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Materialab

Ref No.: 100440EN150481

Contract No. EP/SP/58/08
Sludge Treatment Facilities
Environmental Monitoring and Audit Report
For
April 2015

Materialab Ref No.: 100440EN150481

Certified by



John K. M. Ho
(Environmental Team Leader)

Date

:

14 May 2015

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1. Executive Summary

Construction work commenced on 22 December 2010. It was of main concern to ascertain whether there was any undesirable effect of the construction activities on various environmental parameters over the site area and the surrounding environment. Impact environmental monitoring on water quality, landfill gas, ecology and landscape and visual impact were carried out to acquire data for assessing any impact associated with the construction activities. This report covers the period from 25 March 2015 to 24 April 2015 inclusive.

Marine Water Quality

Pursuant to EM&A manual, marine water quality monitoring is required during the foundation piling. Piling work was commenced on 21 February 2011 while marine water quality monitoring was conducted during the foundation piling. The foundation piling work was completed on 13 October 2011 and the pre-bore piling of the STF was completed on 22 February 2012 (the post monitoring for marine water has been completed on 20 March 2012). Although marine water quality monitoring resumed on 03 July 2012 due to the commencement of pre-bore operation for sheet piling, the pre-bore operation as planned was not carry out. Therefore the impact marine water quality monitoring was suspended on 20 August 2012 and post impact monitoring is not required.

Marine water quality monitoring was not required in the reporting period.

Stream Water Quality

Pursuant to Clause 5.7.1.1 of the EM&A Manual, impact water quality monitoring shall be carried out during site formation, piling and construction of the access road. As the above mentioned site construction has been completed on 17 August 2012 (four weeks post monitoring was commenced by 20 August 2012 and ended on 14 September 2012 inclusively), so that stream water quality monitoring was not required in the reporting period.

In general, the stream water quality was not significantly deteriorated after the commencement of the major construction works on 21 February 2011.

Landfill Gas Monitoring

There was no excavation or works related to manholes, chambers and confined space in the reporting period. Monitoring for landfill gas was not carried out in the reporting period.

Ecology Monitoring

Two surveys were conducted on 02 and 21 April 2015 at the Middle Lagoon. Total of 36 nos. of birds of 11 species was recorded on 21 April 2015. None of the birds showed any apparent signs of disturbance arising from the STF construction activities. All measures were followed to minimize the disturbance of the wildlife. No disturbance was observed while construction work in progress.

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Landscape and Visual Monitoring

Landscape and visual impact monitoring was conducted on 07 and 21 of April 2015. Details are presented in Section 4.3.

Radon Monitoring

Radon monitoring was carried out by a certified indoor air quality inspection body prior to the occupation of the STF buildings and quarterly during the first year of operation of the STF, in accordance with EPD's *ProPECC Note PN 1/99 Control of Radon Concentration in New Buildings Appendix 2, "Protocol of Radon Measurement for Non-residential Building"* to monitor the radon concentrations inside the occupied buildings. Details of the radon measurement before occupation can be referred to the Radon Monitoring Report Ref. No. 100440EN140865(1)A in Appendix 5, Monthly EM&A Report of February 2015.

Works Undertaken During Reporting Period

The construction phase commenced on 22 December 2010, major site activities conducted in the reporting period includes:

- Replacing FRP Glasses;
- Lift Maintenance;
- Dangerous Good Store inspection; and
- Defect Rectification Works in Turbine A & B.

Works area is shown in Figure 1.1

Reporting Changes and Future Key Issues

It is anticipated that the existing operation should not create significant nuisance and disturbance on the environmental aspects of air quality, noise level and water quality. Foundation piling was started on 21 February 2011 and completed on 13 October 2011. Additional pre-bore operation was completed on 22 February 2012. Contractor should implement proposed measures to minimize potential impact to the noise, air quality, stream and marine water quality, ecology and landscape.

Generation of site runoff is anticipated during rain season, the drainage systems should be maintained regularly to ensure wastewater could be treated properly prior to discharge. Loose and exposed surfaces should be compacted or covered to minimize soil erosion. Remove the stagnant water after the rainfall or provide pesticide to avoid mosquito breeding.

Complaints, Summons and Successful Prosecutions

As far as complaints, summons and successful prosecutions on the construction work in respect of the environmental protection and pollution control was concerned, there was no documented correspondence received in the reporting period.

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2. Introduction

This monthly report reviews the progress of the environmental monitoring and audit work at the site for Contract No. EP/SP/58/08 from 25 March 2015 to 24 April 2015 (the reporting period) and forecasts the activities for May 2015. Since water quality monitoring was not required in the reporting period, no graphical presentation for marine and stream water quality results for the reporting period is included. Findings of Landfill Gas, Ecology and Landscape monitoring are presented in Section 4. For radon monitoring, measurement details and results can be referred to the Radon Monitoring Report Ref. No. 100440EN140865(1)A in Appendix 5, Monthly EM&A Report of February 2015.

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3. General Review

3.1 Background

The Contractor, VW-VES (HK) Limited, has been awarded a contract by the Environmental Protection Department of the Government of the Hong Kong Special Administrative Region for the Sludge Treatment Facilities. The location of the site is shown in Figure 3.1.

The program commenced in November 2010 and is anticipated to complete in 2015.

The construction schedule will be based on the major works associated with the project. The major works under this contract include:

Incineration Plant

- a) Sludge receiving, storage and feeding system
- b) Fluidized bed incinerators
- c) Waste heat recovery and power generation system
- d) Flue gas treatment system
- e) Ash storage and handling system
- f) Residue storage and handling system
- g) Fluidized bed sand storage and handling system
- h) Reagent reception and storage system
- i) Process control and monitoring system

Ancillary and Supporting Facilities

- a) Weighbridge
- b) Site security
- c) Administration building
- d) Vehicle washing facilities
- e) Maintenance workshop and utility yard
- f) Drainage system
- g) Sewerage system
- h) Sewage treatment works
- i) Water supply system
- j) Deodorization system

Construction program for the captioned project is enclosed in Appendix 1.

Fugro Technical Services Ltd. – MaterialLab Division (MaterialLab) has been commissioned by the client as the Environmental Team which comprises the monitoring staff and the environmental auditor to undertake the environmental monitoring and audit work for this project. The project management structure and organization chart is shown in Appendix 2.

The contact person and telephone numbers of key personnel for the captioned project are shown in Table 3.1.

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Table 3.1 The Contact Persons and Telephone Numbers of Key Personnel

Company / Department	Role in the Contract	Contact Person	Telephone Number
VW-VES (HK) Limited	Contractor	Mr. Vincent Deleu	2253 2600
Environmental Protection Department	Employer	Mr. Kenneth Chan	2872 1800
Environmental Protection Department, EIAO	EIAO Officer	Mr. Thomas To	2835 1103
JACOBS	Employer Representative	Mr. Leslie Swann	2880 9788
Fugro Technical Services Ltd. – Materialab Division	Environmental Team	Mr. John Ho	2450 8233
BMT Asia Pacific Ltd.	Independent Environmental Checker	Ms. Claudine Lee	2241 9847

3.2 Summary of Environmental Monitoring and Audit (EM&A) Requirements

The EM&A program requires the monitoring of water quality prior to the commencement of and during the construction. A baseline report was prepared in December 2010 for the contract based on monitoring data acquired before the commencement of construction works.

Impact monitoring of water quality is to be undertaken at the designated monitoring stations. The monitored parameters are summarized in Table 3.2.

Action and Limit (AL) levels are established based on the data from the baseline report. Should the monitoring results indicate any non-compliance of AL levels, actions according to the Event / Action Plan in Appendix 3 are to be followed and appropriate environmental mitigation measures as in Appendix 4 are to be implemented to rectify the situation. The implementation status of mitigation measures is also shown in Appendix 4.

Impact ecology and visual survey are to be conducted at the construction area on regular basis. Monitoring parameters are tabulated in Table 3.2.

Radon monitoring should be carried out by a certified indoor air quality inspection body prior to the occupation of the STF buildings and quarterly during the first year of operation of the STF, in accordance with EPD's *ProPECC Note PN 1/99 Control of Radon Concentration in New Buildings Appendix 2, "Protocol of Radon Measurement for Non-residential Building"* to monitor the radon concentrations inside the occupied buildings. Monitoring parameters are tabulated in Table 3.2.

The Contractors (VW-VES (HK) Limited) is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimize waste or redress problems arising from the waste from the site. The waste material may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land, storm sewer, sanitary water, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land.

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The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant licence / permit, such as the effluent discharge licence, the chemical waste producer registration, etc. shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the licence / permit.

The environmental mitigation measures and status for waste management are summarized in Appendix 4.

Table 3.2 Summary of Monitored Parameters

Parameters	Monitored Items	Number of Stations	Frequency	Requirement
Marine water	<ul style="list-style-type: none"> ▪ Cadmium ▪ Chromium ▪ Aluminium 	2 monitoring stations and 1 control station	Three days per week for mid-ebb and mid-flood tides during foundation piling of the STF.	Sampling is taken at three water depths, namely, 1m below water Surface, mid-depth and 1m above sea bed, except where the water depth be less than 6m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3m, only the mid-depth station will be monitored.
Stream water	<ul style="list-style-type: none"> ▪ pH ▪ Turbidity ▪ Suspended solids ▪ Dissolved oxygen 	3 monitoring stations and 2 control stations	Three days per week for mid-ebb and mid-flood tides during site formation and foundation piling of the STF and construction of the access road.	<ul style="list-style-type: none"> ▪ Two consecutive measurements of DO concentration, DO saturation, turbidity and pH are taken at mid-depth at each location. ▪ Water samples for SS measurement is collected at the same depth at each location.
Ecology	Site condition and bird monitoring	Whole Middle Lagoon and 20m from the boundary of the Lagoon	<ul style="list-style-type: none"> ▪ Monthly monitoring for avifauna. ▪ Habitat monitoring at least twice per month. ▪ Monthly vegetation monitoring. 	<ul style="list-style-type: none"> ▪ Avifauna and their behavior. ▪ All birds seen and heard should be identified and counted. ▪ Signs of breeding of birds. ▪ Coverage of water and PFA filling activities in Middle Lagoon.

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Table 3.2 (Con't)

Parameters	Monitored Items	Number of Stations	Frequency	Requirement
Landscape and Visual Impact	All measures, including compensatory planting, undertaken by both the Contractor and the specialist Landscape Sub-Contractor	East Lagoon	Biweekly.	Ensure compliance with the intended aims of the measures and the effectiveness of the mitigation measures.
Landfill gas	<ul style="list-style-type: none"> ▪ Oxygen ▪ Methane ▪ Carbon dioxide 	Excavation, operation in chamber and confined space within the WENT Landfill Control Zone. (See Figure 3.2)	During the construction and operation.	<ul style="list-style-type: none"> ▪ Excavation between 300mm to 1m deep: <ul style="list-style-type: none"> - Directly after the excavation has been completed. - Periodically whilst the excavation remains open. ▪ Excavation deeper than 1m: <ul style="list-style-type: none"> - At ground surface before excavations commences. - Immediately before any worker enters the excavation. - At the beginning of each working day for the entire period the excavation remains open. - Periodically whilst the excavation remains open.
Radon	Bq/m ³	45 Sampling Locations	Prior to the occupation of the STF buildings and quarterly during the first year of operation of the STF.	To confirm that the radon level complies with the guideline value stipulated in EPD ProPECC Note PN 1/99.

3.3 Action and Limit Levels

Water Quality Limit

Environmental auditing on the monitoring data is to be undertaken based on the Action and Limit (AL) levels for water quality to check against any non-compliances.

The AL levels for monitored parameters are formulated from the baseline monitoring data. The AL levels for marine and stream water quality are tabulated in Table 3.3.

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Table 3.3 Action and Limit Levels for Marine and Stream Water Quality

Parameters	Action Level	Limit Level
DO in mg/L (mid-depth)	≤ 5.16	≤ 4
SS in mg/L (mid-depth)	≥ 41 <u>AND</u> 120% of control station's SS on the same day of measurement	≥ 85 <u>AND</u> 130% of control station's SS on the same day of measurement
Turbidity in NTU (mid-depth)	≥ 36.4 <u>AND</u> 120% of control station's turbidity on the same day of measurement	≥ 78.9 <u>AND</u> 130% of control station's turbidity on the same day of measurement
pH	pH ≤ 7.55 or pH ≥ 8.11	pH ≤ 6 or pH ≥ 9
Cadmium in μg/L	≥ 0.5	≥ 0.5
Chromium in μg/L	≥ 1	≥ 1
Aluminium in μg/L	≥ 20	≥ 20

Notes:

- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Landfill Gas Limit

Depending on the results of the measurements, actions required will be vary and should be set down by the Safety Officer or other appropriately qualified person. The actions shown in Table 3.4 should be referred as the minimum requirements to be encompassed.

Table 3.4 Action Level for Landfill Gas Measurement

Parameter	Measurement	Action
Oxygen	<19 %	<ul style="list-style-type: none"> ▪ Ventilate to restore oxygen to >19 %
	<18 %	<ul style="list-style-type: none"> ▪ Stop works ▪ Evacuate personnel / prohibit entry ▪ Increase ventilation to restore oxygen to >19 %
Methane	>10 % LEL (i.e. >0.5 % by volume)	<ul style="list-style-type: none"> ▪ Prohibit hot works ▪ Ventilate to restore methane to <10 % LEL
	>20 % LEL (i.e. >1 % by volume)	<ul style="list-style-type: none"> ▪ Stop works ▪ Evacuate personnel / prohibit entry ▪ Increase ventilation to restore methane to <10 % LEL
Carbon dioxide	>0.5 %	<ul style="list-style-type: none"> ▪ Ventilate to restore carbon dioxide to <0.5 %
	>1.5 %	<ul style="list-style-type: none"> ▪ Stop works ▪ Evacuate personnel / prohibit entry ▪ Increase ventilation to restore carbon dioxide to <0.5 %

Objective for Radon Monitoring

The average radon concentration during the measurement period should preferably be lower than the territory-wide mean concentration of 100 Bq/m³ and in any case, any individual measurement must not exceed 200 Bq/m³.

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4. Construction Phase Environmental Monitoring

The construction phase was commenced on 22 December 2010. Pursuant to Clause 5.7.1.1 of the EM&A Manual, impact water quality monitoring shall be carried out during site formation, piling and construction of the access road. As the above mentioned site construction has been completed on 17 August 2012 (four weeks post monitoring was commenced by 20 August 2012 and ended on 14 September 2012 inclusively), so that stream water quality monitoring was not required in the reporting period.

4.1 Landfill Gas Monitoring**4.1.1 Monitoring methodology**

4.1.1.1 Routine monitoring should be carried out in all excavations, manholes, chambers, relocation of monitoring wells and any other confined spaces that may have been created. All measurements in excavations should be made with the extended monitoring tube located not more than 10mm from the exposed ground surface. Monitoring should be performed properly to make sure that the area is free of landfill gas before any man enters into the area.

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

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

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

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

4.1.1.4 For excavations less than 300mm and 1m deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.

4.1.1.5 Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or other appropriately qualified person. As a minimum these should encompass those actions specified in Table 3.4.

4.1.2 Monitoring equipment

Table 4.1 Landfill Gas Monitoring Equipment

Equipment	Model	Parameters Measured
<i>Fieldwork – Landfill Gas Monitoring</i>		
Landfill Gas Analyzer	RAE QRAE II Multi-gas Detector	Methane, oxygen, carbon dioxide

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4.1.3 Monitoring result

No excavation or confined space operation in progress inside the WENT Landfill consultation Zone in the reporting period. Monitoring of landfill gas was not required.

4.2 Ecological Monitoring

4.2.1 Two monitoring visits were conducted on 02 and 21 April 2015 to assess the measures in place to minimise the disturbance impact to wildlife. The 3m high hoarding to reduce disturbance impact of human activities on adjacent areas (namely the Middle Lagoon and other natural habitats) remains in place. No observations of disturbance through construction operations to wildlife on adjacent habitats were made during this and the other monitoring checks conducted during this period.

4.2.2 Monthly monitoring of avifauna and their notable behaviour, such as breeding activities in the Middle Lagoon, was conducted on 21 April 2015. The Monitoring Area included the whole Middle Lagoon and area extending 20m from the boundary of the Lagoon (see Figure 4.1). All birds seen and heard were identified and counted. Any signs of breeding (e.g. nests, recently fledged juveniles) of birds (e.g. Little Grebe) were also recorded. The coverage of water and PFA filling activities in the Middle Lagoon as well as construction activities were also recorded as reference information.

4.2.3 The list of bird surveys recorded from the survey conducted on 21 April 2015 can be seen in Table 4.2. On that date, water coverage in the Middle Lagoon (in the unfilled section of the Lagoon) was 0%. No PFA filling activities were recorded in the Middle Lagoon; much of the former lagoon has already been raised up to bund level. No Little Grebes were recorded in the remaining sections of the Middle Lagoon, which have not been filled.

Table 4.2 Bird Species Observed During Monthly Monitoring Surveys in April 2015

Survey Date: 21 April 2015			
Water Levels: 0%			
Species Name	Scientific Name	Middle Lagoon	Breeding Activity
Black Kite	<i>Milvus migrans</i>	1	None observed.
Little Ringed Plover	<i>Charadrius dubius</i>	1	None observed.
Spotted Dove	<i>Spilopelia chinensis</i>	2	None observed.
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	1	None observed.
Chinese Bulbul	<i>Pycnonotus sinensis</i>	2	None observed.
Barn Swallow	<i>Hirundo rustica</i>	8	None observed.
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	2	Singing - holding territory
Black-collared Starling	<i>Gracupica nigricollis</i>	2	Singing - holding territory
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	2	None observed.
Black-faced Bunting	<i>Emberiza spodocephala</i>	3	None observed.
Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	12	None observed.
Total Numbers		36	
Total Species		11	

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4.3 Landscape and Visual Impact Monitoring

The landscape and visual impact assessment of the EIA Study recommended a series of mitigation measures to ameliorate the landscape and visual impacts of the Project. The measures for the construction phase as recommended in the EIA Report are summarized in Table 4.3.

Site inspections for the monthly EM&A Record for Landscape and Visual Impact (April 2015) were undertaken on 07 and 21 of April 2015. Observation of the implementation of proposed landscape and visual mitigation measures are summarized in Table 4.3.

Table 4.3 Record of Implementation of the Proposed Landscape and Visual Mitigation Measures in Construction Phase (April 2015)

ID No.	Nature / Type	Landscape and Visual Mitigation Measures	Status (April 2015)	Remarks
CM1	Design / Construction Planning	Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works, where practical.	Not applicable.	Suitable topsoil already imported for planting during landscape planting phase. As per observation on site, the PFA excavated out due to site formation work had been under treatment (dehydration), and is backfilled to its original location inside the site boundary. Capping of the PFA is established to prevent spreading in air. Photographic record of topsoil imported has been shown in Table 4.4.
CM2	Site Practice	Existing trees to be retained on site should be carefully protected during construction.	The contractor has confirmed T758 to be retained on site and proper tree protection would be required for T758. Amendment to the tree felling application already updated and sent to DLO on 17 July 2013.	Photographic record of the retained tree T758 is shown in Table 4.4.

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Table 4.3 (Con't)

ID No.	Nature / Type	Landscape and Visual Mitigation Measures	Status (April 2015)	Remarks
CM3	Design / Construction Planning	Trees unavoidably affected by the works should be transplanted where practical.	Total 13 nos. of transplanted trees have been transplanted back to the site.	There have 2 transplanted trees are found dead in March 2014. Compensatory trees will be proposed in the revised compensatory planting proposal in compensation for the loss of the 2 trees. Condition of the other transplanted trees is under close monitoring.
CM4	Design / Construction Planning	Compensatory tree planting should be provided to compensate for felled trees.	Over half of compensatory trees planting required has been completed. Trees sizes, girth, species tailored with the submitted compensatory tree plan.	Over half of compensatory trees planting required has been completed. Site photos refer to Table 4.4.
CM5	Site Practice	Control of night-time lighting.	In progress.	Night-time work was implemented from 7pm to 6am for certain period in April 2015. The lighting is confined to the construction site without affecting the periphery area. Photographic record of the night-time working is shown in Table 4.4.
CM6	Design / Construction Planning	Erection of decorative screen hoarding compatible with the surrounding setting.	Completed.	Erection of decorative screen hoarding has been set up along the site boundary.

CM1 - Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works, where practical.

Topsoil found within the project site is PFA. Suitable topsoil already imported for planting. All PFA excavated during the tree felling works has been retained in the site confinement. The PFA has been under dehydration and concealed properly to prevent spreading in the air. Backfill of PFA to its original location inside site area is under progress.

CM2 – Existing trees to be retained on site should be carefully protected during construction.

The Tree felling work approved under the Phase 1 and 2 tree felling application has been completed. Proper procedures of tree felling have been observed. The tree felling works should not cause damages to the existing trees on site. T758 has been confirmed to be retained on site. Proper tree protection should be set up for T758.

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- CM3** – Trees unavoidably affected by the works should be transplanted where practical. Total 13 nos. of transplant trees have been transplanted back to the site in August and September 2013. There have 2 more transplant trees found dead in the March 2014. Compensatory trees will be proposed in the revised compensatory planting proposal in compensation for the loss of the 2 trees. Status of the other transplant trees is under close monitoring.
- CM4** – Compensatory tree planting should be provided to compensate for fell trees. Revised compensatory planting plan amendment submission awaiting approval from DLO. Over half of compensatory tree planting has been completed. Trees sizes, girth, species tailored with the submitted compensatory tree plan.
- CM5** – Control of night-time lighting. Night-time work was implemented from 7pm to 6am for certain period in April 2015. The lighting is confined to the construction site without affecting the periphery area.
- CM6** – Erection of decorative screen hoarding compatible with the surrounding setting. Construction of decorative screen hoarding compatible with the surrounding setting has been set up in January 2011.

Table 4.4 Photographic Record of Landscape and Visual Impact Survey

1. Photographic Record of the PFA Treatment	
	
<p>Capping of the PFA is established to prevent spreading in air.</p>	<p>Suitable topsoil has been imported to the site for softscape planting.</p>

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2. Photographic Record of Protection to the Fell / Retained Trees	3. Photographic Record of the Original Transplant Trees Location	4. Photographic Record of the Compensatory Tree Locations
		
<p>T758 is confirmed to be retained on site. Proper tree protection should be applied to protect T758.</p>	<p>Total 13 nos. of transplant trees have been transplanted back to the site in August and September 2013. There have 2 transplant trees found dead in March 2014. Status of the other transplant trees is under close monitoring.</p>	<p>Second batch of compensatory trees has finished.</p>
5. Photographic Record of the Night-Time Working		
		
<p>The lighting during night-time working is confined within the working area within the site boundary. Periphery area and the sensitive receivers are not affected by the lighting during night-time working.</p>	<p>The lighting during night-time working is confined within the working area within the site boundary. Periphery area and the sensitive receivers are not affected by the lighting during night-time working.</p>	

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4.4 Radon Monitoring

Radon monitoring measurement for Sludge Treatment Facilities in East Ash Lagoon area at Tsang Tsui was conducted from 25 August 2014 to 01 February 2015.

Monitoring methodology, equipment, calibration certificates, sampling locations, results and recommendations can be referred to the Radon Monitoring Report Ref. No. 100440EN140865(1)A in Appendix 5, Monthly EM&A Report of February 2015.

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5. Construction Site Environmental Audit**Site Audit**

Site audit is necessary to ensure:

- No unacceptable practice on site;
- Identification of potential impacts associated with construction activities; and
- Implementation of additional mitigation measures if necessary.

Environmental Site Audit has been conducted on 01, 09, 17 and 23 April 2015.

During the reporting period, as far as the site operation was concerned, replacing FRP glasses, lift maintenance, dangerous good store inspection and defect rectification works in Turbine A & B were in progress.

Regarding the air quality, access road were watered regularly by water truck or water sprinklers. Most of the site area has been covered by backfill material or coarse asphalt / aggregate. Moisture content of backfill materials and PFA stockpile had to be kept at the designed level before backfilling operation. Contractor should follow the good site practice to minimize the pulverized fuel ash from blowing up from dried surface.

With respect to water quality monitoring, one temporary water detention basin has been constructed at the North of the Lagoon near the ER's office (the west water detention basin has been backfilled). If there is any wastewater generated which will be pumped into the basin and will not be discharged out of the site. Construction of drainage system is in progress and a large portion of the site drainage has been completed.

Major Observation of Site Audit

- The contractor is reminded to cover exposed stockpiles on site with tarpaulin sheeting after working on the piles.

Waste Management

C&D Waste Backfill and excavation works were conducted during the reporting period. C&D waste was generated from the current activities and sent to public fill.

General Refuse Paper / cardboard, metal and plastics were collected by recycling collectors as far as practicable and general refuse was collected and sent to WENT Landfill.

Chemical Waste No chemical waste was generated during the reporting period.

Wastewater Rain water was treated by the silt removal facilities before discharged outside the site. Waste was collected by licensed collector.

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Table 5.1 Waste Flow Summary

Type of Waste	Quantity Generated in April 2015	Cumulative Quantity during Construction Period
Inert C&D waste*	NIL	30,949.071m ³
Chemical waste (Liquid)	NIL	14,032.000 L
Chemical waste (Solid)	NIL	177,323.000kg
Metal	1.000kg	2,904,617.463kg
Paper / Cardboard Packaging	600.000kg	55,027.500kg
Plastic	10.000kg	6,897.000kg
Others, e.g. general refuse	42.619m ³	6,107.488m ³

Remarks: Density of Inert C&D waste and general refuse is 1.9 tonne/m³ and 1.6 tonne/m³ respectively
* The total quantity generated of Inert C&D Waste in April 2012 and May 2012 were revised as the quantities of reused in other projects need to be included

Impact Predication Review

In May 2015, decoration works, insulation and cladding works in Plant B, hard & soft landscape works, defect rectification works, lift inspection at maintenance workshop & admin building, and dismantling of scaffolding will be conducted. It is expected that these operations will not impose significant air, noise and water quality impact to the sensitive receivers. Nevertheless, necessary mitigation measures should be deployed when needed.

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6. Summary of Complaints, Summons and Successful Prosecutions

No complaints, summons and successful prosecutions in association with the construction activities concerning the environmental protection and pollution control were received in the reporting period.

Table 6.1 Summary of Environmental Complaints and Prosecutions

Complaints Logged		Summons Served		Successful Prosecution	
April 2015	Cumulative	April 2015	Cumulative	April 2015	Cumulative
0	2	0	0	0	0

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7. Works Program for May 2015

The following major construction works will be in progress in May 2015:

1. Decoration Works;
2. Insulation and Cladding Works in Plant B;
3. Hard & Soft Landscape Works;
4. Defect Rectification Works;
5. Lift Inspection at Maintenance Workshop & Admin Building; and
6. Dismantling of Scaffolding.

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8. Monitoring Schedule for the Coming Month

Pursuant to Clause 5.7.1.1 of the EM&A Manual, impact water quality monitoring shall be carried out during site formation, piling and construction of the access road. As the above mentioned site construction has been completed on 17 August 2012, four weeks post monitoring was commenced by 20 August 2012 and ended on 14 September 2012 inclusively.

Impact water quality monitoring is not required for the coming month.

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9. Comments and Conclusions for the Reporting Period

In this reporting period, i.e. 25 March 2015 to 24 April 2015, replacing FRP glasses, lift maintenance, dangerous good store inspection and defect rectification works in Turbine A & B were in progress. The site activities did not lead to any significant impact to noise, air quality, stream and marine water quality.

Contractor shall ensure proper site practices to be implemented to avoid any deterioration of the environment around the construction site. Although there is no sensitive receivers for noise and air quality close to the site area, mitigation measures to minimize dust and noise generated from site activities should be enforced.

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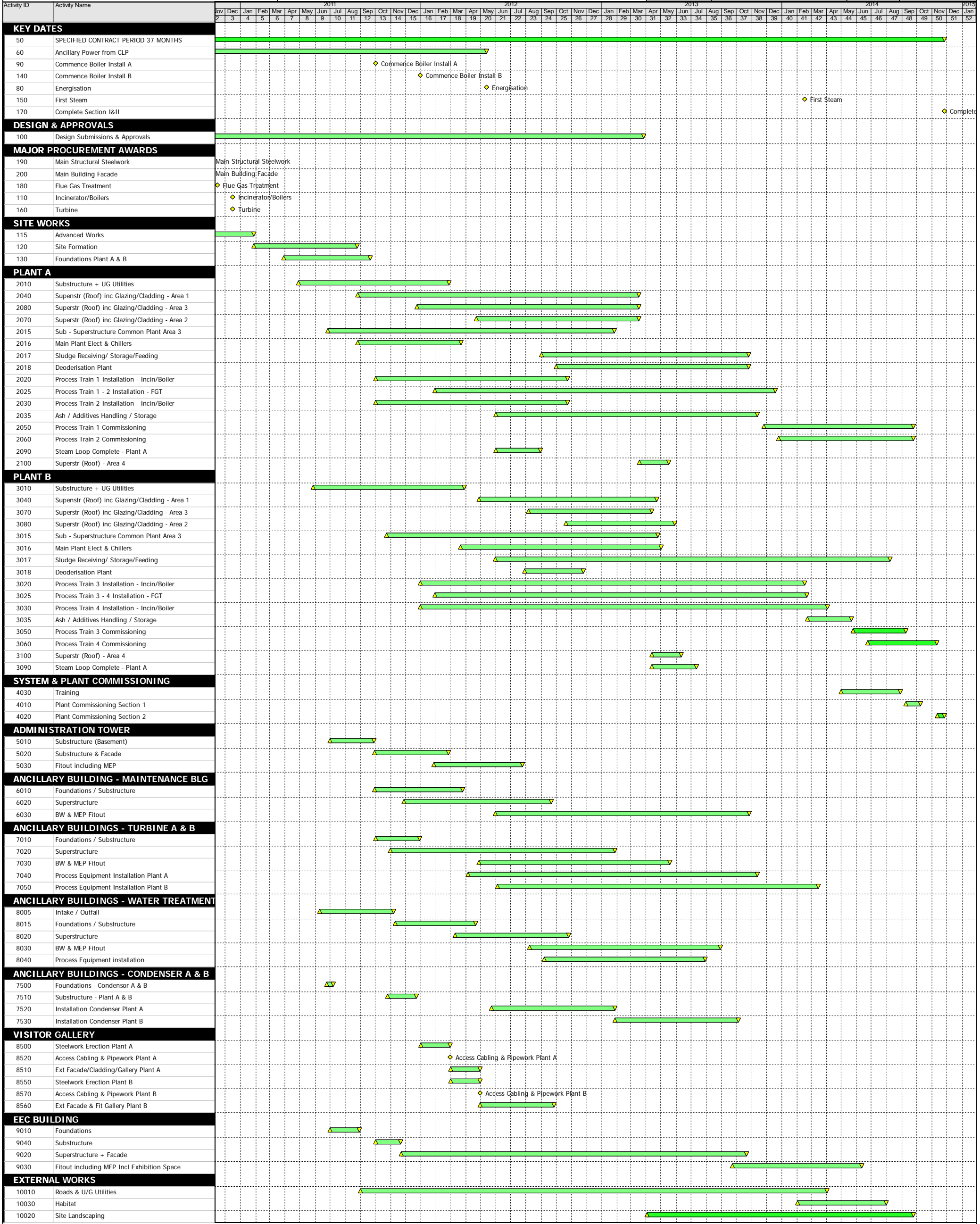
Appendix 1

Construction Program

SLUDGE TREATMENT FACILITIES

Project Overview

Date	Revision	Checked	Approved
02-Dec-10	VLJH-W-PT-ZZ-0002-D01	RGU	NPR



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Appendix 2

Management Structure and Organization Chart

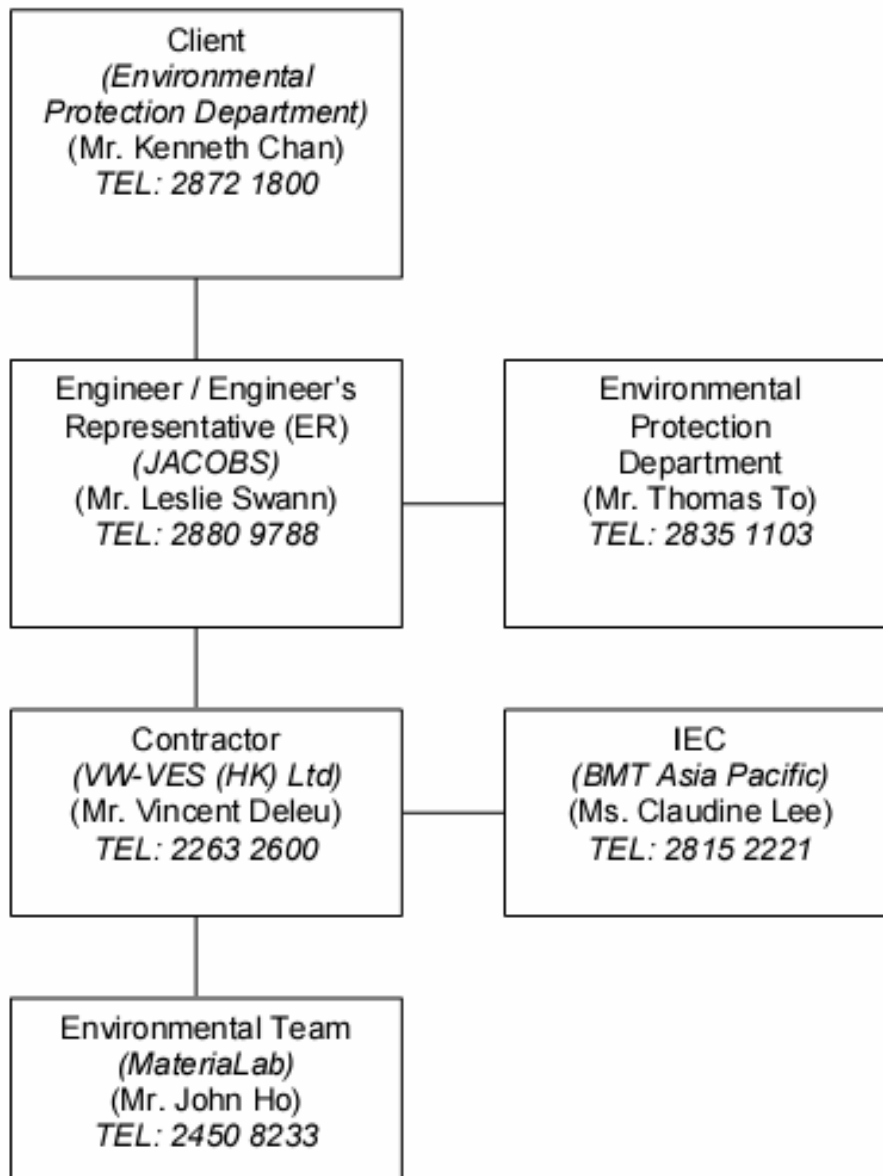
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Management Structure and Organization Chart



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Appendix 3

Event / Action Plan for Water Quality

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Event/Action Plan for Water Quality

Event	ET Leader	IEC	SOR	Contractor
Action level being exceeded by one sampling day	<ul style="list-style-type: none"> Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IEC and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC and Contractor; Repeat measurement on next day of exceedance. 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented. Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the SOR and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and SOR; Implement the agreed mitigation measures.
Action level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IEC and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC and Contractor; Ensure mitigation measures are implemented; Prepare to 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC on the Proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the SOR and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and SOR within three working days; Implement the agreed mitigation measures.

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	<ul style="list-style-type: none"> increase the monitoring frequency to daily; Repeat measurement on next day of exceedance. 			
Limit level being exceeded by one sampling day	<ul style="list-style-type: none"> Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IEC Contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, SOR and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level. 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the SOR and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and SOR and propose mitigation measures to IEC and SOR within three working days; Implement the agreed mitigation measures.
Limit level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IEC Contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the SOR and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and SOR and

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	<ul style="list-style-type: none"> • Discuss mitigation measures with IEC, SOR and Contractor; • Ensure mitigation measures are implemented; • Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. 		<ul style="list-style-type: none"> • of the implemented mitigation measures; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level. 	<ul style="list-style-type: none"> • propose mitigation measures to IEC and SOR within three working days; • Implement the agreed mitigation measures; • As directed by the SOR, to slow down or to stop all or part of the construction activities.
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Appendix 4

Implementation Schedule of Mitigation Measures

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Table 1. Implementation Schedule and Status of Proposed Air Quality Mitigation Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.8.1	<p>Implementation of the Air Pollution Control (Construction Dust) Regulation and good site practices:</p> <ul style="list-style-type: none"> • Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather. • Use of frequent watering for particularly dusty construction areas and areas close to ASRs. • Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines. • Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs. • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site. • Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods. 	Work site / During the construction period	Contractor		√			Air Pollution Control (Construction Dust) Regulation

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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	<ul style="list-style-type: none"> Imposition of speed controls for vehicles on unpaved site roads. Ten kilometers per hour is the recommended limit. Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs. Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise. 				√			
					√			
					√			

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

- Des - Design, C - Construction, O – Operation, and Dec – Decommissioning
- N/A – The associated activities are not in progress during the monitoring month, √ - The proposed mitigation measures is implemented

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Table 2. Implementation Schedule of Proposed Human Health Risk Mitigation Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	<p><u>Human Health Risk Associated with Radon</u></p> <p><i>Prevention of radon influx from the PFA to the STF buildings</i></p> <ul style="list-style-type: none"> A soil cover can be provided beneath the buildings on top of ash lagoon prior to construction works because it reduces the level of radon influx significantly Slab-on-grade can be an option on foundation design Soil suction can also prevent radon from entering the building by drawing the radon from below the building and venting it through a pipe, or pipes, to the air above the building. <p><i>Provision of Sufficient ventilation of the interior of the STF buildings</i></p> <ul style="list-style-type: none"> Forced and natural ventilation should be introduced properly to enhance air exchange rate in the STF buildings. Basement areas should be pressurized by using a fan to blow air into the basement areas from outdoors is suggested. This would create enough pressure at the lowest level indoors to prevent radon from entering into the STF buildings. <p><i>Regular maintenance for the floor slabs and walls</i></p> <ul style="list-style-type: none"> Cracks and other openings in the foundation should be properly sealed to reduce radon ingress. <p>Sealing the cracks limits the flow of radon into the building thereby making other radon reduction techniques more effective and cost-efficient. It also reduces the loss of conditioned air.</p>	STF buildings / During the design, construction and operation of the STF.	Contractor / STF Operator		N/A			EPD's ProPECC Note PN 1/99 Control of Radon Concentration in New Buildings Appendix 2
					N/A			
					N/A			
					N/A			

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Table 3. Implementation Schedule of Proposed Waste Management Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S5.5.1	<p><i>Good Site Practices</i></p> <p>Recommendations for good site practices during the construction activities include:</p> <ul style="list-style-type: none"> 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 minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. 	Work site / During the construction period	Contractor		√			Waste Disposal Ordinance (Cap.354) ETWB TCW No. 19/2005
S5.5.1	<p><i>Waste Reduction Measures</i></p> <ul style="list-style-type: none"> 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: 	Work site / During planning & design stage, and construction stage	Contractor		√			

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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	<ul style="list-style-type: none"> The design of the foundation works should minimize the amount of excavated material to be generated. Excavated soil should be reused on site as far as possible, e.g. for landscape works, in order to minimize the amount of public fill to be disposed off-site. Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. Encourage collection of aluminium cans by individual collectors by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the work force Proper storage and site practices to minimize the potential for damage or contamination of construction materials. Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste. 				√ √ √ √ √ √			
S5.5.1	<p><i>General Refuse</i></p> <p>General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.</p>	Work site / During the construction period	Contractor		√			Public Health and Municipal Services Ordinance (Cap. 132)

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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S5.5.1	<p><i>Construction and Demolition Material</i></p> <p>In order to minimize the impact resulting from collection and transportation of C&D material for off-site disposal, the excavated material arising from site formation and foundation works should be reused on-site as backfilling material and for landscaping works as far as practicable. Other mitigation requirements are listed below:</p> <ul style="list-style-type: none"> • A Waste Management Plan, which becomes part of the Environmental Management Plan, should be prepared in accordance with ETWB TCW No.19/2005. • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. • In order to monitor the disposal of C&D material at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No. 31/2004 for details. 	Work site / During design stage & construction period	Contractor	√	√			ETWB TCW No. 33/2002 ETWB TCW No. 19/2005 ETWB TCW No. 31/2004
S5.5.1	<p><i>Chemical Waste</i></p> <p>If chemical wastes are produced at the construction site, the Contractor would 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</p>	Work site / During the construction period	Contractor		√			Waste Disposal (Chemical Waste)(General) Regulation)

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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	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, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.							

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

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Table 4. Implementation Schedule of Proposed Land Contamination Preventive Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S5.6.3	<p><i>Fuel Oil Tank Construction and Test</i></p> <ul style="list-style-type: none"> The fuel tank to be installed should be of specified durability Double skin tanks are preferable Underground fuel storage tank to be installed should be placed within a concrete pit The concrete pit shall be accessible to allow regular tank integrity tests to be carried out at regular intervals The tank integrity tests should be conducted by an independent qualified surveyor or structural engineer Any potential problems identified in the test should be rectified as soon as possible 	Fuel Oil Storage Tank /	Contractor/ STF Operator	√	√ √ N/A √ √ √			
S5.6.3	<p><i>Fuel Oil Pipeline Construction and Test</i></p> <ul style="list-style-type: none"> Installation of aboveground fuel oil pipelines is preferable; if underground pipelines are unavoidable, concrete lined trenches should be constructed to contain the pipelines Double skin pipelines are preferable Distance between the fuel oil refuelling points and the fuel oil storage tank shall be minimized The integrity tests for the pipelines should be conducted by an independent qualified surveyor or structural engineer at regular intervals Any potential problems identified in the test should be rectified as soon as possible 	Fuel Oil Pipelines/ Design, Construction and Operation Phase	Contractor/ STF Operator	√	√ √ √ √			
S5.6.3	<p><i>Fuel Oil Leakage Detection</i></p> <ul style="list-style-type: none"> Installation of leak detection device at storage tank and pipelines 	Fuel Oil Storage Tank	Contractor/ STF Operator	N/A	N/A			

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

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- N/A - The associated activities are not in progress during the monitoring month, √ - The proposed mitigation measures is implemented

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Table 5. Implementation Schedule of Proposed Water Pollution Control Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S6.7.2	<p>Construction Runoff and Drainage</p> <ul style="list-style-type: none"> Site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" shall be followed as far as practicable in order to minimize surface runoff and the chance of erosion: At the start of site establishment, internal drainage works and erosion and sedimentation control facilities shall be implemented. Channels, earth bunds or sand bag barriers shall be provided on site to direct stormwater to silt removal facilities. The detailed design and installation of the temporary on-site drainage system shall be undertaken by the contractor prior to the commencement of construction. Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public sewers/drains. Boundaries of earthworks shall be surrounded by dykes or embankments for flood protection, as necessary. Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the standards of the Technical 	Work site / During the construction period	Contractor		√			ProPECC PN 1/94; WPCO
					N/A			
					√			
					√			
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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	<p>Memorandum under the Water Pollution Control Ordinance. The design of silt removal facilities shall be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.</p> <ul style="list-style-type: none"> Water pumped out from foundation piles shall be discharged into silt removal facilities. During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means, as far as practicable. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94. Exposed soil areas shall be minimized to reduce potential for increased siltation and contamination of runoff. Earthwork final surfaces shall be well compacted and subsequent permanent work or surface protection shall be immediately performed. Open stockpiles of construction materials or construction wastes on-site of more than 50m³ shall be covered with tarpaulin or similar fabric during rainstorms. All vehicles shall be cleaned before leaving the works area to ensure no earth, mud and debris is deposited on roads. An adequately designed and 							

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	sited wheel washing bay shall be provided at every site exit. The wheel washing facility shall be designed to minimize the intake of surface water (rainwater). Wash-water shall have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process.							
S6.7.2	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> Debris and refuse generated on-site shall be collected, handled and disposed of properly to avoid entering the nearby water bodies and public drainage system. Stockpiles of cement and other construction materials shall be kept covered when not being used. Oils and fuels shall only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies and public drains, all fuel tanks and storage areas shall 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 shall be drained of rainwater after a rain event. 	Work site / During the construction period	Contractor		√			ProPECC PN 1/94;
S6.7.2	<p><i>Sewage Effluents</i></p> <ul style="list-style-type: none"> Temporary sanitary facilities, such as portable chemical toilets, shall be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible for appropriate disposal and maintenance of these facilities. 	Work site / During the construction period	Contractor		√			ProPECC PN 1/94; WPCO

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				Des	C	O	Dec	
S6.7.2	<p><i>Release of PFA Leachate from Ash Lagoon into the Aquatic Environment</i></p> <ul style="list-style-type: none"> Environmental monitoring and audit (EM&A) should be included to ensure that the foundation construction would not cause an unacceptable release of PFA leachate into the Deep Bay waters. The parameters to be measured should include the heavy metals such as cadmium, chromium and aluminium, which have the greatest tendency to leach from the lagooned PFA into the seawater. Details of the measurement requirements are presented in the EM&A manual 	<p>Deep Bay</p> <p>Water outside the Ash Lagoon / During the construction period</p>	Contractor		√			WPCO

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Table 6. Implementation Schedule of Proposed Ecological Mitigation Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S7.8.2	<p>Measures to Minimize Disturbance Impact to Wildlife</p> <ul style="list-style-type: none"> • Hoarding of 3m high shall be set up along the boundary of the works areas and associated site access to shield the fauna and breeding population of Little Grebe in the Middle Lagoon from the disturbance impact of machinery. • The works boundaries shall not go beyond the proposed Project Area. All work crews, equipment and human activities shall be confined within the designated works area only. No personnel should encroach or wilfully disturb any wild animals and their habitats. Traffic and human access from the western side of the Project Area should be avoided. • Fencing with climbers or plantation shall be provided, where appropriate, along the STF site boundary and the two sides of access road to screen the surrounding habitats from the STF works areas. 	<p>Boundary of works areas/ Construction Phase</p>	Contractor		√			
		<p>Boundary of works areas/ Construction Phase</p>	Contractor		√			
		<p>Boundary of works areas/ Operation Phase</p>	Contractor		√			

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EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S7.8.2	<p>Measures to Minimize Impact to natural habitats</p> <ul style="list-style-type: none"> Where practicable, all proposed works shall be conducted in existing built up area to minimize impact to natural habitats. The abutment (permanent structure) for the vehicular bridge shall avoid streambed. The number and size of the temporary supporting structures to be installed over the streambed during construction shall be minimized as far as practicable. The temporarily affected natural habitats, including streambed, shall be reinstated after the completion of works. For affected natural stream section, placement of substrates of similar size and composition to those of original streambed shall be considered to encourage colonization. 	<p>Works areas/ Design and Construction Phase</p> <p>Vehicular bridge/ Design and Construction Phase</p> <p>Works Area/ Operation Phase</p> <p>Works Area/ Operation Phase</p>	<p>STF Designer/ Contractor</p> <p>STF Designer/ Contractor</p> <p>Contractor</p> <p>Contractor</p>	√	√			<p>ETWB TC (Works)</p> <p>No. 5/2005 Protection of natural streams/ rivers from adverse impacts arising from construction works</p>
S7.8.2	<p><i>Minimise sedimentation/water quality impacts to waterbodies</i></p> <ul style="list-style-type: none"> Measures to control potential sedimentation/ water quality impacts during the construction phase shall be implemented. To minimize the potential water quality impacts from the construction works located at any river channels, natural streams or seafront, the practices outlined in 	<p>Whole Site/ Construction Phase</p>	<p>Contractor</p>		√			<p>ETWB TC (Works)</p> <p>No. 5/2005 Protection of natural streams/ rivers from adverse impacts arising from construction works</p>

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				Des	C	O	Dec	
	ETWB TC (Works) No. 5/2005 "Protection of natural streams/rivers from adverse impacts arising from construction works" shall be adopted where applicable.							
S7.8.2	<p><i>Minimize noise disturbance</i></p> <ul style="list-style-type: none"> Noise mitigation measures including the use of quieter piling machinery and construction plants shall be implemented to lower the noise level due to construction works. Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction programme. Machines and plant which may be in intermittent use shall be shut down to a minimum. Plant known to emit noise strongly in one direction, shall be oriented so that the noise is directed away from the Middle Lagoon, where possible. Silencers or mufflers on construction equipment shall be utilized and shall be properly maintained during the construction period. Mobile plant (such as generator) shall be sited as far away from the Middle Lagoon as possible. Material stockpiles and other structures shall be effectively utilized, where practicable, to screen noise from on-site construction activities. 	Whole Site/ Construction Phase	Contractor		√ √ √ √ N/A √ √			ETWB TC (Works) No. 5/2005 Protection of natural streams/ rivers from adverse impacts arising from construction works

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				Des	C	O	Dec	
S7.8.3	<p><i>Measures to Mitigate the Loss of Vegetation</i></p> <ul style="list-style-type: none"> All vegetation located within the work areas shall be preserved as far as practicable. To compensate for the loss of the vegetation and habitats, tree planting shall be provided in the site area where possible. Species chosen for planting shall be similar to the species identified in the survey and be native to Hong Kong or the Southern China. 	Whole Site / Design, Construction and Operation Phase	Contractor / STF Operator	√	√			
S7.8.4	<p>Enhancement Measures to Create Additional Habitat for Little Grebe</p> <ul style="list-style-type: none"> An additional habitat for Little Grebe shall be created in a less disturbed area located at the northeastern part of the proposed STF. The created habitat shall be provided in form of shallow pond(s) incorporating suitable habitat characteristics for Little Grebe. The water level of the created pond shall be kept between 1.5 m to 2 m. Emergent vegetation shall be planted and fish population shall be controlled to allow development of aquatic invertebrate populations as prey of Little Grebe. To screen the created habitat from disturbance due to nearby landfill traffic, planting of native plants shall be provided on the boundary of the pond(s) as appropriate. Prior to construction of the pond(s), detailed Habitat Creation and Management Plan (HCMP) of the created habitat prepared by experienced ecologist(s) with over seven year experience in relevant field shall be circulated to relevant departments including AFCD for comment. 	Within Project Area/ Design Phase, Construction and Operation Phase	Contractor / STF Operator	√	N/A			

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Table 7. Implementation Schedule for Landscape and Visual Impact

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table 9.4 CM-01	<u>Contaminant/ Sediment Control</u> – Suitable temporary barriers, covers and drainage provisions shall be provided around construction works to avoid discharge of contaminants (such as bleeding from in-situ concrete works) and sediments into sensitive water-based habitats, especially the tidal streams and the mangrove.	Work site / During the construction period	Contractor		√			
Table 9.4 CM-02	<u>Early Planting of Tall Trees</u> – Tall trees proposed under mitigation measure OM-02 shall be planted early, providing visual effect also during construction.	Work site / During the construction period	Contractor		N/A			
Table 9.4 CM-03	<u>Good Site Practice</u> – Construction activities should be restricted to works areas and should be clearly demarcated onsite. Piling of construction materials onsite shall be carefully considered for possible impacts before carrying out.	Work site / During the construction period	Contractor		√			
Table 9.4 CM-04	<u>Existing Trees within Works Areas</u> – All existing trees within work sites shall be properly maintained and protected for their crowns, trunks and roots.	Work site / During the construction period	Contractor	√	√			
Table 9.4 OM-01	<u>Sensitive Bridge Design</u> – The bridge of the proposed access road shall be sensitively designed to minimize impact to the tidal stream and mangrove. It shall be constructed with minimal use of in-situ concreting and with maximum use of precast or prefabricated elements. No pile or support shall be erected within the stream channel.	Bridge of access road / During the design & construction phases	Contractor	√	N/A			

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				Des	C	O	Dec	
Table 9.4 OM-02	<u>Tall trees for Chimney</u> – Fast-growing tall trees shall be planted along the east side of the ash-lagoon to counterbalance possible exotic silhouettes, such as from the chimney, of the proposed sludge treatment facilities for sensitive viewers in Pak Nai. The trees shall be planted during the early stage of the construction to ensure effectiveness during operation. They will also help to lessen the visual impact during construction, as already suggested in mitigation measure CM-02.	East side of ash lagoon / During the design & construction phases	Contractor	√	N/A			
Table 9.4 OM-03	<u>Suitable Reinstatement at Ash-lagoon</u> – Affected perimeter of the proposed works area within the ash-lagoon shall be reinstated with suitable planting materials. Traditional reinstatement planting approach for construction projects may not work well for this project. Certain existing grasses and small shrubs have self-seeded the ash- lagoon, demonstrating their tolerance to salts, alkalinity and possible trace metals in the ash. Therefore the same or similar species of vegetation shall be used.	Perimeter of works area / During the design & construction phases	Contractor	√	N/A			
Table 9.4 OM-04	<u>Existing Tree Transplanting</u> – The proposed access roadworks may affect few existing trees, which shall be transplanted as far as practical. A comprehensive tree survey is recommended to locate these trees.	Access road / During the design & operation phases	Contractor	√	N/A			
Table 9.4 OM-05	<u>Planting at Road Intersection</u> – Suitable planting of woodland trees and shrubs shall be provided for the proposed access roadworks at the junction with Nim Wan Road.	Junction of access road with Nim Wan Road / During the design & operation phases	Contractor	√	N/A			

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Table 8. Implementation Schedule of Proposed Landfill Gas Hazard Protection Measures

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S10.7.2	Appointment of Safety Officer Appoint a properly trained safety officer and provide with appropriate equipment to measure and monitor LFG hazard.	Work Site / During the construction phase	Contractor		√			
S10.7.2	Safety Measures - Excavation Staff should receive appropriate training on working in areas susceptible to landfill gas, fire and explosion hazards. Excavation procedures and code of practice should be implemented.	Work Site / During the construction phase	Contractor		√			
S10.7.2	Safety Measures – Welding, Flame-Cutting and Hot works Hot works should be confined to open areas away from any trench or excavation. Should hot works must be carried out in trenches or confined space, “permit to work” procedures should be followed.	Work Site / During the construction phase	Contractor		√			
S10.7.2	Safety Measures – Enclosed Spaces Site offices or buildings located within WENT Landfill Consultation Zone which have the capacity to accumulate landfill gas, then they should either be located in an area which has been proven to be free of landfill gas; or be raised clear of the ground by a minimum of 500mm.	Enclosed Spaces within WENT Consultant Zone / During the construction phase	Contractor		N/A			
S10.7.2	Safety Measures – Electrical Equipment Any electrical equipment, such as motors and extension cords, should be intrinsically safe.	Work Site / During the construction phase	Contractor		N/A			

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S10.7.2	Safety Measures – Piping During piping assembly or conduiting construction, all valves/seals should be closed immediately after installation. As construction progresses, all valves/seals should be closed as installed to prevent the migration of gases through the pipeline/conduit. All piping/conduiting should be capped at the end of each working day.	Work Site / During the construction phase	Contractor		N/A			
S10.7.2	Safety Measures – Fire Safety Adequate fire safety equipments should be provided on site. Workers and visitors should be notified of the potential fire hazards. Safety notices should be posted around the site warning the anger and potential hazards.	Work Site / During the construction phase	Contractor		√			
S10.7.2	Safety Measures – Confined Spaces Precautionary measures should include ensuring that staff members are aware of the potential hazards of working in confined spaces, and that appropriate monitoring procedures are in place to prevent hazards in confined spaces.	Confined Spaces at Work Site / During the construction phase	Contractor		N/A			
S10.7.2	Monitoring Periodically during ground-works within the Consultation Zone, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment. The monitoring frequency and areas to be monitored shall be set down prior to commencement of ground-works. Depending on the results of the measurements, actions required will vary. As a minimum these should encompass those actions specified in Table 10.6 of the EIA Report.	Work Site / During the construction phase	Contractor		N/A			

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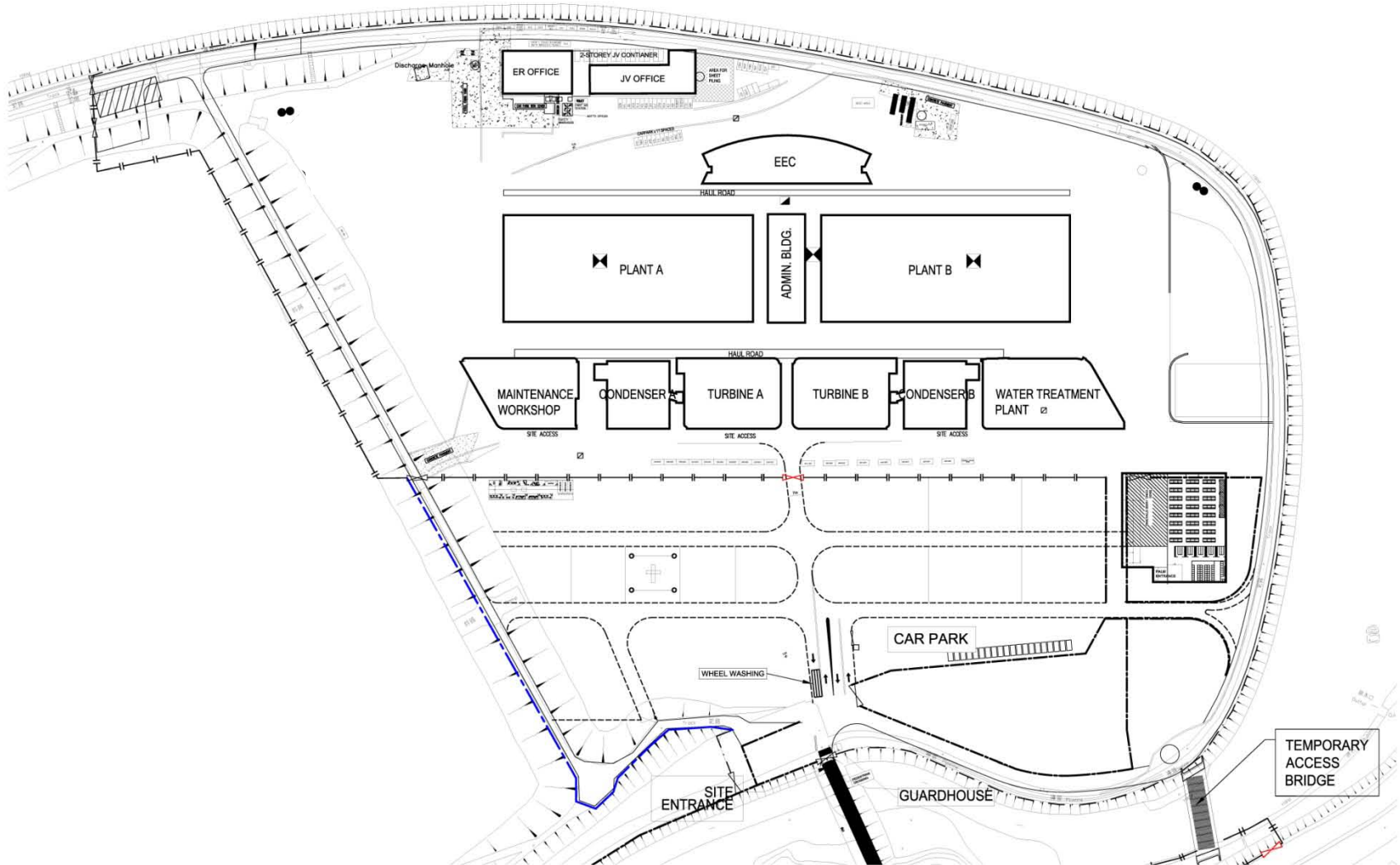
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Figure 1.1

Construction Works Area



General Layout of Sludge Treatment Facilities (STF)



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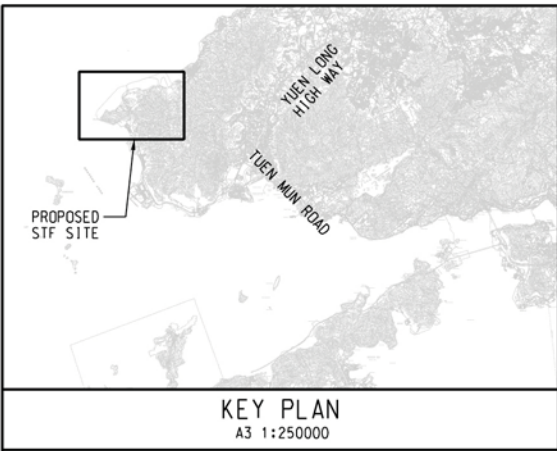
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Figure 3.1

Site Layout Plan



DEEP BAY

PROPOSED SLUDGE TREATMENT FACILITIES

EXISTING CLP ASH LAGOON AT TSANG TSUI

WENT LANDFILL

大水坑
Tai Shui Hong 831250 N

TSANG KOK STREAM

BLACK POINT POWER STATION

BLACK POINT

URMSTON ROAD

配水庫
Ser Res

龍鼓上棚
Lung Au
Sheung Tan

830000 N

807500 E

808750 E

810000 E

811250 E

DATE: GUOXH 2008-9-30

MAUNSELL | AECOM
Metcalf & Eddy Ltd.

AGREEMENT NO. CE 28/2003 (EP)
SLUDGE TREATMENT FACILITIES - FEASIBILITY STUDY
LOCATION PLAN OF PROPOSED SLUDGE TREATMENT FACILITIES

SCALE	A3 1:12500	DATE	SEP. 2008
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		REV	-

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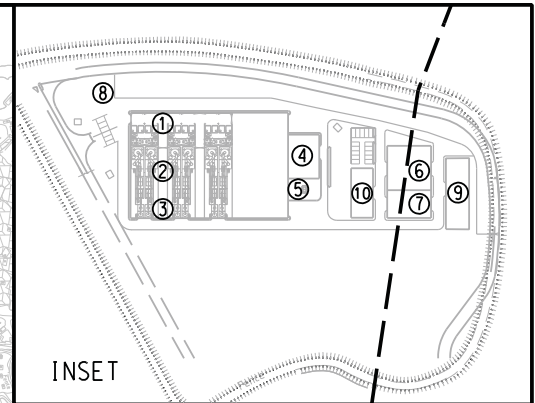
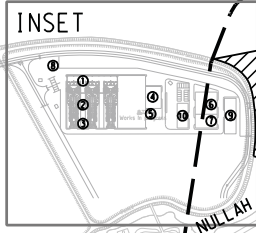
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Figure 3.2

WENT Landfill Gas Control Zone



SECTION OF NULLAH
WHERE WATER IS ALWAYS
PRESENT

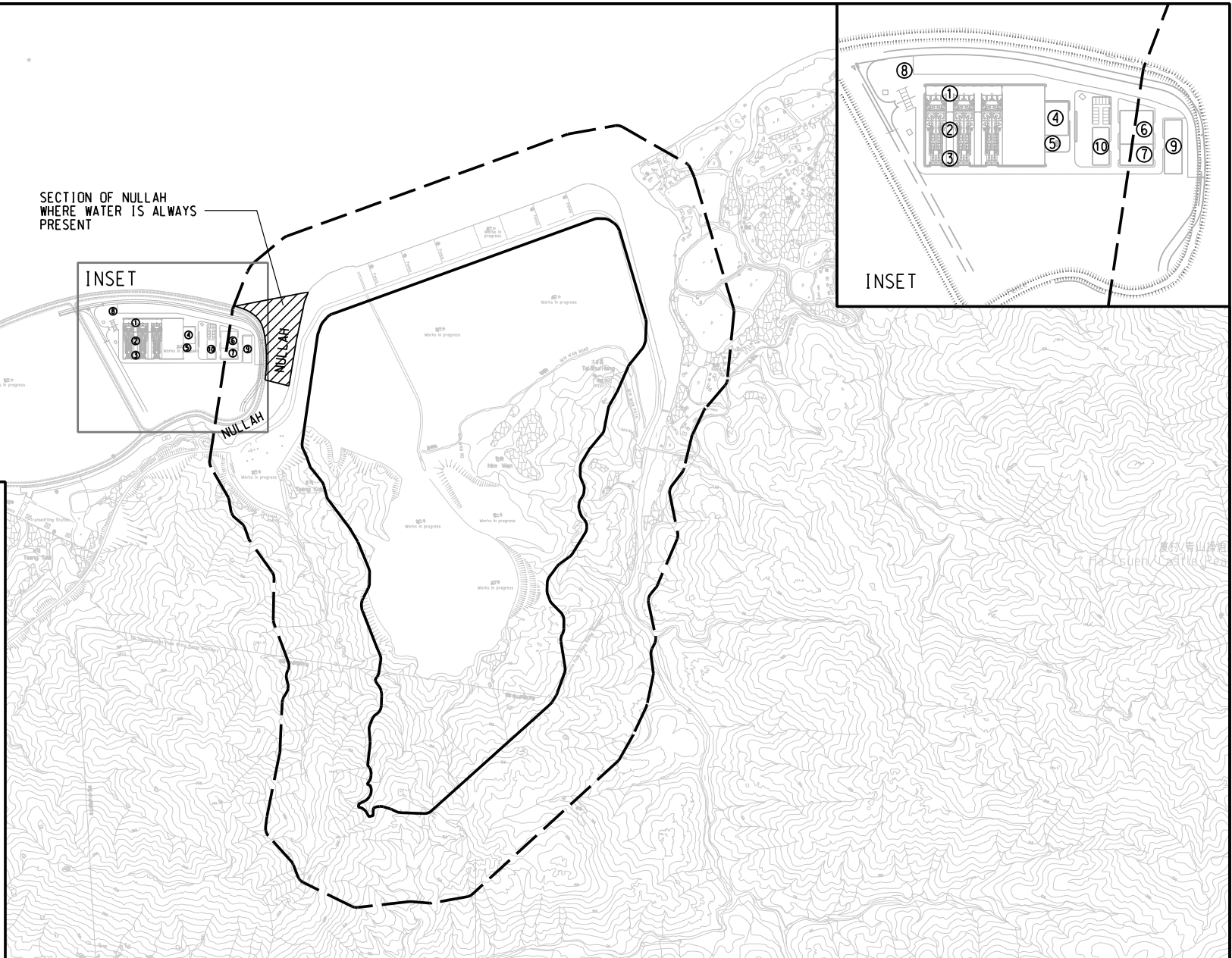


LEGEND

- ① DELIVERY BAY
- ② INCINERATORS AND AIR CONTROL EQUIPMENT
- ③ FUEL GAS RESIDUE SILOS, ASH SILOS & LOADING AREA
- ④ CHEMICAL / FUEL STORAGE AND FEEDING
- ⑤ STACK
- ⑥ ADMINISTRATION BUILDING & LABORATORY
- ⑦ MAINTENANCE WORKSHOP
- ⑧ UTILITY YARD
- ⑨ DESALINATION PLANT, SEAWATER PUMPING STATION & STORAGE TANK
- ⑩ SEWAGE TREATMENT WORKS

WENT LANDFILL
CONSULTATION ZONE
BOUNDARY

WENT LANDFILL
WASTE BOUNDARY



DATE: \$DATE\$

MAUNSELL | AECOM
Metcalf & Eddy Ltd.

AGREEMENT NO. CE 28/2003 (EP)
SLUDGE TREATMENT FACILITIES - FEASIBILITY STUDY
WENT LANDFILL CONSULTATION ZONE

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Figure 4.1

Ecological Transect Route

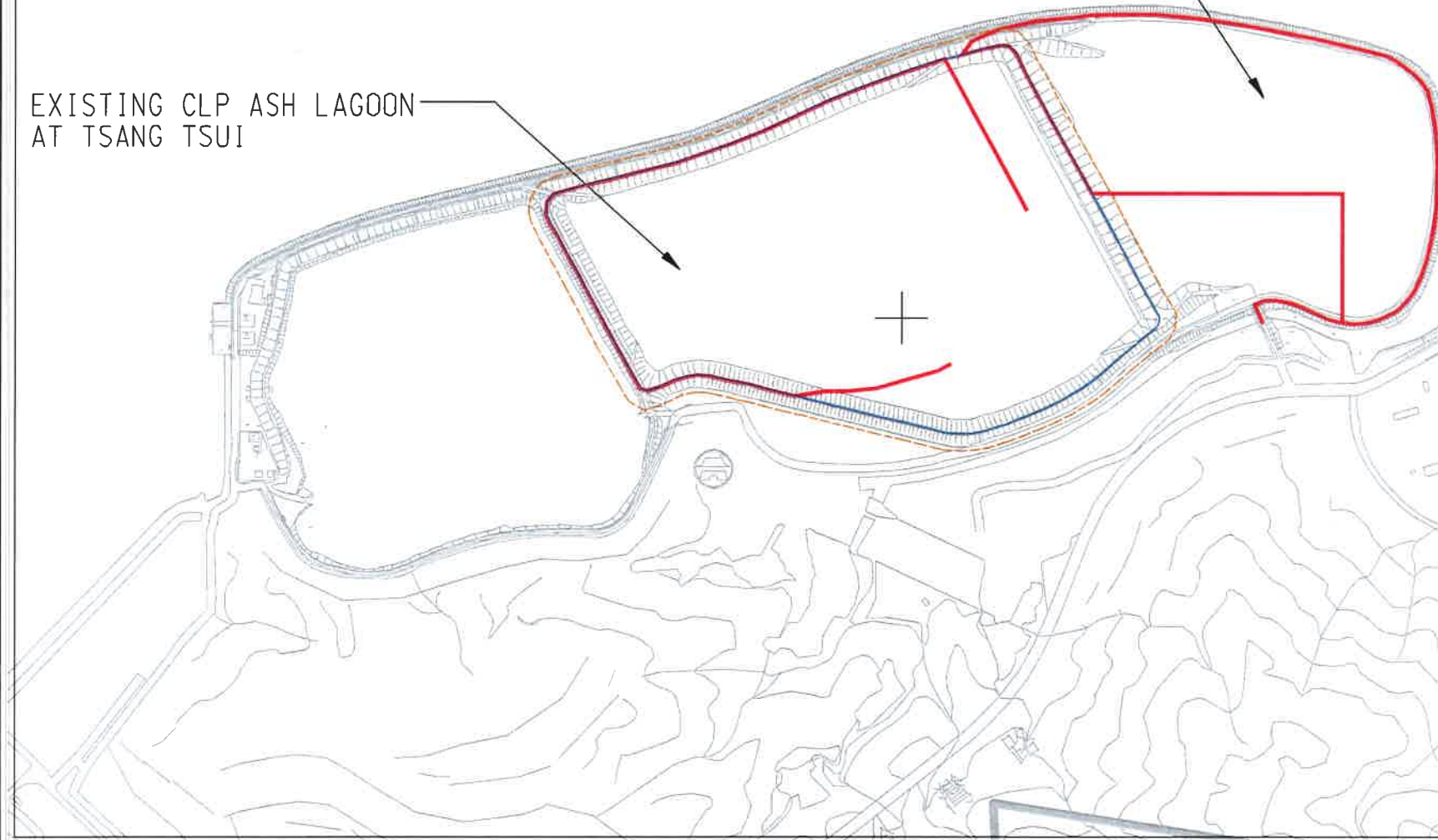
0m 100m 200m 300m 400m



DEEP BAY

EXISTING CLP ASH LAGOON
AT TSANG TSUI

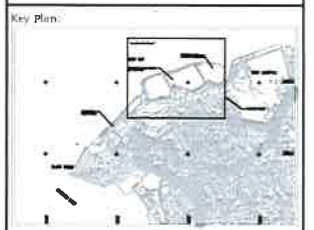
PROPOSED SLUDGE
TREATMENT FACILITIES



- Notes:
- Survey Route
 - Middle Lagoon Boundary
 - - - 20m from Middle Lagoon Boundary

 Asia Ecological Consultants Ltd

Project Title:
Contract No. EP/SP/58/08
Sludge Treatment Facilities



Drawing Title:
Ecological Transect Route

Drawn: SK	Scale: As shown
Checked: DJS	Date: May 2011
Approved: DJS	File: --
Drawing Number: --	Revision 1