to encourage recycling of such waste as aluminium cans, plastics and waste paper.	Throughout operation stage						
8.5.2.2	6.2	**Chemical Waste** If chemical wastes are expected to be produced during the operation phase, the Project Proponent should register with the EPD as a chemical waste producer and follow the guidelines stated in the "Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes". Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidising, irritant, toxic, harmful, corrosive, etc. Licensed collector should be deployed to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Project area / On a regular basis / Throughout operation stage	Contractor appointed by OPC			✓		Code of Practice on the Packaging Labelling and Storage of Chemical Wastes; Waste Disposal (Chemical Waste) (General) Regulation
8.5.2.3	6.2	**Floating Refuse** Regular inspection should be carried out along the artificial seawall of the Project boundary for any entrapment or accumulation of floating refuse. Where an appreciable amount of floating refuse is found on the artificial seawall during the inspection, the locations of such refuse will be recorded and arrangements with the project proponent will immediately be made to collect and clear the refuse from the seawall.	Project area / On a regular basis / Throughout operation stage	Contractor appointed by OPC			✓		Waste Disposal Ordinance
Land Contamination (Construction)									
9.6	7.2	In any case where contaminated soil is identified after the commencement of works, a Contamination Assessment Plan (CAP) is required to be prepared for EPD's endorsement prior to	Project construction site / Before construction stage	Contractor appointed by OPC	✓				Guidance Note for Contaminated Land Assessment and Remediation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		the site investigation. The Contamination Assessment Report (CAR) and/ or Remediation Action Plan (RAP) should be prepared for EPD's approval after the site investigation. If land contamination is confirmed, remediation works should be carried out according to the approved RAP. A Remediation Report (RR) should also be prepared for EPD's endorsement to demonstrate that the clean-up of the contaminated land is completed. No construction work or development of site should be carried out before the approval of the RR.							Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management Practice Guide for Investigation and Remediation of Contaminated Land
9.6	7.2	If contaminated soil is identified, the following mitigation measures are for the excavation and transportation of contaminated materials (if any): ▪ To minimise the incidents of construction workers coming in contact with any contaminated materials, bulk earth-moving excavation equipment should be employed; ▪ Contact with contaminated materials can be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (especially when working directly with contaminated material), provision of washing facilities and prohibition of smoking and eating on site; ▪ Stockpiling of contaminated excavated materials on site should be avoided as far as possible; ▪ The use of any contaminated soil for landscaping purpose should be avoided unless pre-treatment was carried out; ▪ Vehicles containing any excavated materials should be suitably covered to reduce dust emissions and/or release of contaminated wastewater; ▪ Truck bodies and tailgates should be sealed to prevent any discharge; ▪ Only licensed waste haulers should be used to collect and transport contaminated material to treatment/disposal site and should be equipped with tracking system to avoid fly	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		tipping; ▪ Speed control for trucks carrying contaminated materials should be exercised. ▪ Observe all relevant regulations in relation to waste handling, such as Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354) and obtain all necessary permits where required; and ▪ Maintain records of waste generation and disposal quantities and disposal arrangements.							
Landscape and Visual Impact (Construction)									
Table 12.13 (CP01)	Table 9.1 (CP01)	**Minimisation of Construction Period** The construction programme should be carefully designed to minimise the length of the construction period.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Table 12.13 (CP02)	Table 9.1 (CP02)	**Minimisation of Works Areas** The footprint of the proposed hard structures as well as the extent of temporary works areas should be minimised as far as practicable.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Table 12.13 (CP03)	Table 9.1 (CP03)	**Construction Site Controls** Construction site controls should be enforced, where possible, to ensure that the landscape and visual impacts arising from the construction phase activities, such as the storage of materials, the location and appearance of site accommodation, etc. are minimised.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Table 12.13 (CP04)	Table 9.1 (CP04)	**Preservation of Existing Vegetation** The development proposal should avoid disturbance to existing vegetation as far as practicable. A formal tree removal application should be submitted for approval by relevant authorities in accordance with LAO PN No. 07/2007 "Tree Preservation and Tree Removal Application for Building Development in Private Projects" during the detailed design phase of the Project. Where possible, all trees which are not in direct conflict with the development proposals should be retained *in situ*.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM; LAO PN No. 07/2007
Table	Table	**No Intrusion Zones**	Project construction site /	Contractor	✓	✓			EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
12.13 (CP06)	9.1 (CP06)	Where practicable, "no intrusion zones" should be designated within the Project area for protection of existing vegetation. Durable boundary fences should be erected to clearly demarcate these "no intrusion zones". No construction activities, storage of materials and vehicular access will be allowed within the "no intrusion zones" to prevent potential damage to canopies and root zones of vegetation.	Throughout construction stage / Until completion of all construction activities	appointed by OPC					
Table 12.13 (CP09)	Table 9.1 (CP09)	**Construction Site Hoardings** Two types of hoardings should be considered. One is used for areas in close contact with visitors and for areas where visual intrusion is a key concern. It should be graphical and thematic, and visually 'impermeable' to block the views of construction activities from the VSRs. The other is used for areas to be viewed at a distance. It should be subtle and camouflaged so that it blends in with the surrounding landscape.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC	✓	✓			EIAO-TM
Table 12.13 (CP10)	Table 9.1 (CP10)	**Dust and Erosion Control for Exposed Soil** Exposed soil shall be covered or "camouflaged" and watered frequently. Areas that are expected to be left with bare soil for a long period of time should be hydroseeded and / or covered with suitable protective fabrics.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			EIAO-TM
Table 12.13 (CP11)	Table 9.1 (CP11)	**Appearance of Construction Plant / Machinery** To minimise the visual intrusion of construction activities to visitors and other VSRs, a suitable colour scheme of construction machines and plants should be adopted where possible.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			EIAO-TM
Table 12.13 (CP12)	Table 9.1 (CP12)	**Construction Lighting Control** All security floodlights for construction sites should be equipped with adjustable shield, frosted diffusers and reflective covers, and be carefully controlled to minimise light pollution and night-time glare to the VSRs.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			EIAO-TM
Table 12.13 (CP13)	Table 9.1 (CP13)	**Appearance of Construction Workers** To protect Ocean Park's image, construction workers should be required to enter the park areas with their helmets and safety vests properly stored or carried in non-transparent bags. They should also dress properly and cleanly.	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor appointed by OPC		✓			EIAO-TM
Landscape and Visual Impact (Operation)									

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
Table 12.14 (OP01)	Table 9.2 (OP01)	**Sensitive Design and Disposition** All proposed hard structures should be sensitively designed in a manner that responds to the existing and planned landscape context, and minimises potential adverse landscape and visual impacts. The structural design should seek to reduce the apparent visual mass through the use of natural materials such as wooden frame and semi-transparent panels. Subdued tones should be considered for the colour palette with non-reflective finishes to reduce glare effect. Site specific measures, such as the disposition of the key structures closer to the northern slopes, the design of building forms as extension along the existing slope topography, the use of concave roof form and the location of ride platforms on or near the slopes to minimise structural support, should also be considered for better integration with the surroundings and minimisation of potential visual impacts.	Project buildings / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM
Table 12.14 (OP03)	Table 9.2 (OP03)	**Enhancement Planting** Other than compensatory tree planting, additional trees, shrubs, groundcovers and lawn should also be considered to maximise greening within the redevelopment area.	Project area / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM
Table 12.14 (OP06)	Table 9.2 (OP06)	**Responsive Lighting Design** Overall lighting design would carefully consider a reasonable level of functional and thematic lighting with due consideration of possible light pollution and night-time glare to the surroundings. Consideration shall be made by the lighting designers to the following measures: ▪ Lighting shall be designed with due consideration of mounting height and direction of light fixtures so as not to point directly towards any sensitive receiver. ▪ Lighting shall be arranged with due consideration of reflectance so as to avoid glare effect. ▪ Lighting shall be regularly monitored during operation. ▪ Lights located adjacent or in proximity to neighbours shall be carefully designed to prevent possible light intrusion. ▪ Lighting operation schedule shall specify only lights necessary for security to be left on after business hours. ▪ Paving materials should be selected as necessary to reduce	Project area / During design stage / Throughout operation phase	Design Architect / Contractor appointed by OPC	✓		✓		EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stage[1] Des	Con	Op	Dec	Relevant Legislation & Guidelines
		potential glare from surface reflectance. ▪ Particular attention should be paid to the use of lighting having a high intensity or harsher tone (e.g. metal halide lamps). ▪ Lights shall generally be models having precise cut-off range (such as full cut-off optics where available and practicable) and if necessary be fitted with adjustable anti-glare shields.							

Remarks:
1. Des – Design Stage, Con – Construction Stage, Op – Operation, Dec - Decommissioning

Appendix O

Supplementary Information

保華建築有限公司
Paul Y. Construction Company, Limited

Our Ref. : TSW-C004/030/09/L/2707s

Date : 9 January 2017

The Project Manager's Representative **By Hand & Aconex**
Ocean Park Corporation
TSW-C004 PMR's Office,
180 Wong Chuk Hang,
Aberdeen, Hong Kong

Attn: Mr. MC TSOI – Project Manager Representative for TSW Contract C004

Dear Sir,

Contract No.:TSW-C004
Ocean Park Tai Shue Wan Development
Site Formation and Foundation Works
AUES Report on Preliminary Assessment Test of Abnormal Soil & Sediment on working site

We refer to your issuance of PMI-029 dated 21 December 2016 to carry out Chemical and Biological Content Test to the dark clay material at Raft B of Package 5. According to the ad-hoc meeting among OPC, PY & AUES (minutes of meeting is enclosed), we have followed your instruction (Attachment A) to arrange AUES on sampling and preparation of a Preliminary Report for the captioned (Attachment B).

At present, it is quite fortunate that the preliminary finding on this test sample is uncontaminated. However, as only one single test was being instructed & performed, this is not a true representative sample on the abnormal soil & sediment discovered within vast extent of working site.

Based on the submitted test result, the Environmental Consultant also advised that Full Testing Regime should be carried out in accordance with Hong Kong SAR Government published "Guidance Note for Contaminated Land Assessment and Remediation", and therefore present testing regime should accordingly be determined & directed by relevant Authority EPD. We would be grateful if you could inform EPD accordingly, and thereafter instruct the Contractor to proceed.

Yours faithfully,
For and on behalf of
PAUL Y. CONSTRUCTION CO., LTD.

Thomas TANG
Contractor's Representative

TT/FW/kl
Encl.

香港九龍觀塘鴻圖道五十一號保華企業中心十六樓 電話: +852 2831 8338 傳真: +852 2833 1030
16/F, Paul Y. Centre, 51 Hung To Road, Kwun Tong, Kowloon, Hong Kong Tel: +852 2831 8338 Fax: +852 2833 1030 www.pyengineering.com
Fax no.: 2468 2107

TSW-C004
Ocean Park Tai Shue Wan Development
Site Formation and Foundation Work

Date: 02 December, 2016 (Friday)

Time: 15:30 – 17:00

Venue: Site Office Meeting Room

Meeting Notes of Footing Material of Raft B at Package 5

Present:

Ocean Park Corporation (OPC):

M. C. Tsoi (MC) — Project Manager Representative (PMR)

PAUL Y (PY):

Alex Wong — Assistant Project Manager
Andrew Hui — Environmental Manager
Ben Lam — Senior Environmental Officer
Sarah Law — Assistant Environmental Officer

Action-United Environmental Services & Consulting (AUES) :

T. W. Tam (TW) — Environmental Consultant

Item	Description	Action by
1.0	**Observed**	
1.1	The local material of Raft B at Package 5 was found abnormal about two weeks ago, the volume of the captioned material was unknown (still observed below founding level) **which is deviated from the original contract provisions** (see Remark #1)	Noted
1.2	Alex Wong reported that the local material is dark in color, sticky (clay), with odor but not oily on top and layer upon layer (black, gray, and black). *[Post Meeting Note:* *(Remark #1) As depicted in OPC Geotechnical Report, Section 8 Foundation, "Based on the results of the site investigation, no compressible Fill, Alluvium or Marine Deposit layers are found within the proposed foundation footprint……..The Marine Deposit layers encountered at the site were outside the foundation footprint…."]*	Noted

……/2

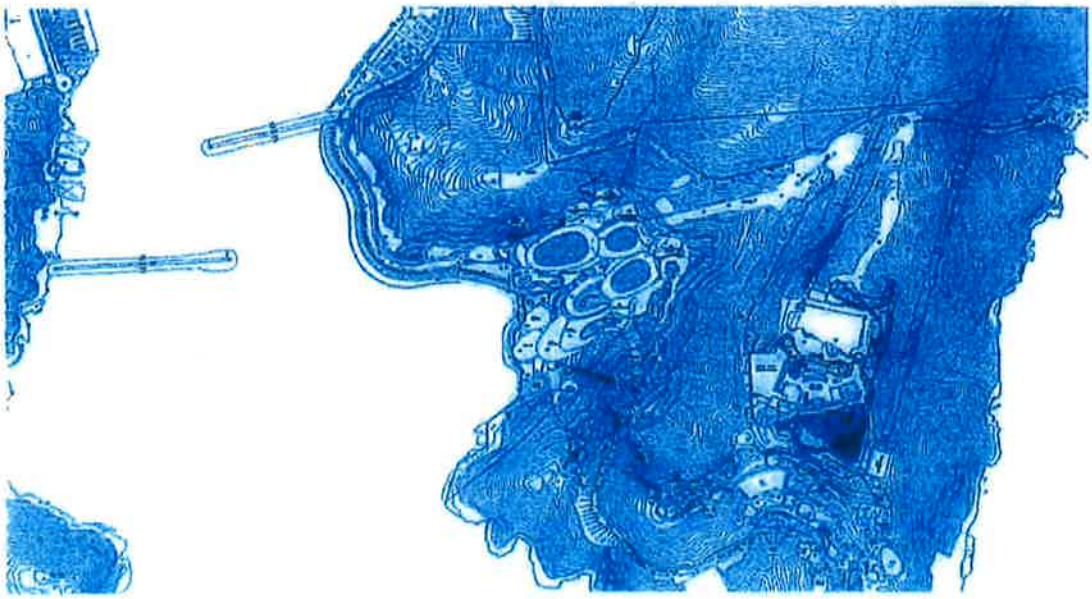
Item	Description	Action by
2.0	**Identify Past Land Uses and Activities**	
2.1	MC stated that reclamation works have been conducted two times before.	Noted
2.2	TW appraised the prophase location may be **Shipyard** (see Remark #2).	Noted
2.3	OPC will look for any related historical and background information for review (aerial photos, location plan, literature, etc.) which will be helpful to classify whether the material is sediment or contaminated soil.	MC
2.4	MC mentioned the GI data (2~3 years ago) was observed only gray rock in level -2 in the location, and the SPT was over 50. *[Post Meeting Note:* *(Remark #2) As depicted in OPC Geotechnical Report, Aerial Photograph Interpretation Report for Ocean Park Development, Section 1 Introduction, "....The toe area of study was originally agricultural area and shipyard from 1949 to 1981.....")]*	Noted
3.0	**Preliminary Soil Test**	
3.1	OPC may give instruction to PAUL Y. to conduct **a preliminary test** of the material to classify whether it is sediment or contaminated soil at this stage. One surrounding mix up sample (around 1 kg) from ten spots would be enough for a preliminary test - (see Remark #3).	OPC
3.2	TW mentioned that the parameters for the preliminary test should be under Technical Circular (Works) No. 34/2002 and Guidance Note for Contaminated Land Assessment and Remediation.	Noted
3.3	TW estimated the time of the preliminary test (test and report) would be at least 3 weeks (excluding test for Dioxins (not recommended) which the test will be conducted in Australia).	Noted
3.4	TW will provide a quotation for the preliminary soil sampling and testing (including reports) - (see Remark #4). *[Post Meeting Note:* *(Remark #3) : OPC issued PMI-029 to carry out "Chemical and biological contest test to the dark clay material at Raft B" as per Attachment A.* *(Remark #4) : AUES furnished testing report in early January 2017 as per Attachment B]*	TW
4.0	**Further Action**	
4.1	TW reminded that different disposal location for different type of sediment.	Noted
4.2	TW reminded that for the contaminated soil, the time for getting the dumping permit approved by EPD would take some time.	Noted
5.0	**Any Other Business**	
5.1	OPC may consider change of design of the affected footing at the captioned location.	Noted

-END-

Ekra Hoppold JACOBS MEINHARDT MVA Aedas

OCEAN PARK CORPORATION
OCEAN PARK TAI SHUE WAN DEVELOPMENT

GEOTECHNICAL REPORT



REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
C	22-12-2014	Final	WL	MJL	LHS
B	27-11-2014	Final	WL	MJL	LHS
A	29-09-2014	Final	WL	MJL	LHS
-	14-07-2014	Final	WL	MJL	LHS
Company Name: Jacobs China Limited			DOCUMENT NO. IAC_TSWD005_SB5_RP-0010		C

JACOBS

JAC_TSWD005_SB5_RP0010
Rev C
December 2014

Ocean Park Corporation
Ocean Park Tai Shue Wan Development

Geotechnical Report

Approved for issue by:

Leslie H Swann

Position: Registered Geotechnical Engineer

Date: December 2014

Ocean Park Corporation
Project Development
180 Wong Chuk Hang Road
Aberdeen
Hong Kong

Jacobs China Limited
15th Floor, Cornwall House
Taikoo Place, 979 King's Road
Quarry Bay
Hong Kong, China

Slope Type	Slope No.	FOS	Affected Facilities	CTL (Note 1)	Required FOS	Meets Current Standards (Y/N)	Mitigation Works
	failure						
	15NW-B/FR54						
Fill Slope with Retaining Wall	Overall Wall Sliding failure Wall Overturning failure	1.226 1.51 2.19	Existing EVA at crest	1 (Note 2)	1.2 1 (Note 3) 1 (Note 3)	Y Y Y	Upgrading work is not required
Slope Type	**Slope No.**	**Affected Facilities**	**Result from Rock Joint Mapping and Kinematic Analysis**				
Rock Slope	15NW-B/C288	Open Area at toe	No Planar, wedge or toppling failure were identified from the kinematic analysis. No loose blocks were identified on site. Therefore the slope is stable, no mitigation measure is required. The rock joint mapping record and kinematic analysis is attached in Appendix L.				Rock joint mapping shall be carried out during site formation for stability review

Note 1: CTL = Consequence-To-Life
Note 2: Based on WBTC No. 13/99. For EVA, CTL is taken as 1.
Note 3: Based on factored load and material parameters

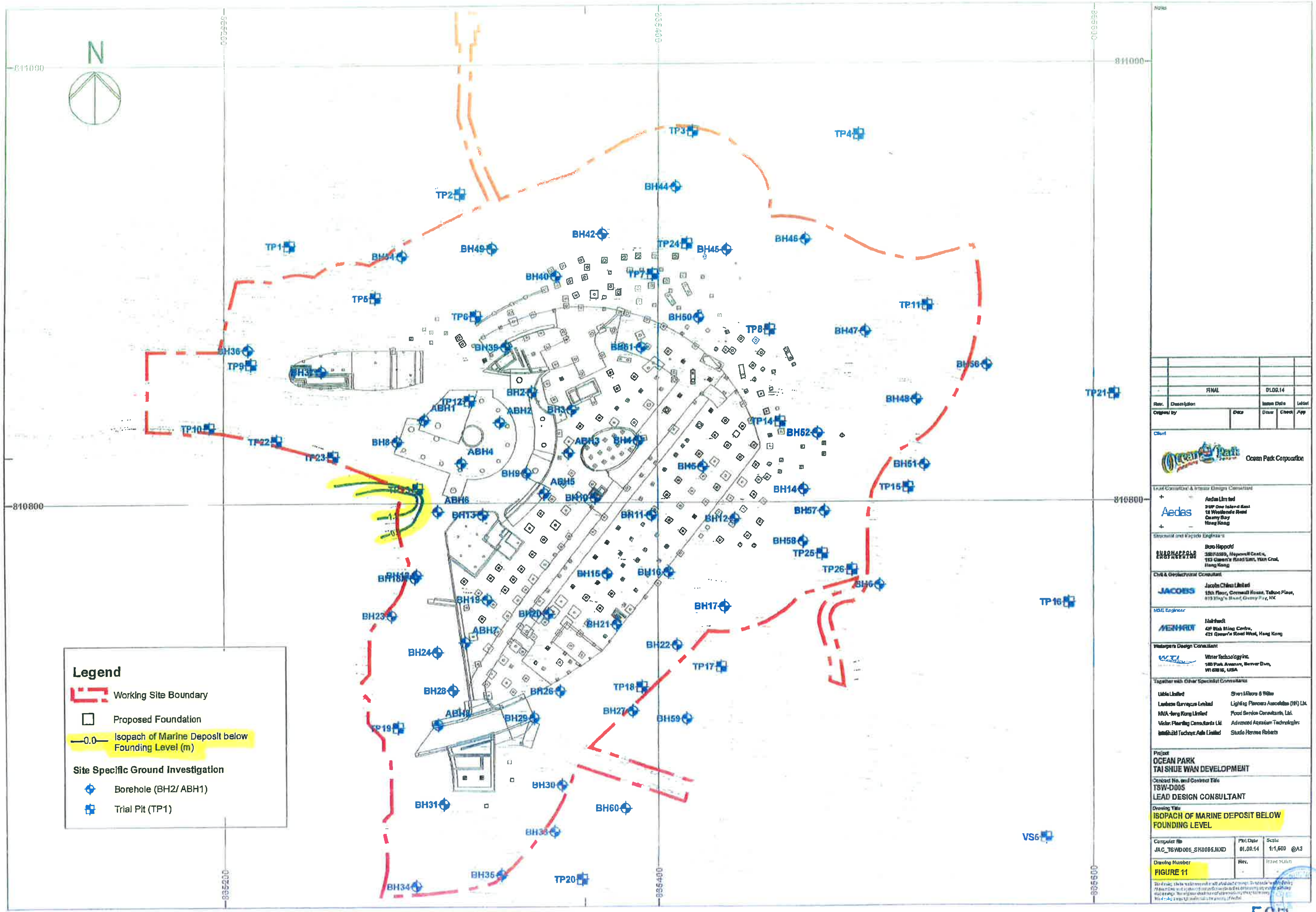
For slope 15NW-B/F85, 15NW-B/C178 and 15NW-B/C179, the FOS is less than the required FOS of 1.2, soil nail design has been carried out and was included in the Report JAC_TSWD005_SB5_RP-0027. The design approach of loose fill has been adopted for the slope 15NW-B/F85. For the fill slope 15NW-B/F52, the stability analysis indicated that FOS is greater than 1.2, however site investigation has been proposed for detailed study and review of stability assessment. Upgrading works shall be carried out if the FOS of 15NW-B/F52 is found not up to standard after the site investigation and review during the site formation stage.

The stability assessment is attached in **Appendix K.**

8 FOUNDATIONS

Based on the results of the site investigation, no compressible Fill, Alluvium or Marine Deposit layers are found within the proposed foundation footprint (See **Figures 10** to **12** and **Figures 17** and **18**). Although thin Alluvium was encountered in ABH4 within the footprint, the material comprised cobbles. The Marine Deposit layers encountered at the site were outside the foundation footprint. Grade IV and better rock is typically encountered at a shallow depth within the foundation footprint particularly on and near the hillsides and shallow foundations (generally pads and local rafts) have been proposed for the development.

For the basement level (The basement comprises three portions with base of slab at +6.725mPD, +6.8mPD and +7.8mPD). Typical founding level for the basement is +5.5mPD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ABH4
ABH5
ABH6
ABH7
VS6
Legend
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Proposed Foundation
Isopach of Marine Deposit below Founding Level (m)
Site Specific Ground Investigation
Borehole (BH2/ ABH1)
Trial Pit (TP1)
FINAL
01.09.14
Ocean Park Corporation
Aedas
JACOBS
Project
OCEAN PARK
TAI SHUE WAN DEVELOPMENT
Contract No. and Contract Title
TSW-D005
LEAD DESIGN CONSULTANT
Drawing Title
ISOPACH OF MARINE DEPOSIT BELOW FOUNDING LEVEL
Computer file
JAC_TSWD005_SK0086.MXD
01.09.14
1:1,500 @A3
Drawing Number
FIGURE 11

1. Introduction

The study area is located on the natural hillside below Nam Long Shan Road and facing Tai Shue Wan. An aerial photograph interpretation (API) has been carried out as part of desk study for the purpose of establishing the site formation history. A summary of the site formation history made from an interpretation of available aerial photographs taken between 1945 and 2012.

Reclamation of Tai Shue Wan was formed in 1983 and 1988 for the construction of Ocean Park and Shum Wan Road. The toe area of study area was originally agricultural area and shipyard from 1949 to 1981. The site formation and reclamation were commenced in 1982 and was completed in 1984. Further development of Ocean Park at Tai Shue Wan was continuous until present.

2. Occurrence of photolineaments/fault

Three major inferred photolineaments (P1, P2 and P3) were identified within the site boundary. P1 was in NNE-SSW trending, P2 was in NE-SW trending while P3 was in E-W trending (see Plate 1).

3. Detailed API Observations

Year	Photograph Ref. No.	Altitude (feet)	Observations	Plate No.
1945	Y00336	20000	The study area was undeveloped. Two drainage lines (D1, D2) are running down to Tai Shue Wan. They are in the direction of north-south and northeast-southwest trending. Nam Long Shan Road was formed. Several slope's surface erosion were observed on the downslope side along the Nam Long Shan Road. Construction site is located on the peak to the southeast of Tai Shue Wan.	1
1949	Y01094-5	8600	Agricultural area was developed at the toe of natural hillside facing Tai Shue Wan. Surface trimming was associated with the construction of Nam Long Shan Road. The construction site to the southeast of Tai Shue Wan was in progress. A dam was under construction on the head of drainage line D2.	2
1961	Y04698-9	30000	There is no significant change on the agricultural area near Tai Shue Wan. The construction site to the southeast of Tai Shue Wan was completed. Several buildings were located on the peak. The construction of dam on the head of drainage line D2 was completed.	3
1963	Y06787-90, Y06774-5, Y06863-4	2700	No significant changes on the Agricultural area are apparent. Surface erosion was observed on the downslope side of Nam Long Shan Road.	-
1973	3703-4	6000	A large portion of agricultural area was abandoned. Half of the beach was covered by vegetation. No significant changes on the natural hillside are apparent.	4
1974	9661-2	12500	No significant changes are apparent on the study area.	-
1975	11674-5	12500	No significant changes are apparent on the natural hillside facing Tai Shue Wan and the area at the	5

Year	Photograph Ref. No.	Altitude (feet)	Observations	Plate No.
			toe. The development of Ocean Park was evident to the southeast of Tai Shue Wan. The original buildings were demolished. The original buildings were demolished. Nam Long Shan Road was under modification. Two roads were construction above and below Nam Long Shan Road. Fill slope (15NW-B/FR12) was formed below Nam Long Shan Road.	
1976	12830-2, 12840-2	4000	The modification (extended part) of Nam Long Shan Road was in progress. The development of Ocean Park was in progress. No significant changes are apparent on the natural hillside facing Tai Shue Wan and the area at the toe.	-
1977	19741-2	4000	The modification of Nam Long Shan Road and construction of Ocean Park were in progress. No significant changes are apparent on the natural hillside facing Tai Shue Wan. Shipyard is located on the beach. No significant changes on the shape of coastline are apparent.	6
1978	23706-7	4000	Shipyard is still located on the beach. No significant changes on the natural hillside facing Tai Shue Wan were apparent. The modification of Nam Long Shan Road and development of Ocean Park were completed.	7
1979	24627-8	12500	No significant changes are apparent.	-
1980	29930-1	4000	No significant changes are apparent.	-
1981	38946-7	10000	No significant changes on the natural hillside are apparent. The agricultural area at the toe of hillside was abandoned. The shipyard was demolished.	8
1982	40965-6	4000	Further development of Ocean Park (later named as Treasure Palace, Bird Paradise and Adventure Land) was evident at the toe of natural hillside. The agricultural area at the toe of natural hillside was removed associated with the site formation of Ocean Park. Reclamation was commenced at Tai Shue Wan. The construction site extended uphill towards the south.	9
1983	47773-4	4000	Construction of further development of Ocean Park, reclamation for Ocean Park at Tai Shue Wan and extension of Shum Wan Road were in progress.	10
1984	56747-8	4000	Reclamation and further development of Ocean Park were completed.	11
1985	A038897-8	4000	No significant changes are apparent.	-
1986	A06111-3	4000	No significant changes are apparent. Further extension of Bird Paradise (Aviary and Bird Theatre) to the east was evident.	12
1987	A10410-1	4000	Construction of Aviary and Bird Theatre were completed. Construction (Middle Kingdom) to the south of Treasure Palace was evident.	13
1988	A14554-5	4000	Second reclamation was evident to the west of Middle Kingdom. Construction of Middle Kingdom was in progress. A	14

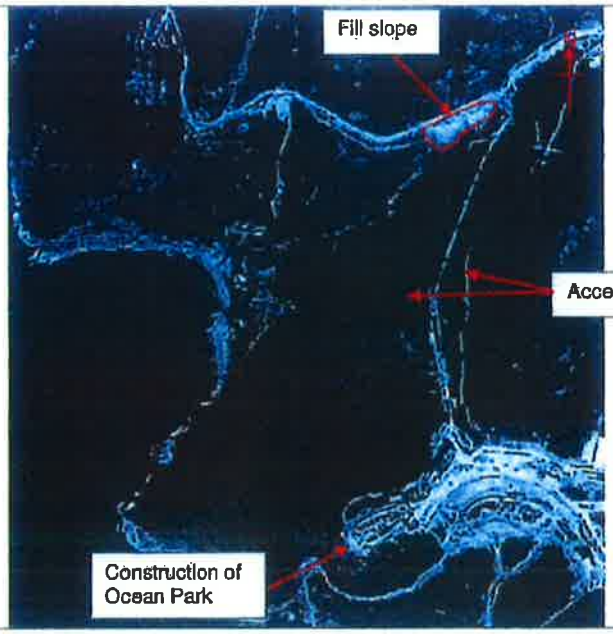


Plate 5: 1975 aerial photograph no. 11674

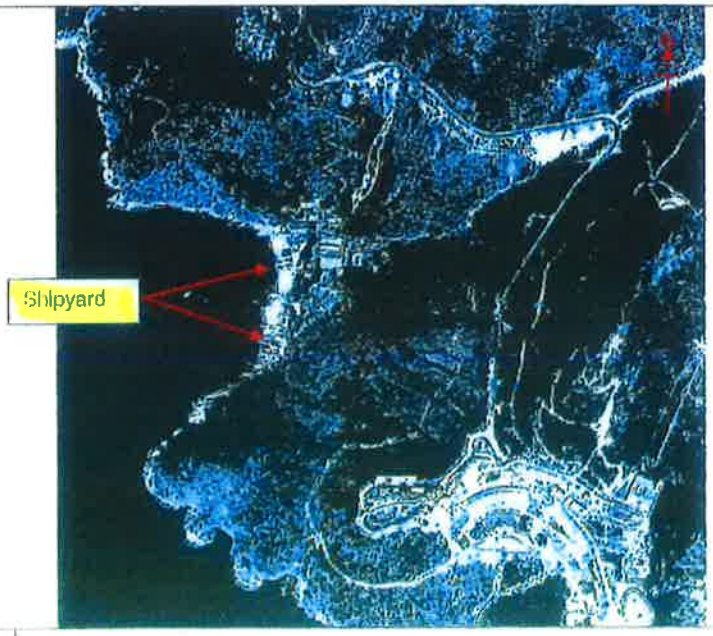


Plate 6: 1977 aerial photograph no. 19742

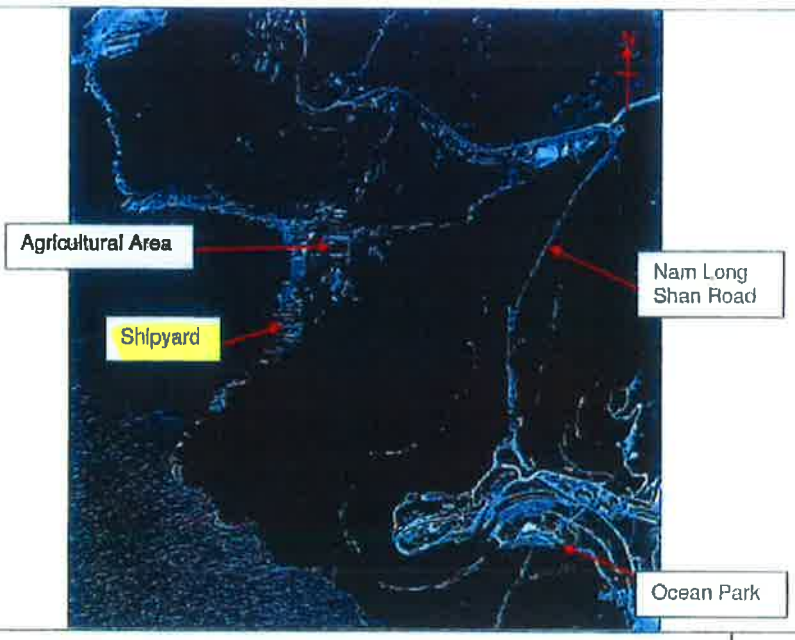


Plate 7: 1978 aerial photograph no. Y08408

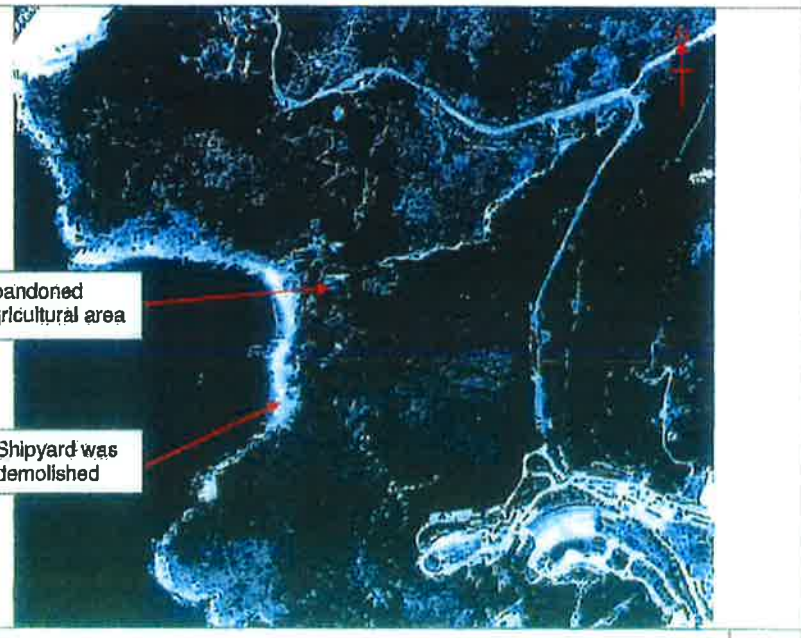


Plate 8: 1981 aerial photograph no. 38946

Attachment A

(OPC issued PMI-029)

Ocean Park
Project Development Division
180 Wong Chuk Hang,
Aberdeen, Hong Kong.

PROJECT MANAGER'S INSTRUCTION

No. PMI/TSWC004/029

Our Ref. TSWC004/462/0589

Paul Y. Construction Company, Limited
16/F, Paul Y Centre
51 Hung To Road
Kwun Tong
Kowloon

Attention: Mr. Thomas Tang

Dear Sirs,

Ocean Park Tai Shue Wan Water World Project
Contract No. TSW-C004 – Site Formation and Foundation Works

PMI/TSWC004/029 – Testing and Storage of Dark Clay Material

Pursuant to Clause 52.1 of the General Conditions of Contract, you are instructed to carry out the following works.

1. Chemical and biological content test to the dark clay material at Raft B
2. Setup temporary storage area for dark clay material storage

Signed _____
MC Tsoi
Project Manager's Representative

Date 21 DEC 2016

AW/MC/PW/wl
Encl.

cc:
Ocean Park – Mr Arthur Wong, Malad Lo, Stanley Leung, Calvin Sit, CK Ng, Penny Wan, Master file
RSS Team – Mr MC Tsoi, Isaac Tsao, Yip King Sun, Issac Chan, Marco Hsu
Aedas – Ms Elita Seow, Mr Paul Hamilton
Langdon & Seah – Mr Steven Tang

Attachment B

(AUES Preliminary Report
for a Single Test
as instructed under PMI-029)

Contractor Submission Form

Ocean Park Tai Shue Wan Development
Contract No. TSW-C004 – Site Formation and Foundation Works

To: Project Manager's Representative – Mr. MC Tsoi

Title of Submission: Preliminary Assessment Report - Dark Material Located on Working Site

Submission No.: TSWC004/CSF/ENV/001663

In accordance with Specification Clause(s) **Particular Specification Section** _____,
We submit the following document:-

( ) Material	( ) General Obligations
( ) Shop Drawing	( ) Safety & Health
( ) Sample	(✓) Environmental
( ) Programme	( ) Quality
( ) Method Statement	( ) Testing Report

Purpose of Submission ☐ For Review ☐ For Information ☒ For Record
Type of Submission ☐ Civil & Structural ☐ Architectural ☐ E&M ☒ Others

Details:

PY reference no. TSW-C004/030/02.1/L/4099s

Remark:
The attached Preliminary Assessment Report was originally submitted to OPC on 09th January 2017 as Attachment B in TSW-C004/030/09/L/2707s. We now submit an update version due to IEC's comment on typo and the terms used. Also Section 4.3 was added.

Please respond by: _____ **Urgent** ☐

Mr. Thomas Tang / Contractor's Representative

12 APR 2017
Date

DARK MATERIAL LOCATED ON WORKING SITE

AUES Reference:	TCS00744/14/600/R0106v3
Contract Name:	TSW-C004 Ocean Park Tai Shue Wan Development, Site Formation and Foundation Works
Sampling Location:	Ocean Park Tai Shue Wan Development Area
Main Contractor:	Paul Y. Construction Company, Limited
Sample Matrix:	Dark Material
Attention:	Mr. Ben Lam

1. INTRODUCTION

1.1 Due to the discovery of dark material was found on the site, therefore Paul Y with the Engineer of Ocean Park Corporation undertaken site meeting on 2 December 2016 to discuss its disposal requirements and criteria. Finally decision was made to carry out preliminary assessment as considered to further disposal approach.

1.2 Currently, there are two guidelines which shown below, issued by the SAR Hong Kong Government is used to assess the similar soil disposal.

A. Guidance Note for Contaminated Land Assessment and Remediation

B. Practice Note for Authorized Persons and Registered Structural Engineers 252 "Management Framework for Disposal of Dredged/Excavated Sediment" (hereinafter "**PNAP ADV-21**")

1.3 Dark material sampling as ordered by Paul Y is undertaken on 12 December 2016. To accordance with two guidelines, the recommendation chemicals analytical are listed below:

a. **Heavy Metal**: Antimony, Arsenic, Barium, Cadmium, Chromium III & VI, Cobalt, Copper, Lead, Manganese, Mercury, Molybdenum, Nickel, Silver, Tin and Zinc

b. **Petroleum Carbon Ranges:** Fractions C6-C8, Fractions C9-C16 and Fractions C17-C35

c. **Volatile Organic Compounds (VOCs)**: Acetone, Benzene, Bromodichloromethane, 2-Butanone, Chloroform, Ethylbenzene, Methyl tert-Butyl Ether, Methylene Chloride, Styrene, Tetrachloroethene, Toluene, Trichloroethene and Xylenes (Total)

d. **Semi-volatile Organic Compounds (SVOCs)**: Acendphthene, Acenaphthylene, Anthracene, Benze(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, bis-(2-Ethylhexyl)phthalate, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Hexachlorobenzene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene, Phenol and Pyrene

e. **Others**: Polychlorinated Biphenyls (PCBs), Cyanide, Organometallics of Tributyltin (TBTO) and Polycyclic Aromatic Hydrocarbons (PAHs)

1.4 Moreover, a local HOKLAS-accredited laboratory ALS Technichem (HK) Pty Ltd is appointed to carry out chemical testing.

2. THE ASSESSMENT CRITERIA

RISK-BASED REMEDIATION GOALS (RBRGS) CRITERIA OF LAND CONTAMINATION ASSESSMENT

2.1 The RBRGs have been developed for four different post restorations to reflect land uses in accordance with "Guidance Note for Contaminated Land Assessment and Remediation". The four different land using is listed below:

- **Urban Residential -** A high rise residential building situated in a housing estate including landscaped yards and children playgrounds
- **Rural Residential -** Village-type houses or low-rise residential blocks surrounded by open area
- **Industrial -** The activities involve manufacturing, chemical or petrochemical processing, storage of raw materials, transport operations, energy production or transmission

- **Public Parks-** Lawn, walkways, garden and play areas. Furthermore, public parks are not considered to have buildings present on them

2.2 Chemicals acceptance criteria listed the below table is in accordance with the RBRGs requirement for each land using.

Chemical	Risk-Based Remediation Goals for Soil			
	Urban Residential (mg/kg)	Rural Residential (mg/kg)	Industrial (mg/kg)	Public Parks (mg/kg)
Volatile Organic Compounds (VOCs)				
Acetone	9.59E+03	4.26E+03	1.00E+04	1.00E+04
Benzene	7.04E-01	2.79E-01	9.21E+00	4.22E+01
Bromodichloromethane	3.17E-01	1.29E-01	2.85E+00	1.34E+01
2-Butanone	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Chloroform	1.32E-01	5.29E-02	1.54E+00	2.53E+02
Ethylbenzene	7.09E+02	2.98E+02	8.24E+03	1.00E+04
Methyl tert-Butyl Ether	6.88E+00	2.80E+00	7.01E+01	5.05E+02
Methylene Chloride	1.30E+00	5.29E-01	1.39E+01	1.28E+02
Styrene	3.22E+03	1.54E+03	1.00E+04	1.00E+04
Tetrachloroethene	1.01E-01	4.44E-02	7.77E-01	1.84E+00
Toluene	1.44E+03	7.05E+02	1.00E+04	1.00E+04
Trichloroethene	5.23E-01	2.11E-01	5.68E+00	6.94E+01
Xylenes (Total)	9.50E+01	3.68E+01	1.23E+03	1.00E+04
Semi-volatile Organic Compounds (SVOCs)				
Acenaphthene	3.51E+03	3.28E+03	1.00E+04	1.00E+04
Acenaphthylene	2.34E+03	1.51E+03	1.00E+04	1.00E+04
Anthracene	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Benzo(a)anthracene	1.20E+01	1.14E+01	9.18E+01	3.83E+01
Benzo(a)pyrene	1.20E+00	1.14E+00	9.18E+00	3.83E+00
Benzo(b)fluoranthene	9.88E+00	1.01E+01	1.78E+01	2.04E+01
Benzo(g,h,i)perylene	1.80E+03	1.71E+03	1.00E+04	5.74E+03
Benzo(k)fluoranthene	1.20E+02	1.14E+02	9.18E+02	3.83E+02
bis-(2-Ethylhexyl)phthalate	3.00E+01	2.80E+01	9.18E+01	9.42E+01
Chrysene	8.71E+02	9.19E+02	1.14E+03	1.54E+03
Dibenzo(a,h)anthracene	1.20E+00	1.14E+00	9.18E+00	3.83E+00
Fluoranthene	2.40E+03	2.27E+03	1.00E+04	7.62E+03
Fluorene	2.38E+03	2.25E+03	1.00E+04	7.45E+03
Hexachlorobenzene	2.43E-01	2.20E-01	5.82E-01	7.13E-01
Indeno(1,2,3-cd)pyrene	1.20E+01	1.14E+01	9.18E+01	3.83E+01
Naphthalene	1.82E+02	8.56E+01	4.53E+02	9.14E+02
Phenanthrene	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Phenol	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Pyrene	1.80E+03	1.71E+03	1.00E+04	5.72E+03
Heavy Metal				
Antimony	2.95E+01	2.91E+01	2.61E+02	9.79E+01
Arsenic	2.21E+01	2.18E+01	1.96E+02	7.35E+01
Barium	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Cadmium	7.38E+01	7.28E+01	6.53E+02	2.45E+02
Chromium III	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Chromium VI	2.21E+02	2.18E+02	1.96E+03	7.35E+02
Cobalt	1.48E+03	1.46E+03	1.00E+04	4.90E+03
Copper	2.95E+03	2.91E+03	1.00E+04	9.79E+03
Lead	2.58E+02	2.55E+02	2.29E+03	8.57E+02
Manganese	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Mercury	1.10E+01	6.52E+00	3.84E+01	4.56E+01
Molybdenum	3.69E+02	3.64E+02	3.26E+03	1.22E+03
Nickel	1.48E+03	1.46E+03	1.00E+04	4.90E+03
Tin	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Zinc	1.00E+04	1.00E+04	1.00E+04	1.00E+04

Chemical	Risk-Based Remediation Goals for Soil			
	Urban Residential (mg/kg)	Rural Residential (mg/kg)	Industrial (mg/kg)	Public Parks (mg/kg)
Polychlorinated Biphenyls (PCBs)				
PCBs	2.36E-01	2.26E-01	7.48E-01	7.56E-01
Petroleum Carbon Ranges				
C6 - C8	1.41E+03	5.45E+02	1.00E+04	1.00E+04
C9 - C16	2.24E+03	1.33E+03	1.00E+04	1.00E+04
C17 - C35	1.00E+04	1.00E+04	1.00E+04	1.00E+04
Other Inorganic Compounds				
Cyanide, free	1.48E+03	1.46E+03	1.00E+04	4.90E+03
Organometallics				
TBTO	2.21E+01	2.18E+01	1.96E+02	7.35E+01

2.3 Consider the C&D excavation materials generated from the Project will be delivered to government's public filling facilities for disposal. Also, government's public filling area is unknown future land using. Hence, the lower RBRGs values will be used as compared the dark material situation.

CLASSIFICATION OF SEDIMENT IN ACCORDANCE WITH PNAP ADV-21

2.4 Consider again the dark material maybe required sea dumping for disposal as under PNAP ADV-21 requirement. According to the PNAP ADV-21 stipulation, the sediment shall be classified into ***3*** categories based on its contaminant levels:

Category L: Sediment with all contaminant levels not exceeding the Lower Chemical Exceedance Level (LCEL). The material must be dredged, transported and disposed of in a manner, which minimizes the loss of contaminants either into solution or by resuspension.

Category M: Sediment with any one or more contaminant levels exceeding the LCEL and none exceeding the Upper Chemical Exceedance Level (UCEL). The material must be dredged and transported with care, and must be effectively isolated from the environment upon final disposal unless appropriate biological tests demonstrate that the material will not adversely affect the marine environment.

Category H: Sediment with any one or more contaminant levels exceeding the UCEL. The material must be effectively isolated from the environment upon final disposal.

2.5 Sediment Quality Criteria to indicate the Classification of Sediment lists below:

Contaminants	Lower Chemical Exceedance Level	Upper Chemical Exceedance Level
Metal ***(mg/kg dry wt.)***		
Cadmium (Cd)	1.5	4
Chromium (Cr)	80	160
Copper (Cu)	65	110
Mercury (Hg)	0.5	1
Nickel (Ni)*	40	40
Lead (Pb)	75	110
Silver (Ag)	1	2
Zinc (Zn)	200	270
Metalloid ***(mg/kg dry wt.)***		
Arsenic (As)	12	42
Organic-PAHs ***(µg/kg dry wt.)***		
Low Molecular Weight PAHs	550	3160
High Molecular Weight PAHs		
Organic-non-PAHs ***(µg/kg dry wt.)***		
Total PCBs	23	180
Organometallics ***(µg TBT/L in Interstitial water)***		
Tributyltin*	0.15	0.15

2.6 If the dark material classified as ***Category M*** and ***certain Category H*** (with one or more

contaminant levels exceeding 10 times of Lower Chemical Exceedance Level), biological screening of toxicity testing shall require to carry out for the sea dumping application.

SAMPLING METHOD

2.7 One composite sample (mixed with ten sub-samples) was collected from the dark material discovery areas. The ten sub-samples is random collected from the discovery areas.

3. CHEMICAL AND PHYSICAL TESTING RESULTS

CHEMICAL

3.1 Chemicals results of the composite sample under land contamination criteria of RBRGs and PNAP ADV-21of Classification of Dark Material are respectively listed below Tables and the laboratory data report is attached in ***Annex***.

Land Contamination Criteria of RBRGs

Chemical	Detected Result
Volatile Organic Compounds (VOCs)	
Acetone	<50
Benzene	<0.2
Bromodichloromethane	<0.1
2-Butanone	<5.0
Chloroform	<0.04
Ethylbenzene	<0.5
Methyl tert-Butyl Ether	<0.5
Methylene Chloride	<0.5
Styrene	<0.5
Tetrachloroethene	<0.04
Toluene	<0.5
Trichloroethene	<0.1
Xylenes (Total)	<2.0
Semi-volatile Organic Compounds (SVOCs)	
Acenaphthene	<0.5
Acenaphthylene	<0.5
Anthracene	<0.5
Benzo(a)anthracene	<0.5
Benzo(a)pyrene	<0.5
Benzo(b)fluoranthene	<0.5
Benzo(g,h,i)perylene	<0.5
Benzo(k)fluoranthene	<0.5
bis-(2-Ethylhexyl)phthalate	<5.0
Chrysene	<0.5
Dibenzo(a,h)anthracene	<0.5
Fluoranthene	<0.5
Fluorene	<0.5
Hexachlorobenzene	<0.2
Indeno(1,2,3-cd)pyrene	<0.5
Naphthalene	<0.5
Phenanthrene	<0.5
Phenol	<0.5
Pyrene	<0.5
Heavy Metal	
Antimony	<1
Arsenic	2
Barium	13
Cadmium	<0.2
Chromium III	4
Chromium VI	<1
Cobalt	2
Copper	3
Lead	66
Manganese	173
Mercury	<0.05
Molybdenum	4

Chemical	Detected Result
Nickel	2
Tin	2
Zinc	38
Polychlorinated Biphenyls (PCBs)	
PCBs	<0.1
Petroleum Carbon Ranges	
C6 - C8	<5
C9 - C16	<200
C17 - C35	<500
Other Inorganic Compounds	
Cyanide, free	<1
Organometallics	
TBTO	<5.0

PNAP ADV-21of Classification of Dark Material

Contaminants	Detected Result
Metal *(mg/kg dry wt.)*	
Cadmium (Cd)	<0.2
Chromium (Cr)	5
Copper (Cu)	3
Mercury (Hg)	0.09
Nickel (Ni)*	2
Lead (Pb)	64
Silver (Ag)	0.2
Zinc (Zn)	37
Metalloid *(mg/kg dry wt.)*	
Arsenic (As)	2
Organic-PAHs *(µg/kg dry wt.)*	
Low Molecular Weight PAHs	<550
High Molecular Weight PAHs	<1700
Organic-non-PAHs *(µg/kg dry wt.)*	
Total PCBs	<18
Organometallics *(µg TBT/L in Interstitial water)*	
Tributyltin*	<0.015

Remark: (*) The contaminant level is considered to have exceeded the UCEL if it greater than the value of LCEL.

PHYSICAL

3.2 Particle size distribution of physical testing was carried out to analysis the grading of dark material. Particle size distribution analyzed is in accordance with the method of GEOSPEC3. The results is shown below:

- Gravel: 8%
- Sand: 35%
- Silt: 41%
- Clay: 16%

3.3 Based on the findings, the dark material likely is "**ALLUVIUM**". The data report submitted by the Laboratory is attached in ***Annex***.

4. CONCLUSION

4.1 Chemicals results of the composite sample comparison with land contamination and PNAP ADV-21 stipulations, all detected parameters concentration are found below the lowest concentration acceptance levels and the Lower Chemical Exceedance Levels.

4.2 According to the results from preliminary assessment, the dark material is considered that remediation action is not required and can be directly disposal at the public filling facilities if not rejected by the operator. Otherwise, sea dumping should be the final disposal approach.

4.3 This preliminary assessment report has covered all the parameters of RBRGs according to EPD's "Guidance Note for Contaminated Land Assessment and Remediation" except the test of Dioxins. If a detailed classification or analysis on the dark material is required, the test of dioxins is recommended to be conducted in order to get a clear knowledge.

ANNEX

Chemical Result Data Report
(Under Land Contamination Criteria of RBRGs)

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

HOKLAS 066 TEST

CERTIFICATE OF ANALYSIS

Client	: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 11
Contact	: MR T W TAM	Contact	: Fung Lim Chee, Richard	Work Order	: HK1650386
Address	: RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T. HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Twtam@fordbusiness.com	E-mail	: Richard.Fung@alsglobal.com		
Telephone	: +852 2959 6059	Telephone	: +852 2610 1044		
Facsimile	: +852 2959 6079	Facsimile	: +852 2610 2021		
Project	: TCS00744	Quote number	: HK/5804/2015	Date Samples Received	: 12-DEC-2016
Order number	: ----			Issue Date	: 30-DEC-2016
C-O-C number	: H032907			No. of samples received	: 1
Site	: OCEAN PARK - RBRG AND 34/2002			No. of samples analysed	: 1

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
Chan Ka Yu, Karen	Manager - Organics	Organics
Lin Wai Yu, Iris	Senior Chemist - Inorganics	Inorganics
Wong Wing, Kenneth	Manager - Metals	Inorganics

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 12-DEC-2016 to 29-DEC-2016.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK1650386

Site Name: Ocean Park - RBRG and 34/2002 Testing

Sample(s) were picked up from client by ALS Technichem (HK) staff in chilled condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Soil sample(s) as received, digested by In-house method E-ASTM D3974-09 prior to determination of metals. The In-house method is developed based on ASTM D3974-09 method.

Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: COMPOSITE SAMPLE (PT1 TO PT10)				
				Client sampling date / time: [12-DEC-2016]				
				HK1650386-001				
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	**26.1**				
ED/EK: Inorganic Nonmetallic Parameters								
EK025MD: Free Cyanide	----	1	mg/kg	<1				
EG: Metals and Major Cations								
EG020: Antimony	7440-36-0	1	mg/kg	<1				
EG020: Arsenic	7440-38-2	1	mg/kg	**2**				
EG020: Barium	7440-39-3	1	mg/kg	**13**				
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2				
EG020: Cobalt	7440-48-4	1	mg/kg	**2**				
EG020: Copper	7440-50-8	1	mg/kg	**3**				
EG020: Lead	7439-92-1	1	mg/kg	**66**				
EG020: Manganese	7439-96-5	1	mg/kg	**173**				
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05				
EG020: Molybdenum	7439-98-7	1	mg/kg	**4**				
EG020: Nickel	7440-02-0	1	mg/kg	**2**				
EG020: Tin	7440-31-5	1	mg/kg	**2**				
EG020: Zinc	7440-66-6	1	mg/kg	**38**				
EG049: Trivalent Chromium	16065-83-1	1	mg/kg	**4**				
EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1				
EP-066: Polychlorinated Biphenyls								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	91-20-3	0.500	mg/kg	<0.500				
Acenaphthylene	208-96-8	0.500	mg/kg	<0.500				
Acenaphthene	83-32-9	0.500	mg/kg	<0.500				
Fluorene	86-73-7	0.500	mg/kg	<0.500				
Phenanthrene	85-01-8	0.500	mg/kg	<0.500				
Anthracene	120-12-7	0.500	mg/kg	<0.500				
Fluoranthene	206-44-0	0.500	mg/kg	<0.500				
Pyrene	129-00-0	0.500	mg/kg	<0.500				
Benz(a)anthracene	56-55-3	0.500	mg/kg	<0.500				
Chrysene	218-01-9	0.500	mg/kg	<0.500				
Benzo(b)fluoranthene	205-99-2	0.500	mg/kg	<0.500				
Benzo(k)fluoranthene	207-08-9	0.500	mg/kg	<0.500				
Benzo(a)pyrene	50-32-8	0.500	mg/kg	<0.500				
Indeno(1.2.3.cd)pyrene	193-39-5	0.500	mg/kg	<0.500				
Dibenz(a.h)anthracene	53-70-3	0.500	mg/kg	<0.500				

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: COMPOSITE SAMPLE (PT1 TO PT10)				
				Client sampling date / time: [12-DEC-2016]				
				HK1650386-001				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued								
Benzo(g.h.i)perylene	191-24-2	0.500	mg/kg	<0.500				
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate								
Phenol	108-95-2	0.50	mg/kg	<0.50				
Hexachlorobenzene (HCB)	118-74-1	0.200	mg/kg	<0.200				
Bis(2-ethylhexyl)phthalate	117-81-7	5.00	mg/kg	<5.00				
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH)								
C6 - C8 Fraction	----	5	mg/kg	<5				
C9 - C16 Fraction	----	200	mg/kg	<200				
C17 - C35 Fraction	----	500	mg/kg	<500				
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH)								
Benzene	71-43-2	0.2	mg/kg	<0.2				
Toluene	108-88-3	0.5	mg/kg	<0.5				
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5				
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0				
Styrene	100-42-5	0.5	mg/kg	<0.5				
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5				
Xylenes (Total)	----	2.0	mg/kg	<2.0				
EP-074_SR-B: Oxygenated Compounds								
2-Butanone (MEK)	78-93-3	5	mg/kg	<5				
EP-074_SR-E: Halogenated Aliphatics								
Methylene chloride	75-09-2	0.5	mg/kg	<0.5				
Trichloroethene	79-01-6	0.1	mg/kg	<0.1				
Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04				
EP-074_SR-G: Trihalomethanes (THM)								
Chloroform	67-66-3	0.04	mg/kg	<0.04				
Bromodichloromethane	75-27-4	0.1	mg/kg	<0.1				
EP-074_SR-I: Methyl-tert-butyl Ether								
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg	<0.5				
EP-390: Triorganotins								
Tributyltin oxide	56-35-9	5.00	mg/kg	<5.00				
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**113**				
4-Terphenyl-d14	1718-51-0	0.1	%	**94.0**				
EP-066S: PCB Surrogate								
Tetrachlorometaxylene	877-09-8	0.1	%	**73.0**				
Dibutylchlorendate	1770-80-5	0.1	%	**87.2**				
EP-080_SRS: TPH(Volatile)/BTEX Surrogate								

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*LOR*	*Unit*	*Client sample ID*: **COMPOSITE SAMPLE (PT1 TO PT10)** *Client sampling date / time*: [12-DEC-2016] **HK1650386-001**
EP-080_SRS: TPH(Volatile)/BTEX Surrogate - Continued				
Dibromofluoromethane	1868-53-7	0.1	%	**90.8**
Toluene-D8	2037-26-5	0.1	%	**104**
4-Bromofluorobenzene	460-00-4	0.1	%	**108**
EP-074_SR-S: VOC Surrogates				
Dibromofluoromethane	1868-53-7	0.1	%	**90.8**
Toluene-D8	2037-26-5	0.1	%	**104**
4-Bromofluorobenzene	460-00-4	0.1	%	**108**

Laboratory Duplicate (DUP) Report

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 4386236)								
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	26.1	25.7	1.4
HK1651010-001	Anonymous	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	19.5	19.4	0.6
EG: Metals and Major Cations (QC Lot: 4382363)								
HK1650503-001	Anonymous	**EG020: Mercury**	7439-97-6	0.05	mg/kg	0.11	0.10	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Antimony	7440-36-0	1	mg/kg	<1	<1	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	9	8	0.0
		EG020: Barium	7440-39-3	1	mg/kg	53	47	12.0
		EG020: Cobalt	7440-48-4	1	mg/kg	2	2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	5	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	59	55	8.0
		EG020: Manganese	7439-96-5	1	mg/kg	234	248	5.6
		EG020: Molybdenum	7439-98-7	1	mg/kg	2	2	0.0
		EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
		EG020: Tin	7440-31-5	1	mg/kg	3	3	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	49	57	15.7
EG: Metals and Major Cations (QC Lot: 4384942)								
HK1650503-001	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	1	mg/kg	<1	<1	0.0
HK1651010-001	Anonymous	**EG3060: Hexavalent Chromium**	18540-29-9	1	mg/kg	<1	<1	0.0
EP-066: Polychlorinated Biphenyls (QC Lot: 4382415)								
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**Total Polychlorinated biphenyls**	----	0.1	mg/kg	<0.1	<0.1	0.0
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)								
HK1650325-001	Anonymous	**Naphthalene**	91-20-3	500	µg/kg	<500	<500	0.0
		Acenaphthylene	208-96-8	500	µg/kg	<500	<500	0.0
		Acenaphthene	83-32-9	500	µg/kg	<500	<500	0.0
		Fluorene	86-73-7	500	µg/kg	<500	<500	0.0
		Phenanthrene	85-01-8	500	µg/kg	<500	<500	0.0
		Anthracene	120-12-7	500	µg/kg	<500	<500	0.0
		Fluoranthene	206-44-0	500	µg/kg	<500	<500	0.0
		Pyrene	129-00-0	500	µg/kg	<500	<500	0.0
		Benz(a)anthracene	56-55-3	500	µg/kg	<500	<500	0.0
		Chrysene	218-01-9	500	µg/kg	<500	<500	0.0
		Benzo(b)fluoranthene	205-99-2	500	µg/kg	<500	<500	0.0
		Benzo(k)fluoranthene	207-08-9	500	µg/kg	<500	<500	0.0
		Benzo(a)pyrene	50-32-8	500	µg/kg	<500	<500	0.0
		Indeno(1.2.3.cd)pyrene	193-39-5	500	µg/kg	<500	<500	0.0
		Dibenz(a.h)anthracene	53-70-3	500	µg/kg	<500	<500	0.0

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602) - Continued								
HK1650325-001	Anonymous	**Benzo(g.h.i)perylene**	191-24-2	500	µg/kg	<500	<500	0.0
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 4380602)								
HK1650325-001	Anonymous	**Phenol**	108-95-2	500	µg/kg	<500	<500	0.0
		Hexachlorobenzene (HCB)	118-74-1	500	µg/kg	<500	<500	0.0
		Bis(2-ethylhexyl)phthalate	117-81-7	5000	µg/kg	<5000	<5000	0.0
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4380603)								
HK1650325-001	Anonymous	**C9 - C16 Fraction**	----	200	mg/kg	<200	<200	0.0
		C17 - C35 Fraction	----	500	mg/kg	<500	<500	0.0
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4381070)								
HK1650289-001	Anonymous	**C6 - C8 Fraction**	----	5	mg/kg	<5	<5	0.0
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 4381069)								
HK1650279-001	Anonymous	**Benzene**	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0
		Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0
		Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0
		Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.0
		ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0
		meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	<1.0	0.0
		Xylenes (Total)	----	2.0	mg/kg	<2.0	<2.0	0.0
EP-074_SR-B: Oxygenated Compounds (QC Lot: 4381069)								
HK1650279-001	Anonymous	**2-Butanone (MEK)**	78-93-3	5	mg/kg	<5	<5	0.0
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 4381069)								
HK1650279-001	Anonymous	**Tetrachloroethene**	127-18-4	0.04	mg/kg	<0.04	<0.04	0.0
		Trichloroethene	79-01-6	0.1	mg/kg	<0.1	<0.1	0.0
		Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.0
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 4381069)								
HK1650279-001	Anonymous	**Chloroform**	67-66-3	0.04	mg/kg	<0.04	<0.04	0.0
		Bromodichloromethane	75-27-4	0.1	mg/kg	<0.1	<0.1	0.0
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 4381069)								
HK1650279-001	Anonymous	**Methyl tert-Butyl Ether (MTBE)**	1634-04-4	0.5	mg/kg	<0.5	<0.5	0.0
EP-390: Triorganotins (QC Lot: 4389508)								
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**Tributyltin oxide**	56-35-9	5000	µgSn/kg	<5000	<5000	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 4386226)											
EK025MD: Free Cyanide	----	1	mg/kg	<1	10 mg/kg	101	----	91	115	----	----

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4382363)											
EG020: Antimony	7440-36-0	1	mg/kg	<1	5 mg/kg	87.8	----	75	111	----	----
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	92.6	----	75	111	----	----
EG020: Barium	7440-39-3	1	mg/kg	<1	5 mg/kg	93.5	----	79	111	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	97.7	----	80	108	----	----
EG020: Cobalt	7440-48-4	1	mg/kg	<1	5 mg/kg	88.8	----	74	108	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	86.7	----	79	109	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	90.3	----	81	107	----	----
EG020: Manganese	7439-96-5	1	mg/kg	<1	5 mg/kg	97.3	----	74	116	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	108	----	74	114	----	----
EG020: Molybdenum	7439-98-7	1	mg/kg	<1	5 mg/kg	91.0	----	78	104	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	87.8	----	74	106	----	----
EG020: Tin	7440-31-5	1	mg/kg	<1	5 mg/kg	96.4	----	79	109	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	96.4	----	76	118	----	----
EG: Metals and Major Cations (QC Lot: 4384942)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	2.5 mg/kg	101	----	92	122	----	----
EP-066: Polychlorinated Biphenyls (QC Lot: 4382415)											
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	82.7	----	43	152	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)											
Naphthalene	91-20-3	50	µg/kg	<50	500 µg/kg	89.8	----	47	103	----	----
Acenaphthylene	208-96-8	50	µg/kg	<50	500 µg/kg	83.8	----	46	90	----	----
Acenaphthene	83-32-9	50	µg/kg	<50	500 µg/kg	86.2	----	52	97	----	----
Fluorene	86-73-7	50	µg/kg	<50	500 µg/kg	91.2	----	55	98	----	----
Phenanthrene	85-01-8	50	µg/kg	<50	500 µg/kg	97.5	----	52	99	----	----
Anthracene	120-12-7	50	µg/kg	<50	500 µg/kg	79.5	----	42	95	----	----
Fluoranthene	206-44-0	50	µg/kg	<50	500 µg/kg	96.3	----	65	97	----	----
Pyrene	129-00-0	50	µg/kg	<50	500 µg/kg	92.6	----	58	105	----	----
Benz(a)anthracene	56-55-3	50	µg/kg	<50	500 µg/kg	96.0	----	52	101	----	----
Chrysene	218-01-9	50	µg/kg	<50	500 µg/kg	93.3	----	62	108	----	----
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	500 µg/kg	93.8	----	56	107	----	----
Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	500 µg/kg	91.5	----	62	108	----	----
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	500 µg/kg	86.8	----	41	109	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<50	500 µg/kg	90.0	----	52	122	----	----
Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	500 µg/kg	97.8	----	53	107	----	----
Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	500 µg/kg	96.0	----	56	115	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 4380602)											
Phenol	108-95-2	500	µg/kg	<500	500 µg/kg	84.0	----	37	112	----	----
Hexachlorobenzene (HCB)	118-74-1	50	µg/kg	<50	500 µg/kg	99.0	----	56	107	----	----
Bis(2-ethylhexyl)phthalate	117-81-7	1000	µg/kg	<1000	500 µg/kg	96.0	----	72	136	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4380603)											

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4380603) - Continued											
C9 - C16 Fraction	----	200	mg/kg	<200	31.5 mg/kg	70.4	----	69	119	----	----
C17 - C35 Fraction	----	500	mg/kg	<500	67.5 mg/kg	65.6	----	58	119	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4381070)											
C6 - C8 Fraction	----	5	mg/kg	<5	4.5 mg/kg	91.8	----	77	119	----	----
EP-074_SR-A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 4381069)											
Benzene	71-43-2	0.1	mg/kg	<0.1	0.25 mg/kg	111	----	75	121	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	0.25 mg/kg	109	----	77	130	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.25 mg/kg	110	----	77	128	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<0.4	0.50 mg/kg	118	----	70	146	----	----
Styrene	100-42-5	0.2	mg/kg	<0.2	0.25 mg/kg	109	----	80	111	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.25 mg/kg	110	----	82	118	----	----
Xylenes (Total)	----	1.0	mg/kg	<1.0	0.75 mg/kg	116	----	77	134	----	----
EP-074_SR-B: Oxygenated Compounds (QC Lot: 4381069)											
2-Butanone (MEK)	78-93-3	2	mg/kg	<2	2.5 mg/kg	106	----	79	117	----	----
EP-074_SR-E: Halogenated Aliphatics (QC Lot: 4381069)											
Methylene chloride	75-09-2	0.5	mg/kg	<0.5	0.25 mg/kg	102	----	75	125	----	----
Trichloroethene	79-01-6	0.1	mg/kg	<0.1	0.25 mg/kg	108	----	79	109	----	----
Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	0.25 mg/kg	106	----	75	107	----	----
EP-074_SR-G: Trihalomethanes (THM) (QC Lot: 4381069)											
Chloroform	67-66-3	0.04	mg/kg	<0.04	0.25 mg/kg	110	----	75	123	----	----
Bromodichloromethane	75-27-4	0.1	mg/kg	<0.1	0.25 mg/kg	108	----	79	123	----	----
EP-074_SR-I: Methyl-tert-butyl Ether (QC Lot: 4381069)											
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.2	mg/kg	<0.2	0.25 mg/kg	111	----	77	114	----	----
EP-390: Triorganotins (QC Lot: 4389508)											
Tributyltin oxide	56-35-9	1.5	µg/kg	<1.5	0.75 µg/kg	117	----	70	130	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 4386226)										
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**EK025MD: Free Cyanide**	----	10 mg/kg	99.4	----	75	125	----	----
EG: Metals and Major Cations (QC Lot: 4382363)										
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**EG020: Antimony**	7440-36-0	50 mg/kg	91.9	----	75	125	----	----
		EG020: Arsenic	7440-38-2	50 mg/kg	92.7	----	75	125	----	----
		EG020: Barium	7440-39-3	50 mg/kg	94.5	----	75	125	----	----
		EG020: Cadmium	7440-43-9	50 mg/kg	95.6	----	75	125	----	----
		EG020: Cobalt	7440-48-4	50 mg/kg	91.2	----	75	125	----	----
		EG020: Copper	7440-50-8	50 mg/kg	86.4	----	75	125	----	----
		EG020: Lead	7439-92-1	50 mg/kg	90.5	----	75	125	----	----
		EG020: Manganese	7439-96-5	50 mg/kg	96.5	----	75	125	----	----
		EG020: Mercury	7439-97-6	1 mg/kg	98.3	----	75	125	----	----
		EG020: Molybdenum	7439-98-7	50 mg/kg	93.0	----	75	125	----	----
		EG020: Nickel	7440-02-0	50 mg/kg	90.4	----	75	125	----	----
		EG020: Tin	7440-31-5	50 mg/kg	95.2	----	75	125	----	----
		EG020: Zinc	7440-66-6	50 mg/kg	86.2	----	75	125	----	----
EG: Metals and Major Cations (QC Lot: 4384942)										
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**EG3060: Hexavalent Chromium**	18540-29-9	2.5 mg/kg	113	----	75	125	----	----
EP-066: Polychlorinated Biphenyls (QC Lot: 4382415)										
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	**Total Polychlorinated biphenyls**	----	0.5 mg/kg	63.4	----	50	130	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)										
HK1650380-001	Anonymous	**Naphthalene**	91-20-3	500 µg/kg	96.1	----	50	130	----	----
		Acenaphthylene	208-96-8	500 µg/kg	99.3	----	50	130	----	----
		Acenaphthene	83-32-9	500 µg/kg	88.5	----	50	130	----	----
		Fluorene	86-73-7	500 µg/kg	90.6	----	50	130	----	----
		Phenanthrene	85-01-8	500 µg/kg	93.0	----	50	130	----	----
		Anthracene	120-12-7	500 µg/kg	88.6	----	50	130	----	----
		Fluoranthene	206-44-0	500 µg/kg	97.7	----	50	130	----	----
		Pyrene	129-00-0	500 µg/kg	97.9	----	50	130	----	----
		Benz(a)anthracene	56-55-3	500 µg/kg	93.0	----	50	130	----	----
		Chrysene	218-01-9	500 µg/kg	97.2	----	50	130	----	----
		Benzo(b)fluoranthene	205-99-2	500 µg/kg	91.4	----	50	130	----	----
		Benzo(k)fluoranthene	207-08-9	500 µg/kg	100	----	50	130	----	----
		Benzo(a)pyrene	50-32-8	500 µg/kg	93.5	----	50	130	----	----
		Indeno(1.2.3.cd)pyrene	193-39-5	500 µg/kg	80.5	----	50	130	----	----
		Dibenz(a.h)anthracene	53-70-3	500 µg/kg	87.9	----	50	130	----	----
		Benzo(g.h.i)perylene	191-24-2	500 µg/kg	86.6	----	50	130	----	----
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 4380602)										

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-076HK: Phenol, Hexachlorobenzene and Bis(2-ethylhexyl) Phthalate (QC Lot: 4380602) - Continued										
HK1650380-001	Anonymous	**Phenol**	108-95-2	500 µg/kg	82.0	----	50	130	----	----
		Hexachlorobenzene (HCB)	118-74-1	500 µg/kg	111	----	50	130	----	----
		Bis(2-ethylhexyl)phthalate	117-81-7	1000 µg/kg	84.7	----	50	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4380603)										
HK1650325-001	Anonymous	**C9 - C16 Fraction**	----	31.5 mg/kg	90.3	----	50	130	----	----
		C17 - C35 Fraction	----	67.5 mg/kg	56.5	----	50	130	----	----
EP-071HK_SR: Total Petroleum Hydrocarbons (TPH) (QC Lot: 4381070)										
HK1650289-002	Anonymous	**C6 - C8 Fraction**	----	4.5 mg/kg	90.2	----	50	130	----	----
EP-390: Triorganotins (QC Lot: 4389508)										
HK1650510-002	Anonymous	**Tributyltin oxide**	56-35-9	0.75 µg/kg	109	----	70	130	----	----

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%): Low	Recovery Limits (%): High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-066S: PCB Surrogate			
Tetrachlorometaxylene	877-09-8	50	130
Dibutylchlorendate	1770-80-5	50	130
EP-080_SRS: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074_SR-S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121

Chemical Result Data Report
(Under PNAP ADV-21)

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

HOKLAS 066 TEST

CERTIFICATE OF ANALYSIS

Client	: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 10
Contact	: MR T W TAM	Contact	: Fung Lim Chee, Richard	Work Order	: HK1650548
Address	: RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T. HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Twtam@fordbusiness.com	E-mail	: Richard.Fung@alsglobal.com		
Telephone	: +852 2959 6059	Telephone	: +852 2610 1044		
Facsimile	: +852 2959 6079	Facsimile	: +852 2610 2021		
Project	: TCS00744	Quote number	: HK/5804/2015	Date Samples Received	: 12-DEC-2016
Order number	: ----			Issue Date	: 28-DEC-2016
C-O-C number	: H032907			No. of samples received	: 1
Site	: OCEAN PARK - RBRG AND 34/2002			No. of samples analysed	: 1

Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*	*Authorised results for*
Chan Ka Yu, Karen	Manager - Organics	Organics
Chan Siu Ming, Vico	Manager - Inorganics	Inorganics
Wong Wing, Kenneth	Manager - Metals	Inorganics

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 12-DEC-2016 to 24-DEC-2016.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK1650548

Site Name: Ocean Park - RBRG and 34/2002 Testing

Sample(s) were picked up from client by ALS Technichem (HK) staff in chilled condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Soil sample(s) as received, digested by In-house method E-ASTM D3974-09 prior to determination of metals. The In-house method is developed based on ASTM D3974-09 method.

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.

Low and High M.W. PAHs results (Method: EP076HK) are not HOKLAS accredited. Low M.W. PAHs is sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene; High M.W. PAHs is sum of Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1.2.3.cd)pyrene, Dibenz(a.h)anthracene, Benzo(g.h.i)perylene.

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: COMPOSITE SAMPLE (PT1 TO PT10)				
				Client sampling date / time: [12-DEC-2016]				
				HK1650548-001				
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	**28.2**				
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	1	mg/kg	**2**				
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2				
EG020: Chromium	7440-47-3	1	mg/kg	**5**				
EG020: Copper	7440-50-8	1	mg/kg	**3**				
EG020: Lead	7439-92-1	1	mg/kg	**64**				
EG020: Mercury	7439-97-6	0.05	mg/kg	**0.09**				
EG020: Nickel	7440-02-0	1	mg/kg	**2**				
EG020: Silver	7440-22-4	0.1	mg/kg	**0.2**				
EG020: Zinc	7440-66-6	1	mg/kg	**37**				
EP-065: PCB Single Congeners								
PCB 8	34883-43-7	3	µg/kg	<3				
PCB 18	37680-65-2	3	µg/kg	<3				
PCB 28	7012-37-5	3	µg/kg	<3				
PCB 44	41464-39-5	3	µg/kg	<3				
PCB 52	35693-99-3	3	µg/kg	<3				
PCB 66	32598-10-0	3	µg/kg	<3				
PCB 77	32598-13-3	3	µg/kg	<3				
PCB 101	37680-73-2	3	µg/kg	<3				
PCB 105	32598-14-4	3	µg/kg	<3				
PCB 118	31508-00-6	3	µg/kg	<3				
PCB 126	57465-28-8	3	µg/kg	<3				
PCB 128	38380-07-3	3	µg/kg	<3				
PCB 138	35065-28-2	3	µg/kg	<3				
PCB 153	35065-27-1	3	µg/kg	<3				
PCB 169	32774-16-6	3	µg/kg	<3				
PCB 170	35065-30-6	3	µg/kg	<3				
PCB 180	35065-29-3	3	µg/kg	<3				
PCB 187	52663-68-0	3	µg/kg	<3				
Total Polychlorinated biphenyls	----	18	µg/kg	<18				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	91-20-3	50	µg/kg	<50				
Acenaphthylene	208-96-8	50	µg/kg	<50				
Acenaphthene	83-32-9	50	µg/kg	<50				
Fluorene	86-73-7	50	µg/kg	<50				
Phenanthrene	85-01-8	50	µg/kg	<50				

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: COMPOSITE SAMPLE (PT1 TO PT10)				
				Client sampling date / time: [12-DEC-2016]				
				HK1650548-001				
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued								
Anthracene	120-12-7	50	µg/kg	<50				
Fluoranthene	206-44-0	150	µg/kg	<150				
Pyrene	129-00-0	150	µg/kg	<150				
Benz(a)anthracene	56-55-3	150	µg/kg	<150				
Chrysene	218-01-9	150	µg/kg	<150				
Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150				
Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150				
Benzo(a)pyrene	50-32-8	150	µg/kg	<150				
Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg	<150				
Dibenz(a.h)anthracene	53-70-3	150	µg/kg	<150				
Benzo(g.h.i)perylene	191-24-2	150	µg/kg	<150				
Low M.W. PAHs	----	550	µg/kg	<550				
High M.W. PAHs	----	1700	µg/kg	<1700				
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**109**				
4-Terphenyl-d14	1718-51-0	0.1	%	**105**				
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**53.0**				

Sub-Matrix: **INTERSTITIAL WATER**				*Client sample ID*	**COMPOSITE SAMPLE (PT1 TO PT10)**				
				Client sampling date / time	[12-DEC-2016]				
Compound	*CAS Number*	*LOR*	*Unit*		**HK1650548-001**				
EP-390: Triorganotins									
Tributyltin	56573-85-4	0.015	µg TBT /L		<0.015				

Laboratory Duplicate (DUP) Report

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 4385076)								
HK1650289-004	Anonymous	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	14.2	14.2	0.0
HK1650548-001	COMPOSITE SAMPLE (PT1 TO PT10)	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	28.2	28.0	0.7
EG: Metals and Major Cations (QC Lot: 4382363)								
HK1650503-001	Anonymous	**EG020: Mercury**	7439-97-6	0.05	mg/kg	0.11	0.10	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	9	8	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	5	5	0.0
		EG020: Copper	7440-50-8	1	mg/kg	5	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	59	55	8.0
		EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	49	57	15.7
EP-065: PCB Single Congeners (QC Lot: 4378891)								
HK1649886-001	Anonymous	**Total Polychlorinated biphenyls**	----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)								
HK1650325-001	Anonymous	**High M.W. PAHs**	----	1700	µg/kg	<1700	<1700	0.0
		Naphthalene	91-20-3	500	µg/kg	<500	<500	0.0
		Acenaphthylene	208-96-8	500	µg/kg	<500	<500	0.0
		Acenaphthene	83-32-9	500	µg/kg	<500	<500	0.0
		Fluorene	86-73-7	500	µg/kg	<500	<500	0.0

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602) - Continued								
HK1650325-001	Anonymous	**Phenanthrene**	85-01-8	500	µg/kg	<500	<500	0.0
		Anthracene	120-12-7	500	µg/kg	<500	<500	0.0
		Fluoranthene	206-44-0	500	µg/kg	<500	<500	0.0
		Pyrene	129-00-0	500	µg/kg	<500	<500	0.0
		Benz(a)anthracene	56-55-3	500	µg/kg	<500	<500	0.0
		Chrysene	218-01-9	500	µg/kg	<500	<500	0.0
		Benzo(b)fluoranthene	205-99-2	500	µg/kg	<500	<500	0.0
		Benzo(k)fluoranthene	207-08-9	500	µg/kg	<500	<500	0.0
		Benzo(a)pyrene	50-32-8	500	µg/kg	<500	<500	0.0
		Indeno(1.2.3.cd)pyrene	193-39-5	500	µg/kg	<500	<500	0.0
		Dibenz(a.h)anthracene	53-70-3	500	µg/kg	<500	<500	0.0
		Benzo(g.h.i)perylene	191-24-2	500	µg/kg	<500	<500	0.0
		Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-390: Triorganotins (QC Lot: 4389504)								
HK1650510-001	Anonymous	**Tributyltin**	56573-85-4	5	ngSn/L	<5	<5	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4382363)											
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	92.6	----	75	111	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	97.7	----	80	108	----	----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	98.0	----	77	119	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	86.7	----	79	109	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	90.3	----	81	107	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	108	----	74	114	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	87.8	----	74	106	----	----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.8	----	77	101	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	96.4	----	76	118	----	----
EP-065: PCB Single Congeners (QC Lot: 4378891)											
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	90.8	----	45	113	----	----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	85.7	----	49	109	----	----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	83.0	----	58	108	----	----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	81.8	----	55	121	----	----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	83.2	----	60	116	----	----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	79.9	----	54	129	----	----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	92.6	----	58	112	----	----

Matrix: SOIL

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-065: PCB Single Congeners (QC Lot: 4378891) - Continued											
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	94.4	----	56	116	----	----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	94.5	----	60	119	----	----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	93.4	----	60	115	----	----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	93.5	----	59	115	----	----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	95.0	----	59	127	----	----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	93.2	----	59	120	----	----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	95.1	----	61	117	----	----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	97.9	----	67	119	----	----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	99.4	----	68	123	----	----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	98.2	----	65	121	----	----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	94.6	----	60	116	----	----
Total Polychlorinated biphenyls	----	18	µg/kg	<18	----	----	----	----	----	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)											
Naphthalene	91-20-3	50	µg/kg	<50	500 µg/kg	89.8	----	47	103	----	----
Acenaphthylene	208-96-8	50	µg/kg	<50	500 µg/kg	83.8	----	46	90	----	----
Acenaphthene	83-32-9	50	µg/kg	<50	500 µg/kg	86.2	----	52	97	----	----
Fluorene	86-73-7	50	µg/kg	<50	500 µg/kg	91.2	----	55	98	----	----
Phenanthrene	85-01-8	50	µg/kg	<50	500 µg/kg	97.5	----	52	99	----	----
Anthracene	120-12-7	50	µg/kg	<50	500 µg/kg	79.5	----	42	95	----	----
Fluoranthene	206-44-0	50	µg/kg	<50	500 µg/kg	96.3	----	65	97	----	----
Pyrene	129-00-0	50	µg/kg	<50	500 µg/kg	92.6	----	58	105	----	----
Benz(a)anthracene	56-55-3	50	µg/kg	<50	500 µg/kg	96.0	----	52	101	----	----
Chrysene	218-01-9	50	µg/kg	<50	500 µg/kg	93.3	----	62	108	----	----
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	500 µg/kg	93.8	----	56	107	----	----
Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	500 µg/kg	91.5	----	62	108	----	----
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	500 µg/kg	86.8	----	41	109	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	50	µg/kg	<50	500 µg/kg	90.0	----	52	122	----	----
Dibenz(a.h)anthracene	53-70-3	50	µg/kg	<50	500 µg/kg	97.8	----	53	107	----	----
Benzo(g.h.i)perylene	191-24-2	50	µg/kg	<50	500 µg/kg	96.0	----	56	115	----	----
Low M.W. PAHs	----	550	µg/kg	<550	----	----	----	----	----	----	----
High M.W. PAHs	----	1700	µg/kg	<1700	----	----	----	----	----	----	----

Matrix: WATER

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-390: Triorganotins (QC Lot: 4389504)											
Tributyltin	56573-85-4	5	ngSn/L	<5	4 ngSn/L	111	----	70	130	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4382363)										
HK1650386-001	Anonymous	**EG020: Arsenic**	7440-38-2	50 mg/kg	92.7	----	75	125	----	----
		EG020: Cadmium	7440-43-9	50 mg/kg	95.6	----	75	125	----	----
		EG020: Chromium	7440-47-3	50 mg/kg	97.0	----	75	125	----	----
		EG020: Copper	7440-50-8	50 mg/kg	86.4	----	75	125	----	----
		EG020: Lead	7439-92-1	50 mg/kg	90.5	----	75	125	----	----
		EG020: Mercury	7439-97-6	1 mg/kg	98.3	----	75	125	----	----
		EG020: Nickel	7440-02-0	50 mg/kg	90.4	----	75	125	----	----
		EG020: Silver	7440-22-4	50 mg/kg	97.0	----	75	125	----	----
		EG020: Zinc	7440-66-6	50 mg/kg	86.2	----	75	125	----	----
EP-065: PCB Single Congeners (QC Lot: 4378891)										
HK1649886-002	Anonymous	**PCB 8**	34883-43-7	5 µg/kg	61.2	----	50	130	----	----
		PCB 18	37680-65-2	5 µg/kg	57.1	----	50	130	----	----
		PCB 28	7012-37-5	5 µg/kg	52.4	----	50	130	----	----
		PCB 44	41464-39-5	5 µg/kg	52.1	----	50	130	----	----
		PCB 52	35693-99-3	5 µg/kg	52.0	----	50	130	----	----
		PCB 66	32598-10-0	5 µg/kg	56.7	----	50	130	----	----
		PCB 77	32598-13-3	5 µg/kg	61.6	----	50	130	----	----
		PCB 101	37680-73-2	5 µg/kg	61.1	----	50	130	----	----
		PCB 105	32598-14-4	5 µg/kg	66.4	----	50	130	----	----
		PCB 118	31508-00-6	5 µg/kg	62.3	----	50	130	----	----
		PCB 126	57465-28-8	5 µg/kg	68.4	----	50	130	----	----
		PCB 128	38380-07-3	5 µg/kg	68.8	----	50	130	----	----
		PCB 138	35065-28-2	5 µg/kg	67.6	----	50	130	----	----
		PCB 153	35065-27-1	5 µg/kg	68.9	----	50	130	----	----
		PCB 169	32774-16-6	5 µg/kg	71.4	----	50	130	----	----
		PCB 170	35065-30-6	5 µg/kg	71.5	----	50	130	----	----
		PCB 180	35065-29-3	5 µg/kg	70.8	----	50	130	----	----
		PCB 187	52663-68-0	5 µg/kg	69.5	----	50	130	----	----
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602)										
HK1650380-001	Anonymous	**Naphthalene**	91-20-3	500 µg/kg	96.1	----	50	130	----	----
		Acenaphthylene	208-96-8	500 µg/kg	99.3	----	50	130	----	----
		Acenaphthene	83-32-9	500 µg/kg	88.5	----	50	130	----	----
		Fluorene	86-73-7	500 µg/kg	90.6	----	50	130	----	----
		Phenanthrene	85-01-8	500 µg/kg	93.0	----	50	130	----	----
		Anthracene	120-12-7	500 µg/kg	88.6	----	50	130	----	----
		Fluoranthene	206-44-0	500 µg/kg	97.7	----	50	130	----	----
		Pyrene	129-00-0	500 µg/kg	97.9	----	50	130	----	----
		Benz(a)anthracene	56-55-3	500 µg/kg	93.0	----	50	130	----	----

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-076HK: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 4380602) - Continued										
HK1650380-001	Anonymous	**Chrysene**	218-01-9	500 µg/kg	97.2	----	50	130	----	----
		Benzo(b)fluoranthene	205-99-2	500 µg/kg	91.4	----	50	130	----	----
		Benzo(k)fluoranthene	207-08-9	500 µg/kg	100	----	50	130	----	----
		Benzo(a)pyrene	50-32-8	500 µg/kg	93.5	----	50	130	----	----
		Indeno(1.2.3.cd)pyrene	193-39-5	500 µg/kg	80.5	----	50	130	----	----
		Dibenz(a.h)anthracene	53-70-3	500 µg/kg	87.9	----	50	130	----	----
		Benzo(g.h.i)perylene	191-24-2	500 µg/kg	86.6	----	50	130	----	----

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPD (%): Value	RPD (%): Control Limit
EP-390: Triorganotins (QC Lot: 4389504)										
HK1650510-003	Anonymous	**Tributyltin**	56573-85-4	4 ngSn/L	92.0	----	70	130	----	----

Surrogate Control Limits

Sub-Matrix: SOIL

Compound	CAS Number	Recovery Limits (%): Low	Recovery Limits (%): High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130

Physical Test Report
(Particle Size Distribution)

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR T W TAM	WORK ORDER	: **HK1650386**
CLIENT	: **ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING**		
ADDRESS	: RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T. HONG KONG	SUB-BATCH DATE RECEIVED DATE OF ISSUE	: 1 : 12-DEC-2016 : 30-DEC-2016
PROJECT	: TCS00744	NO. OF SAMPLES CLIENT ORDER	: 1 : ----

General Comments

- **Site Name: Ocean Park - RBRG and 34/2002 Testing**
- **Sample(s) were picked up from client by ALS Technichem (HK) staff in chilled condition.**
- **Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.**
- **Soil sample(s) as received, digested by In-house method E-ASTM D3974-09 prior to determination of metals. The In-house method is developed based on ASTM D3974-09 method.**
- **Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.**

Signatories

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	*Position*
Richard Fung	General Manager

This is the Final Report and supersedes any preliminary report with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ALS Technichem (HK) Pty Ltd
Part of the ALS Laboratory Group
1/F, Chung Shun Knitting Centre 1 - 3 Wing Yip Street Kwai Chung N.T. Hong Kong
Tel. +852 2610 1044 Fax. +852 2610 2021 www.alsglobal.com

WORK ORDER	: HK1650386
SUB-BATCH	: 1
CLIENT	: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING
PROJECT	: TCS00744

ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	SOIL	12-DEC-2016	J2999-262.2

TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001

Report No : J2999-262.2

Customer : ALS Technichem (HK) Pty Ltd Job No. : J2999 Works Order No. : 262

Project : - Contract No.: Date : 14/12/2016

Sample ID No.	Sample ID No.	Type	Depth (m)	Δ Moisture Content (%)	Test 6.1 Liquid Limit (%)	Test 6.1 Plastic Limit (%)	Test 6.1 Plasticity Index (%)	Test 6.2 Liquidity Index	Passing 425μm Test Sieve (%)	Preparation Method	Particle Size Distribution # Test Method	Percentage Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Description	Sample Origin
HK1650386-001	COMPOSITE SAMPLE (PT1 TO PT10)	LB									1,5,7	8	35	41	16	Dark grey, slightly gravelly, sandy SILT/CLAY	-‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45 °C ± 5°C (A), Test 5.2 Moisture Content at 105 °C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105 °C± 5°C (C)

= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

Symbols : U - Undisturbed Sample; LB - Large Disturbed Sample; BLK - Block Sample; SPTL - SPT Split-Barrel Sample; P - Piston Sample; M - Mazier Sample; D - Small Disturbed Sample; PT - Portable triple tube Sample; N.P. - Non Plastic; A.R. - As Received; H.P. - Hand Picked; ^ - Moisture Content for A.L. Test. A.D. - Air Dried; O.D. - Oven Dried; W.S. - Wet Sieved; Sampling History - Refer the Individual Test Report; Estimated Uncertainty - Refer the Individual Test Report. ‡ - Information provided by customer.

Notes: IS - Insufficient Sample; Tf - To Follow on supplementary Report.

Checked by : H W Chung Approved By : Lau Wai Cheong, Deputy Laboratory Manager Date : 20/12/2016

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

TEST REPORT
DETERMINATION OF PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / ~~8.2~~*, 8.5 / ~~8.6~~* and 8.7
(Wet Sieve and Hydrometer Method)

Report No. : J2999-262.2

Job No. : J2999 Contract No. :
Customer : ALS Technichem (HK) Pty Ltd
Project :

Date Received : 14/12/2016
Tested Date : 14/12/2016

Description : Dark grey, slightly gravelly, sandy SILT/CLAY
Sieve Method : Method A

Works Order No. : 262
Sample ID No. : HK1650386-001
Sample No. : COMPOSITE SAMPLE (PT1 TO PT10)
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Large Disturbed
Sample Origin : -‡

ˆUpon request * Delete as appropriate ‡Information provided by customer

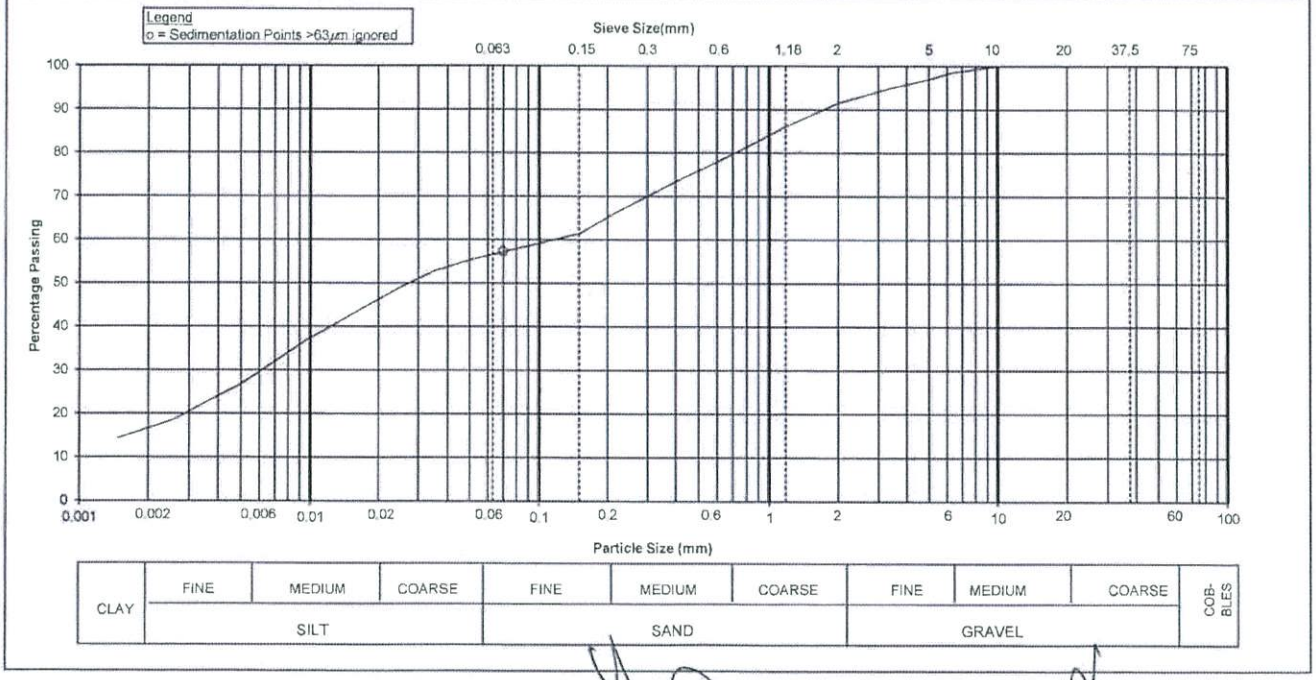
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	97	-	-
3.35 mm	95	-	-
2.00 mm	92	-	-
1.18 mm	86	-	-
600 µm	78	-	-
425 µm	74	-	-
300 µm	70	-	-
212 µm	66	-	-
150 µm	62	-	-
63 µm	57	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0695	-	57	-
0.0495	-	55	-
0.0353	-	53	-
0.0253	-	49	-
0.0181	-	45	-
0.0096	-	37	-
0.0049	-	27	-
0.0025	-	18	-
0.0015	-	14	-

SUMMARY :

Gravel (%)	:	**8**
Sand (%)	:	**35**
Silt (%)	:	**41**
Clay (%)	:	**16**



Technician : K L Lau
Date : 14/12/2016

Checked By :
Name : H W Chung
Date : 20/12/2016

Approved By :
Signatory : Lau Wai Cheong
Date : 20/12/2016

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