MOTT MACDONALD

Proposed Interim Sewage Treatment Plant and Effluent Reuse Facility at Wo Shang Wai, Yuen Long

Environmental Monitoring and Audit Manual

June 2018

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1 Introduction

1.1 Purpose of the Manual

The purpose of this Environmental Monitoring and Audit (EM&A) Manual (hereafter referred to as the Manual) is to guide the setup of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme proposed for the "Proposed Interim Sewage Treatment Plant and Effluent Reuse Facility at Wo Shang Wai, Yuen Long" (the Project).

It should be noted that this EM&A Manual would be further reviewed and updated where necessary.

1.2 Project Description

The Project consists of site formation works and building works for the proposed sewage treatment plant (STP). The STP is a 1-storey high building structure with effluent reuse facility located in the basement of the building. Membrane Bioreactor (MBR) technology has been proposed for sewage treatment, with a capacity of 1,446m^3/d.

The effluent reuse facility will comprise of the following:

- Equalization tank;
- Reclaimed water storage tank;
- Anoxic tank;
- Aerobic / membrane tank;
- An ultraviolet (UV) steriliser;
- Sludge tank;
- Treated effluent collection tank;
- Emergency storage tank; and
- Associated pumping facilities and piping network.

The location of the Project and the aforementioned components is shown in **Figure 1.1** and **Figure 1.2** respectively. The flow diagram of the operation of the facilities is shown in **Figure 1.3.**

1.3 Tentative Construction Programme

Construction of the Project is targeted to commence in Q3 2018 and complete by 2021 in time for Phase 1 occupation of the WSW Development. The Project will be decommissioned once the planned public sewer on Castle Peak Road is available. However, it is to be noted that the structure of the STP and its associated infrastructure will only cease operation and will not be demolished.

1.4 Project Organisation

The proposed project organisation is shown in **Figure 1.4**. The responsibilities of respective parties are set out below.

1.4.1 Project Proponent

Profit Point Enterprises Limited is the Project Proponent for the development of the Project, and will assume overall responsibility for the progress of the construction, operation and decommissioning activities.

1.4.2 Environmental Protection Department (EPD)

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

1.4.3 Engineer or Engineer's Representative (ER)

The ER 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 include:

- to monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;
- to employ an Independent Environmental Checker (IEC) to audit the results of the EM&A works carried out by the Environmental Team (ET);
- to monitor Contractors', ET's and IEC's compliance with the requirements in the Environmental Permit (EP) and EM&A Manual;
- to facilitate ET's implementation of the EM&A programme;
- participate in joint site inspection by the ET and IEC;
- to oversee the implementation of the agreed Event / Action Plan in the event of any exceedance; and
- to adhere to the procedures for carrying out complaint investigation.

1.4.4 The Contractor

The Contractor should report to the ER. The duties and responsibilities of the Contractor include:

- to comply with the relevant contract conditions and specifications on environmental protection;
- to employ an ET to undertake monitoring, laboratory analysis and reporting of EM&A;
- to facilitate ET's monitoring and site inspection activities;
- to participate in the site inspections undertake by the ET and IEC, and undertake any corrective actions;
- to provide information / advice to the ET regarding works programme and activities which may contribute to the generation of adverse environmental impacts;
- to submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event / Action Plans;
- to implement measures to reduce impact where Action and Limit levels are exceeded; and
- to adhere to the procedures for carrying out complaint investigation.

1.4.5 Environmental Team (ET)

The ET shall be employed by the either the Project Proponent or by the Engineer's Representative 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 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's duties should include:

- to monitor and audit various environmental parameters as required in this EM&A Manual;
- to analyse the environmental monitoring and audit 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 environmental monitoring and audit 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 Even 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.

1.4.6 Independent Environmental Checker (IEC)

The IEC is empowered by 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 the Project Proponent prior to the commencement of the construction of the Project and shall report directly to the Project Proponent and EPD. 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 the Project Proponent 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 / 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, to the ER and the Project Proponent 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.

1.4.7 Estate Manager / Operator

During Operation Phase, the Estate Manager / Operator should ensure the management, maintenance and operation of the onsite STP follow the O&M Manual. If it is found that the reclaimed water quality achieves

the proposed criteria or the reclaimed water can be fully reused, the Estate Manager / Operator should investigate and rectify unacceptable practice.

1.4.8 Environmental Monitoring Team

During Operation Phase, Project Proponent / Estate Manager should appoint an Environmental Monitoring Team who will be responsible for water sampling works and reclaimed water supply and use monitoring. The sampling and testing works shall be carried out by a HOKLAS or other internationally accredited laboratory. Environmental Monitoring Team will be responsible to report the findings of the monitoring activities in operation phase monitoring report.

1.5 Structure of this EM&A Manual

Following this Introduction section, the structure of this EM&A Manual has been set out as follows:

Section 2 – Air Quality Impact

Section 3 – Noise Impact

Section 4 – Water Quality Impact

Section 5 – Waste Management and Land Contamination

Section 6 – Ecological Impact (Terrestrial and Aquatic)

Section 7 – Landscape and Visual Impact

Section 8 – Site Environmental Audit

Section 9 – Reporting

2 Air Quality Impact

2.1 Introduction

An assessment of potential air quality impact during both construction and operation phases of the Project have been assessed in Section 3 of the EIA Report. Within the 500m Study Area, fugitive dust from construction activities and odour impact from the operation of the sewage treatment plant would be minimal. With the implementation of appropriate dust suppression measures, as stipulated in the Air Pollution Control (Construction Dust) Regulation, and adequate odour containment and control measures during the operation phase, as described in Section 3.6.2 of the EIA Report, adverse air quality impact is not anticipated.

2.2 Construction Phase

Since the extent of the STP building construction works for the proposed Project represent only a small part of the proposed WSW Development, regular dust monitoring is not considered necessary during the construction of the Project. The on-going EM&A programme for the proposed WSW Development would overlap with any monitoring proposed for this Project.

2.3 Operational Phase

As the proposed STP will be fully enclosed, installed with a high-efficiency deodorizer with a forced ventilation system, and is not of a large scale; it is anticipated that there would not be significant odour impact due to the proposed STP and sludge generated on the nearby ASRs. Therefore, no monitoring during the operation phase is required.

2.4 Decommissioning Phase

Upon commissioning of the public trunk sewer, the sewage from the proposed development will be connected to the public sewerage system and the STP will be decommissioned. However, as the STP will remain on-site and not be demolished, no monitoring during the decommissioning phase is required.

3 Noise Impact

3.1 Introduction

The potential noise impact arising from the construction and operation phases of the Project have been assessed in Section 4 of the EIA Report. With the implementation of the appropriate noise mitigation measures during construction phase and adoption of the maximum allowable sound power levels for the proposed STP in operation phase, no adverse construction and operation noise impacts are anticipated.

3.2 Construction Phase

The extent of the STP construction works represent only a small part of the proposed WSW Development. As regular noise monitoring of the on-going EM&A programme for the proposed WSW Development would be carried out during the whole construction period of the Project, no noise monitoring is proposed under this project during the construction phase of the proposed STP.

3.3 Operation Phase

Prior to the operation of the proposed STP, a noise commissioning test should be conducted by the Contractor to check for the compliance of the noise levels from the operation of the fixed plant with the stipulated noise criteria. The testing results should be checked and signed by the Contractor, the Engineer's Representative and the Environmental Team and verified by Independent Environmental Checker respectively.

3.4 Decommissioning Phase

Since the proposed interim STP will be decommissioned without demolition of the structure, no noise impact is anticipated during the decommissioning phase. Therefore, no noise monitoring is required during the decommissioning phase.

4 Water Quality Impact

4.1 Introduction

The potential construction, operation and decommissioning phase water quality impacts associated with the Project are assessed in Chapter 5 of the EIA report. With the implementation of the recommended design and mitigation measures during construction phase, the proposed design, operation and management measures during the operation phase, and the proposed management measures during decommissioning phase, it is predicted that all potential impacts would be adequately controlled. Therefore, no adverse water quality impacts are expected during construction, operation and decommissioning phase.

4.2 Construction Phase

Adverse water quality impacts were not predicted during the construction phase of the Project, thus water quality monitoring is not considered necessary. Nevertheless, appropriate mitigation measures are recommended to minimise potential water quality impacts, and regular site audits shall be conducted to check implementation of the recommended mitigation measures.

The site audit shall check that the mitigation measures identified in **Appendix A** are properly implemented throughout construction phase.

4.3 Operation Phase

During operation phase, discharges from the onsite STP shall comply with the discharge license issued by Environmental Protection Department (EPD) under the WPCO, and the management, maintenance and operation of the onsite STP shall follow the O&M Manual for the onsite STP and the Management Manual of the Development, which shall cover the mitigation measures specified in the EIA report and in **Appendix A**. A water quality monitoring programme is proposed to monitor compliance with the reclaimed water reuse criteria. The Water Supplies Department's reclaimed water standards as summarized in **Table 4.1** will be adopted by this Project.

Table 4.1: WSD Reuse Water Quality Standard for Non-Potable Uses

Water Quality Parameter	Unit	WSD Criteria (Irrigation & Non-Potable Uses)
pH	-	6-9
Turbidity	NTU	$\leqslant$ 5
Total Suspended Solids	mg/l	$\leqslant$ 5
BOD_5	mg/l	$\leqslant$ 10
E. coli	cfu/100ml	Non-detectable
Total Residual Chlorine	mg/l	$\geqslant$ 1 (out of treatment system) $\geqslant$ 0.2 (at point of use)
Dissolved Oxygen (DO)	mg/l	$\geqslant$ 2
Colour	Hazen Unit	$\leqslant$ 20
Threshold Odour Number (TON)	TON	$\leqslant$ 100
Ammonia nitrogen	mg/l	$\leqslant$ 1
Synthetic detergents	mg/l	$\leqslant$ 5

Note: The water quality standards for all parameters shall be applied at the point of use, unless otherwise specified

Implementation of the O&M Manual for the onsite STP and the Management Manual of the Development shall be audited by the Estate Manager at least annually during operation phase of the onsite STP.

Apart from the O&M Manual for the onsite STP and the Management Manual, a contingency plan should be prepared by the STP operator to deal with situation when the reclaimed water cannot meet the proposed criteria as well as the situation when the STP is out of service.

4.3.1 Monitoring Requirements

4.3.1.1 Effluent Quality Sampling and Testing

Samples of reclaimed water should be taken regularly and tested to ensure the quality meet the reuse standard specified in the "Water Supplies Department Inter-departmental Working Group on the Implementation of Reclaimed Water Supply in Sheung Shui and Fanling". The monitoring works should be done by an Environmental Monitoring Team appointed by the Project Proponent / Estate Manager. The Environmental Monitoring Team will be responsible for the sampling works, and the sampling and testing works shall be carried out by a HOKLAS or other internationally accredited laboratory.

4.3.1.2 Water Quality Parameters

The water quality parameters that should be monitored for compliance with the criteria are presented in **Table 4.1**.

4.3.1.3 Monitoring Equipment

All monitoring equipment should be provided by the Environmental Monitoring Team:

Dissolved Oxygen and Temperature Measuring Equipment

The instrument should be portable and weatherproof using a DC power source. It should have a membrane electrode with automatic temperature compensation complete with a cable. The equipment should be capable of measuring:

- A dissolved oxygen level in the range of 0-20 mg/L and 0-200 % saturation; and
- A temperature of 0-45 degree Celsius with a capability of measuring to ±0.1 degree Celsius

pH Meter

A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions accordingly to the Standard Methods, APHA.

Turbidity Measurement Instrument

The instrument should be portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU.

Calibration of In-Situ Instruments

The pH meter, DO meter and turbidimeter should be checked, calibrated and certified by a laboratory accredited under HOKLAS (or other international accreditation scheme that is HOKLAS-equivalent) before use, and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before use. Sufficient stocks of spare parts should be maintained for replacements when necessary.

Water Samples for Laboratory Parameters

A clean plastic water sampler with capacity of at least 1 L should be used to take the water samples. Water samples should be contained in high density polythene bottles. Water samples for ammonia nitrogen

measurement should be collected in high density polythene bottles and preserved by addition of H_2SO_4. All the samples should be packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory as soon as possible after collection.

4.3.1.4 Laboratory Analysis

Laboratory analysis of suspended solids, BOD_5, *E.coli,* total residual chlorine, colour, threshold odour number, ammonia nitrogen and synthetic detergent should be carried out in a HOKLAS laboratory (or other international accredited laboratory that is HOKLAS-equivalent). Sufficient water samples should be collected for laboratory analysis. The analysis should commence within 24 hours after collection of the water samples.

If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control should be approved by EPD.

The standard methods for laboratory measurements that should be followed are shown in **Table 4.2**.

Table 4.2: Standard Methods for Laboratory Measurements

Parameter	Unit	Standard Method
Suspended Solids	mg/l	APHA 2540D
BOD_5	mg/l	APHA 5210B / BS 6068: Section 2.14:1984
E.coli	cfu/100ml	Membrane lauryl sulphate method with *in situ* urease test for *E. coli* / membrane filtration with CHRO Magar Liquid *E. coli* – Coliform culture
Total Residual Chlorine	mg/l	APHA 4500
Colour	Hazen Unit	APHA 2120 C
Threshold Odour Number	TON	APHA 2150 B
Ammonia Nitrogen	mg/l	APHA 4500
Synthetic Detergent	mg/l	APHA 5540 C and D

If in-house or non-standard methods are proposed, details of the method verification should, if required, be submitted to EPD. In any circumstances, the sample testing should have comprehensive quality assurance (QA) and quality control (QC) programmes. The laboratory should be prepared to demonstrate the QC programmes to EPD or their representative if and when required.

Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for three months in case repeat analysis is required.

4.3.1.5 Sampling Location and Frequency

One water quality sample shall be taken at either the treated effluent outlet pipe or the reclaimed water storage tank, and one at a representative point of use. Exact location shall be determined by the Environmental Monitoring Team before commencement of operation of the onsite STP. Duplicate samples should be taken and analysed.

Water quality sampling works should be conducted at least on monthly basis during the first three months' operation of the STP. Thereafter and provided there is no non-compliances during the first three months, the sampling frequency will be reduced to quarterly.

Monitoring frequency and parameters are subject to the discharge licence under the Water Pollution Control Ordinance and the EP conditions. The selected monitoring parameters will be reviewed based on the first three months' monitoring results.

4.3.1.6 Reclaimed Water Supply and Use Monitoring

Flow Meter Readings

Flow meters shall be installed at appropriate end points of the trunk pipeline of the irrigation supply system and at the treated effluent outlet immediately before the reclaimed water storage tank from the STP. Exact locations shall be proposed by the Environmental Monitoring Team before commencement of operation of the onsite STP.

The flow meters should be capable of taking continuous readings that are cumulative for a period of at least one year. The flow meter readings should be recorded by the Environmental Monitoring Team at least on a monthly basis. All readings should be taken on the same monitoring day. The monthly total volume of treated sewage and the demand for reclaimed water for both toilet flushing and landscape irrigation should be counter-checked to confirm the balance between supply and demand.

Visual Inspections

Monthly visual inspection of the relevant stormwater drains that drains runoff from the public irrigation areas (i.e. those areas irrigated using reclaimed water) shall be conducted by the Environmental Monitoring Team to check for the presence of any dry weather flows that may indicate surplus irrigation using reclaimed water. At least three locations shall be monitored (one at the landscaped areas of the Clubhouse and two at other public landscaped areas within the Development). Exact locations shall be proposed by the Environmental Monitoring Team before commencement of operation of the onsite STP.

The monitoring shall be conducted on a dry (non-rainy) day. As far as possible, the monitoring should be undertaken when there are no other (non-reclaimed water related) activities that may contribute runoff to the stormwater drains being monitored.

The timing of the monitoring shall coincide with the irrigation schedule. The stormwater drains shall be checked once immediately before an irrigation event, once during the irrigation event, and for a continuous period of 30 minutes immediately after an irrigation event. Details on the presence, if any, of dry weather flow, including an indication of the amount and the duration where applicable, shall be recorded. Photographic records should also be taken.

4.3.2 Event and Action Plan

The actions specified in **Table 4.2** shall be implemented if any of the specified events arises during operation phase of the onsite STP.

Table 4.3: Action Plan for Exceedance of Specified Events

Event	Actions to be Taken
Any of the tested criteria exceed the WSD criteria	1. Environmental Monitoring Team should inform Manager and Operator of STP; 2. The Manager and Operator of STP should check whether all plant; equipment, and working methods are properly implemented; 3. The Manager and Operator should rectify unacceptable practice, if any; 4. Environmental Monitoring Team should discuss follow up actions with STP manager and operator; and 5. Environmental Monitoring Team should repeat the measurement after the investigation and on a monthly basis until no further exceedance for two consecutive months.
Monthly total supply of reclaimed water exceeds the monthly total demand for reclaimed water by more than 1,000 m^3 (according to flow meter readings)*	1. Environmental Monitoring Team should check the flow meters and the calculation; 2. Environmental Monitoring Team should inform the Estate Manager; 3. The Estate Manager should ensure the operation has followed the Management Manual of the Development for proper reuse of reclaimed water; 4. The Estate Manager should implement the recommended mitigation measures and rectify unacceptable practice, if any; 5. Environmental Monitoring Team should discuss follow up actions with Estate Manager; and 6. Environmental Monitoring Team should increase the frequency of flow meter readings to weekly until no further exceedance for three consecutive weeks.
Dry weather flow observed at stormwater drain due to irrigation with reclaimed water	1. Environmental Monitoring Team should inform the Estate Manager; 2. The Estate Manager should check the semi-automatic control irrigation system to ensure that reclaimed water would be used properly for irrigation. The system should be re-set if it was found that excessive irrigation water was applied; 3. The Estate Manager should rectify unacceptable practice, if any; and

Event	Actions to be Taken
	4. Environmental Monitoring Team should repeat the visual inspection after the investigation.

*Note: 1000 m^3 is equivalent to approx. 85% of the reclaimed water storage buffer tank

The monitoring results as well as any events and actions undertaken as part of the Event and Action Plan should be recorded by the Environmental Monitoring Team and submitted to EPD.

Once the sewerage connection to the Government sewer is established and the on-site STP is decommissioned, the Environmental Monitoring Team may seek EPD's approval to cease the monitoring works.

4.4 Decommissioning Phase

Procedures for decommissioning shall be specified in the O&M Manual for the onsite STP, which shall cover the mitigation measures specified in the EIA report and in **Appendix A**.

Prior to decommissioning of the onsite STP, written confirmation from Drainage Services Department on the commissioning of the Government trunk sewer shall be obtained by the Estate Manager, and agreement on the proposed decommissioning shall be obtained from EPD. The proposed date for decommissioning of the onsite STP shall be notified to EPD at least 2 weeks prior to decommissioning.

5 Waste Management Implications

5.1 Introduction

The potential waste arising from the construction and operation activities of the Project has been evaluated in the EIA report. Provided that all wastes are handled, transported and disposed of in strict accordance with the relevant legislative requirements and the recommended mitigation measures are properly implemented, no adverse environmental impact is expected during the construction and operation phases.

5.2 Construction Phase

It would be the Contractor's responsibility to ensure that all wastes produced during the construction of the Project are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements. The recommended mitigation measures should form the basis of the Waste Management Plan (WMP) to be developed by the Contractor throughout the Project period. The WMP shall be prepared and implemented in accordance with ETWB TC (W) No. 19/2005 Environmental Management on Construction Site.

Throughout the construction phase of the Project, regular site inspections as part of the EM&A procedures should be carried out to determine if wastes are being managed in accordance with the WMP. Different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal would be included in the programme.

5.3 Operation Phase

Wastes produced during operation phase would be mainly comprised of screening and grits, sludge, general refuse, and chemical waste. With the implementation of the recommended mitigation measures for handling, transportation and disposal of the identified waste arisings, no adverse impacts are anticipated during operation phase of the Project. Therefore, no other specific waste monitoring during operation phase is required.

5.4 Decommissioning Phase

The on-site sewage treatment plant (STP) is proposed to temporary handle the sewage generated by the WSW Development before the government sewerage network is available. Once all the sewage is connected to the permanent government sewer, the on-site STP would be decommissioned but will not be demolished. Therefore, it is anticipated that no waste will be generated during decommissioning phase. Therefore, no other specific waste monitoring during decommissioning phase is required.

6 Ecological Impact (Terrestrial and Aquatic)

6.1 General

The potential ecological impacts associated with the Project are evaluated in Chapter 7 of the EIA report.

With adequate separation of the wetland habitat including WRA from the Project Site, as well as implementation of good site practices for waste handling and minimisation of water quality impact, no adverse water quality impacts are anticipated and the potential indirect ecological impacts as a result of construction activities is considered negligible.

No significant impact will be resulted from the operation of the Project as all potential air quality, noise and water qualify impacts will be controlled to environmentally acceptable levels. Given the small scale and localized nature of works, the cumulative impact on top of the concurrent projects identified is insignificant.

No ecological specific precautionary and mitigation measures are considered required. However, the mitigation measures for air, noise, water, waste and landscape aspects proposed in respective sections which are indirectly beneficial to the local ecology shall be checked as part of the environmental monitoring and audit procedures during construction period as presented in the implementation schedule in **Appendix A**.

7 Landscape and Visual Impact

7.1 Introduction

Potential landscape and visual impacts arising from the construction, operation and decommissioning phases of the Project have been identified and evaluated in the EIA report. Visual impacts are anticipated during the operation and decommissioning phases of the Project. Precautionary / enhancement / mitigation measures are recommended to minimize any potential landscape and visual impacts.

The main Contractor to be employed by the Project Proponent shall be responsible for the implementation of the recommended landscape and visual precautionary / enhancement / mitigation measures. The Project Proponent shall employ a qualified landscape consultant in the design, construction and operation phases. A Registered Landscape Architect (RLA), as a member of the ET team, with substantial construction site experience, shall be responsible for monitoring the implementation of landscape and visual precautionary / enhancement / mitigation measures during the construction phase and the first year of operation phase.

7.2 Precautionary / Enhancement / Mitigation Measures

The EIA has recommended a series of landscape and visual precautionary / enhancement / mitigation measures for both the construction and operation phases of the Project, which are summarised in **Table 7.4** and **Table 7.5** respectively.

Table 7.4: Recommended Construction Phase Precautionary / Enhancement Measures

Mitigation Code	Mitigation Measure	Target LR(s), LCA(s) and / or VSR(s)	Responsible Agent for Mitigation Implementation
CP1	**Integration of Construction Programme with that of the WSW Development** – The construction programme should be carefully integrated into the overall programme of the WSW Development, so that the construction of the Project will not cause any delay and thereby lengthen the construction period of the WSW Development.	LCA2	Project Proponent via Design Team & Contractor
CP2	**Advance Planting** – Proposed landscape planting should be undertaken at the earliest practicable stage of the construction phase of the Project.	LCA2	Project Proponent via Contractor
CP3	**Dust and Erosion Control for Exposed Soil** – Exposed soil shall be covered or "camouflaged" and watered frequently as dust suppression. 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 to minimize dust impact.	LCA2	Project Proponent via Contractor

Table 7.5: Recommended Operation Phase Mitigation Measures

Mitigation Code	Mitigation Measure	Target LR(s), LCA(s) and / or VSR(s)	Responsible Agent for Mitigation Implementation
OP1	**Sensitive Design and Disposition** – The above-ground structure of the Sewage Treatment Plant should be sensitively designed in a manner that responds to the planned landscape context of the WSW Development to minimize potential adverse visual impacts. The structural design should seek to reduce the apparent visual mass. Subdued tones should be considered for the colour palette with non-reflective finishes to reduce glare effect. The layout of buildings and their windows should take into account the location of the proposed Sewage Treatment	VSR1; VSR2; VSR3; VSR4	Project Proponent via Design Team

Mitigation Code	Mitigation Measure	Target LR(s), LCA(s) and / or VSR(s)	Responsible Agent for Mitigation Implementation
	Plant so as to avoid and minimize any potential views of the Sewage Treatment Plant by potential VSRs.		
OP2	**Visual Screening** – Visual screening such as boundary fences / walls at the periphery of the swimming pool should be considered as far as practicable to obstruct the views of the above-ground structure of the proposed Sewage Treatment Plant from the VSRs.	VSR1; VSR3	Project Proponent via Design Team
OP3	**Screen Planting** – Trees with mature height of at least 10 m should be planted around the proposed Sewage Treatment Plant as far as practicable for screening purpose to minimize the visual impact to the VSRs.	LCA2; VSR1; VSR2; VSR3; VSR4	Project Proponent via Design Team
OP4	**Enhancement Planting** – Other than screen planting, additional trees, shrubs and groundcovers should also be considered to maximize greening within the Project site upon completion of the Project.	LCA2; VSR1; VSR2; VSR3; VSR4	Project Proponent via Design Team
OP5	**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 the above-ground structure of the proposed Sewage Treatment Plant.	LCA2; VSR1; VSR2; VSR3; VSR4	Project Proponent via Design Team

7.3 Construction Phase

The design, implementation and maintenance of landscape and visual precautionary / enhancement measures shall be checked bi-weekly to ensure that they are fully realised during the construction phase. Any potential conflicts between the proposed landscape and visual precautionary / enhancement 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.

7.4 Operation Phase

All landscape planting shall be monitored bi-monthly during the first year of the operation phase to ensure proper establishment and its effectiveness as landscape and visual mitigation measures. Any observation of unsatisfactory horticultural maintenance works, failure of establishment of soft landscape or poor condition of established planting shall be recorded for the Contractor to undertake any necessary actions to improve the conditions of the landscape planting.

7.5 Event and Action Plan

Should non-compliance of the landscape and visual impacts occur, actions in accordance with the action plan as shown in **Table 7.6** shall be carried out.

Table 7.6: 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	1. Check Report 2. Check the Contractor's working method 3. Discuss with the ER and the Contractor on possible remedial	1. Notify the Contractor 2. Ensure remedial measures are properly	1. Amend working methods 2. Rectify damage and undertake remedial

Action Level	Environmental Team Leader (ETL)	Independent Environmental Checker (IEC)	Engineer's Representative (ER)	Contractor
	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)	measures 4. Advise the ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures	implemented	measures or any necessary replacement

8 Site Environmental Audit

8.1 Site Inspection

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They should be undertaken routinely by the ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET Leader is responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out the site inspection works. He should prepare a proposal for site inspection and deficiency and action reporting procedures to the IEC for agreement, and to the ER for approval. The Contractor's proposal for rectification would be made known to the ER and IEC.

Regular site inspections led by the ET leader should be carried out at least once per week. The areas of inspection should not be limited to the environmental situation, pollution control and mitigation measures within the site; it should also review the environmental situation outside the Project area which is likely to be affected, directly or indirectly, by the site activities. The ET should make reference to the following information in conducting the inspection:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- the EP conditions;
- ongoing results of the EM&A programme;
- works progress and programme;
- individual works methodology proposals (which should include proposal on associated pollution control measures);
- contract specifications on environmental protection;
- relevant environmental protection and pollution control laws; and
- previous site inspection results undertaken by the ET and others.

The Contractor should keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works should be submitted to the IEC and the Contractor within 24 hours for reference and for taking immediate action. The Contractor should follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

The ET should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work.

8.2 Compliance with Legal and Contractual Requirements

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

In order that the works are in compliance with the contractual requirements, relevant sections (e.g. sections related to environmental measures) of works method statements submitted by the Contractor to the ER for approval should be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.

The ET Leader should also keep himself informed of the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violation can be prevented.

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

After reviewing the documentation, the ET Leader should advise the Contractor of any noncompliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions, including any potential violation of requirements.

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

8.3 Environmental Complaints

Complaints should be referred to the ET for action. The ET should undertake the following procedures upon receipt of any valid complaint:

- The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
- The Contractor to investigate the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency, stations and parameters, if necessary;
- The Contractor to identify mitigation measures in consultation with IEC, ET and ER if a complaint is valid and due to the construction works of the Project;
- The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency, stations and parameters, where necessary, for checking the effectiveness of the mitigation measures;
- The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
- The ET to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
- If the complaint is referred by the EPD, the Contractor is to prepare interim report on the status of the complaint investigation and follow-up actions stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by EPD; and
- The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

Handling of environmental complaints should follow the environmental complaint flow diagram and reporting channel as presented in **Figure 8.1**.

During the complaint investigation work, the Contractor and ER should cooperate with the ET in providing all necessary information and assistance for completion of the investigation. If mitigation measures are

identified in the investigation, the Contractor should promptly carry out the mitigation works. The ER should ensure that the measures have been carried out by the Contractor.

9 Reporting

9.1 General

The reporting requirements of EM&A are based upon a paper-documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the IEC, the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach.

For construction phase EM&A, the types of reports that the ET Leader shall prepare and submit include monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection. The exact details of the frequency, distribution and time frame for submission shall be agreed with the IEC, the ER and EPD prior to commencement of works.

9.2 Baseline Monitoring Report

Since no baseline environmental monitoring is proposed specifically for this Project, Baseline Environmental Monitoring Report is not considered necessary.

9.3 Monthly EM&A Report (Construction Phase)

The results and findings of all EM&A work carried out during the month should be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report should be prepared and submitted within 10 working days after the end of each reporting month. Each monthly EM&A report should be submitted to the following parties: the Contractor, the IEC, the ER and the EPD. Before submission of the first EM&A report, the ET Leader should liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

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

9.3.1 First Monthly EM&A Report

The first monthly EM&A report should include at least but not be limited to the following:

1. executive summary (1-2 pages):
   - breaches of Action and Limit levels
   - complaint log
   - notifications of any summons and status of prosecutions
   - changes made that affect the EM&A
   - future key issues

2. basic project information:
   - project organisation including key personnel contact names and telephone numbers
   - scope of works of the Project
   - construction programme
   - works undertaken during the month with illustrations (such as location of works etc)

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

3. a brief summary of EM&A requirements including:
   - all monitoring parameters
   - environmental quality performance limits (Action and Limit levels)
   - Event and Action Plans
   - environmental mitigation measures, as recommended in the Project EIA study final report
   - environmental requirements in contract documents

4. environmental status
   - advice on status of compliance with EP including the status of submissions under the EP

5. implementation status
   - implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA report

6. monitoring results (in both hard and diskette copies) together with the following information:
   - monitoring methodology
   - name of laboratory and types of equipment used and calibration details
   - parameters monitored
   - monitoring locations
   - monitoring date, time frequency, and duration
   - weather conditions during the period / monitoring
   - graphical plots of the monitored parameters in the month annotated against
   - the major activities being carried out on site during the period
   - weather conditions that may affect the monitoring results
   - any other factors which might affect the monitoring results
   - QA / QC results and detection limits

7. analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:
   - analysis and interpretation of monitoring results in the month
   - any non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
   - changes made that affect the EM&A during the month
   - complaints received (written or verbal) for each media, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
   - notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
   - reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
   - actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance

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

- comment on the solid and liquid waste management status during the month including waste generation and disposal records
- outstanding issues and deficiencies
- comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures, recommendations (for example, any improvement in the EM&A programme) and conclusions

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

9.3.2 Subsequent Monthly EM&A Report

The subsequent monthly EM&A reports should include the following:

1. executive summary (1-2 pages):
   - breaches of Action and Limit levels
   - complaint log
   - notifications of any summons and status of prosecutions
   - changes made that affect the EM&A
   - future key issues

2. environmental status:
   - advice on status of compliance with EP including the status of submissions under the EP

3. implementation status:
   - implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA report

4. monitoring results (in both hard and diskette copies) together with the following information:
   - monitoring methodology
   - name of laboratory and types of equipment used and calibration details
   - parameters monitored
   - monitoring locations
   - monitoring date, time frequency, and duration
   - weather conditions during the period / monitoring
   - graphical plots of the monitored parameters in the month annotated against:
     i. the major activities being carried out on site during the period
     ii. weather conditions that may affect the monitoring results
     iii. any other factors which might affect the monitoring results
     iv. QA / QC results and detection limits

5. analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:
   - analysis and interpretation of monitoring results in the month
   - any non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
   - changes made that affect the EM&A during the month

- complaints received (written or verbal) for each media, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
- notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
- reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
- actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance

6. others
   - an account of the future key issues as reviewed from the works programme and work method statements
   - comment on the solid and liquid waste management status during the month including waste generation and disposal records
   - outstanding issues and deficiencies
   - comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures, recommendations (for example, any improvement in the EM&A programme) and conclusions

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

Some information concerning the EM&A works, such as the EM&A requirements would remain unchanged throughout the EM&A programme. In the subsequent Monthly EM&A Reports, the First Monthly EM&A Report can be referred instead of repeating the description of the unchanged information.

9.4 Quarterly EM&A Summary Report (Construction Phase)

A quarterly EM&A report should be produced and should contain at least the following information. In addition, the first quarterly summary report should also confirm if the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

1. up to half a page executive summary
2. basic project information including a synopsis of the Project organisation and programme, and a synopsis of works undertaken during the quarter
3. a brief summary of EM&A requirements including:
   - monitoring parameters
   - environmental quality performance limits (Action and Limit levels)
   - environmental mitigation measures, as recommended in the Project EIA Final Report
4. drawings showing the Project area, environmental sensitive receivers and the locations of the monitoring and control stations
5. implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA report
6. graphical plots of the monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
   - the major activities being carried out on site during the period
   - weather conditions during the period

- any other factors which might affect the monitoring results

7. advice on the solid and liquid waste management during the quarter including waste generation and disposal records
8. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
9. a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures
10. a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance
11. a summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken
12. comments on the effectiveness and efficiency of the mitigation measures; recommendations on any improvements in the EM&A programme and conclusions for the quarter
13. proponents' contacts and any hotline telephone number for the public to make enquiries.

9.5 Final EM&A Summary Report (Construction Phase)

The EM&A program could be terminated (for individual works sites / construction contracts) upon completion of those construction activities that have the potential to cause significant environmental impacts.

The proposed termination by the Contractor should only be implemented after the proposal has been endorsed by the IEC and the ER followed by final approval from the DEP.

The final EM&A report should include, inter alia, the following information:

1. an executive summary
2. basic project information including a synopsis of the Project organisation and programme, contacts of key management, and a synopsis of work undertaken during the entire construction period
3. a brief summary of EM&A requirements including:
   - monitoring parameters
   - environmental quality performance limits (Action and Limit levels)
   - environmental mitigation measures, as recommended in the Project EIA study final report
4. drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations
5. advice on the implementation status of environmental and pollution control / mitigation measures, as recommended in the Project EIA study final report, summarised in the updated implementation status pro forma
6. graphical plots of the monitoring parameters over the construction period for representative monitoring stations, including the post-project monitoring annotated against:
   - the major activities being carried out on site during the period
   - weather conditions during the period
   - any other factors which might affect the monitoring results
   - the baseline condition
7. compare the EM&A data with the EIA predictions
8. effectiveness of the solid and liquid waste management
9. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
10. a brief account of the reasons the non-compliance including a review of pollution sources and working procedures
11. a summary of the actions taken against the non-compliance
12. a summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken

13. a review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness)
14. a summary of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results
15. a review of the practicality and effectiveness of the EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), and recommendation on any improvement in the EM&A programme
16. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings

9.6 Data Keeping

No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the EM&A reporting documents. However, any such document should be retained by the ET and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. Monitoring data should also be recorded in digital format, and the soft copy must be available upon request. Data format should be agreed with the IEC, the ER and EPD. All documents and data should be kept for at least one year following completion of the construction contract and one year after the completion of operation phase monitoring for construction phase EM&A and operational phase EM&A respectively.

9.7 Interim Notifications of Environmental Quality Limit Exceedances

For construction phase EM&A, with reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader should immediately notify the IEC, the ER and EPD, as appropriate and should keep them informed of the results of the investigation, proposed remedial measures, actions taken, updated situation on site, need for further follow-up proposals, etc. A sample template for the interim notifications is shown in **Appendix B**. The ET Leader may modify the interim notification form for this EM&A programme, the format of which should be approved by the ER and agreed by the IEC.

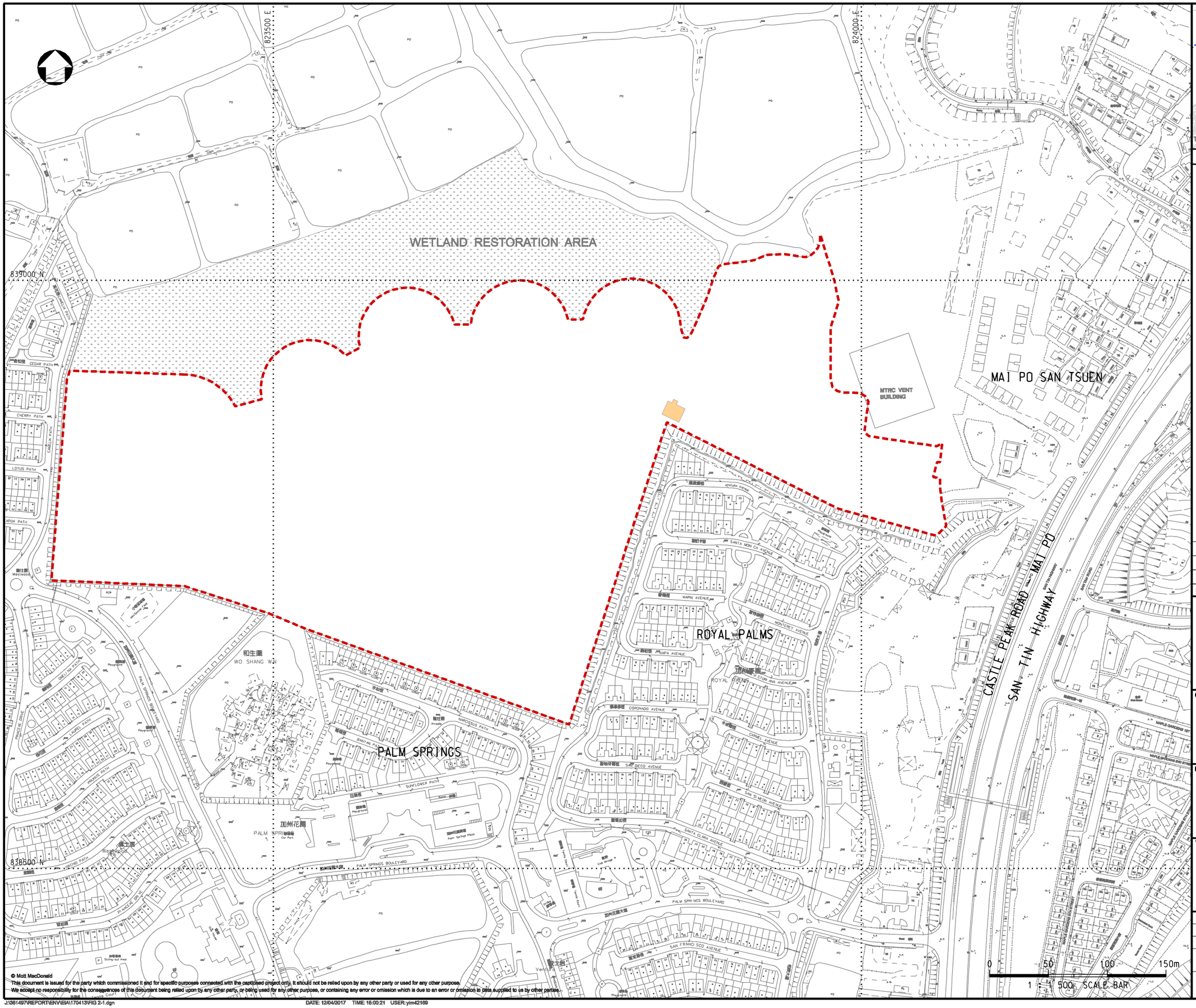
9.8 Operation Phase Monitoring Report

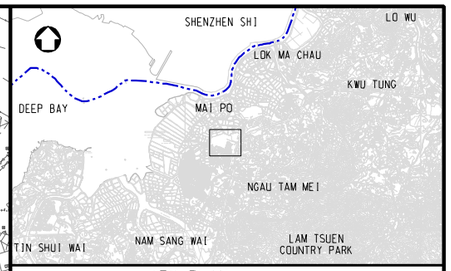
During operation phase, the monitoring activities specified in this EM&A Manual shall be reported by the Environmental Monitoring Team in an operation phase monitoring report. This report shall be submitted to EPD and other authorities which may be required in the EP/ licence.

For reclaimed water supply and use monitoring, the requirements specified in **Section 4.3.1.6**, including the final monitoring locations, monitoring results, and the events and actions taken according to **Table 4.2** shall be reported in the monthly operation phase monitoring report. For operation phase landscape monitoring, the requirements specified in **Section 7.4** shall be reported.

The operation phase monitoring report should be submitted monthly for the duration of operation phase monitoring (until decommissioning of the onsite STP). A final monitoring report which shall summarise all the monitoring activities and the findings of the operation phase monitoring shall be submitted to EPD upon completion of all operation phase monitoring activities.

Figures





KEY PLAN (1:100000)

LEGEND

- PROJECT BOUNDARY (COVERING THE ASSOCIATED WORKS)
- PROPOSED SEWAGE TREATMENT PLANT (ABOVE-GROUND STRUCTURE)

Rev	Date	Drawn	Description	Ch'k'd	App'd
P3	APR 17	MING	GENERAL REVISION	EY	EC
P2	JAN 17	MING	GENERAL REVISION	EY	JFP
P1	SEP 16	MING	FIRST ISSUE	EY	JFP

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Client

PROFIT POINT ENTERPRISES LTD.

Project

PROPOSED INTERIM SEWAGE TREATMENT PLANT AND EFFLUENT REUSE FACILITY AT WO SHANG WAI, YUEN LONG

Title

PROJECT LOCATION

Designed	EY		Eng check	JC	
Drawn	MING		Coordination	JC	
Dwg check	EY		Approved	EC	
Scale at A1	1:1500	Status	PRE	Rev	P3

Drawing Number

FIGURE 1.1

823800 E

823950 E

838900 N

SLUDGE TANK

ANOXIC TANK

ANOXIC TANK

AEROBIC / MEMBRANE TANK

AEROBIC / MEMBRANE TANK

EQUALIZATION TANK

EMERGENCY STORAGE TANK

SWITCHROOM & CONTROL ROOM

RECLAIMED WATER SUPPLY PUMP ROOM

RECLAIMED WATER STORAGE TANK NO.1

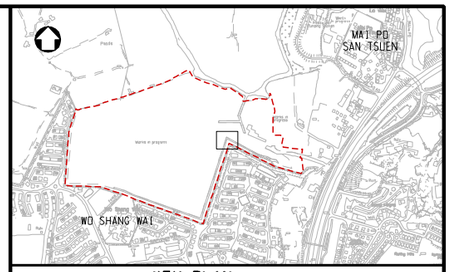
RECLAIMED WATER STORAGE TANK NO.2

UV DISINFECTION

TREATED EFFLUENT COLLECTION TANK

0 2 4 6 8 10 m

1 : 100 SCALE BAR



KEY PLAN (1:10000)

LEGEND

PROJECT BOUNDARY (COVERING THE ASSOCIATED WORKS)

PROPOSED EFFLUENT REUSE FACILITY (UNDERGROUND)

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	JUN 17	MING	FIRST ISSUE	SC	EC

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PROPOSED INTERIM SEWAGE TREATMENT PLANT AND EFFLUENT REUSE FACILITY AT WO SHANG WAI, YUEN LONG

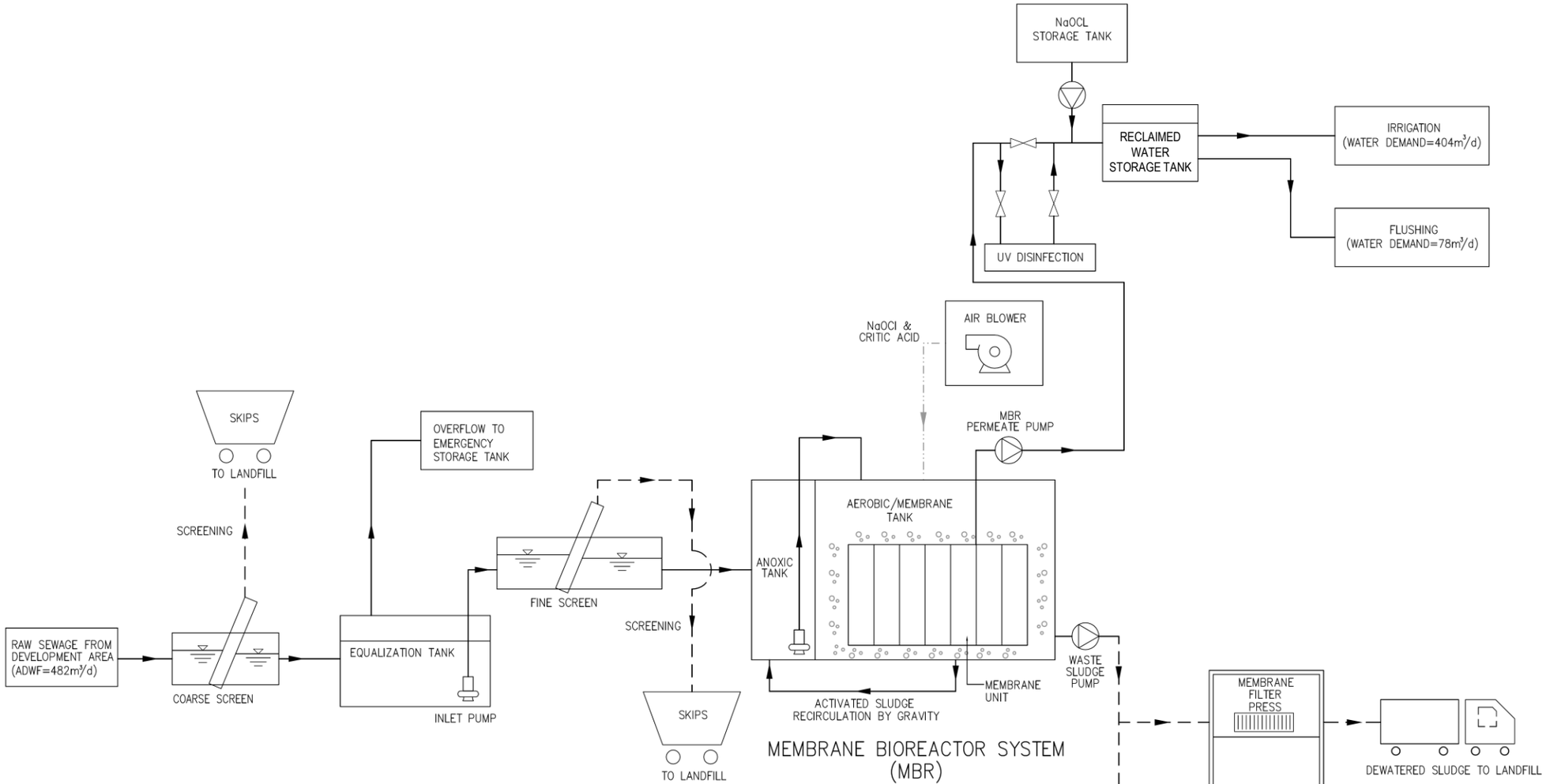
Title

PROPOSED EFFLUENT REUSE FACILITY

Designed	SC		Eng check	JC	
Drawn	MING		Coordination	JC	
Dwg check	SC		Approved	EC	
Scale at A1 1:100		Status PRE		Rev P1	

Drawing Number

FIGURE 1.2



Notes

Key to symbols

LEGEND:

SEWAGE FLOW

SLUDGE/SCREENING/GRIT FLOW

AIR FLOW

Reference drawings

Rev	Date	Drawn	Description	Chk'd	App'd
	Mar 18				

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PROPOSED INTERIM SEWAGE TREATMENT PLANT AND EFFLUENT REUSE FACILITY AT WO SHANG WAI, YUEN LONG

Title

PROCESS FLOW DIAGRAM OF INTERIM ON-SITE STP

Designed			Eng check		
Drawn			Coordination		
Dwg check			Approved		
Scale at A1 N.T.S		Status		Rev	

Drawing Number

FIGURE 1.3

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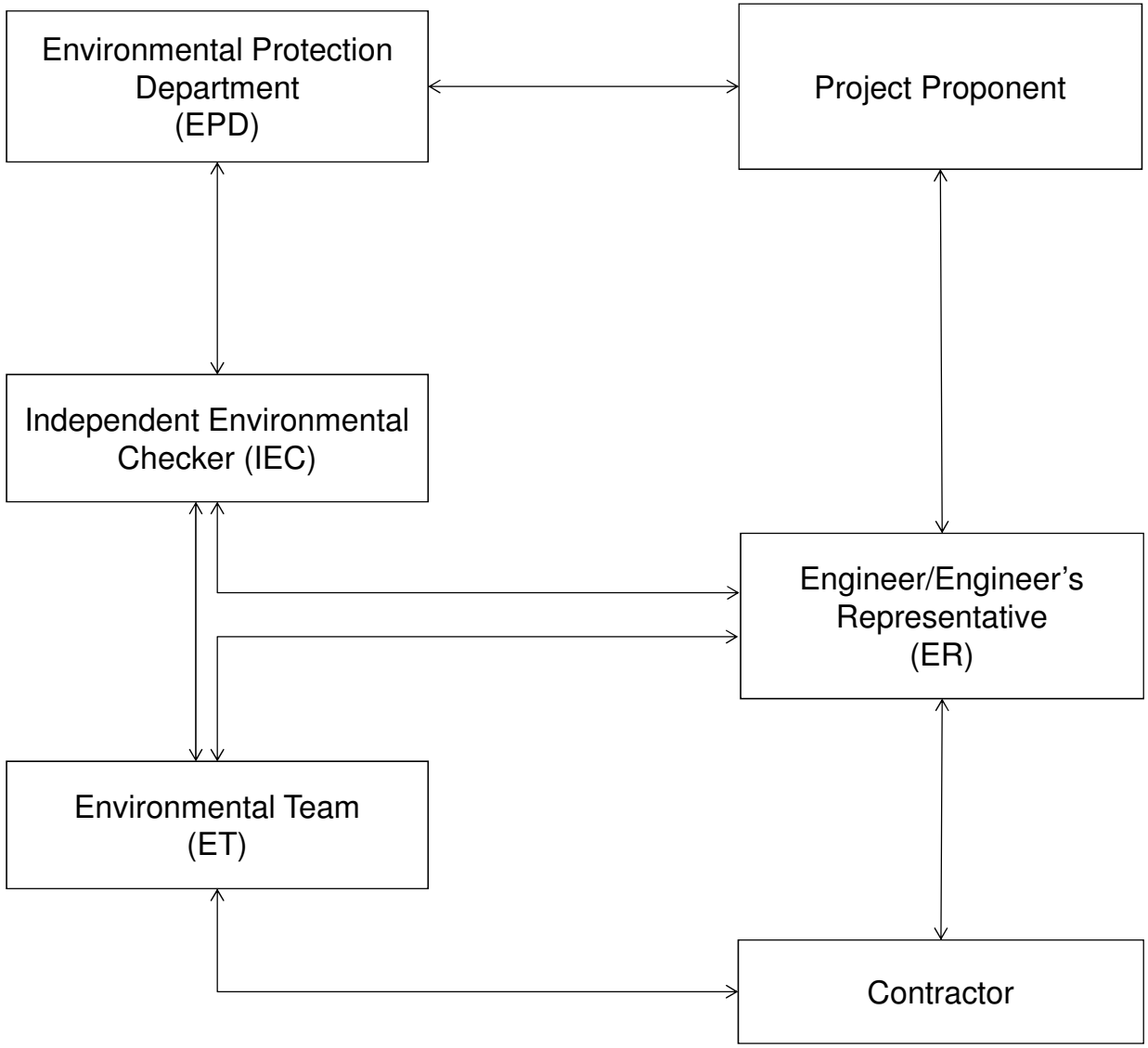

Notes

Key to symbols

Reference drawings

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

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PROPOSED INTERIM SEWAGE TREATMENT PLANT AND EFFLUENT REUSE FACILITY AT WO SHANG WAI, YUEN LONG

Title

PROJECT ORGANISATION CHART

Designed			Eng check		
Drawn			Coordination		
Dwg check			Approved		
Scale at A1		Status		Rev	

Drawing Number

FIGURE 1.4

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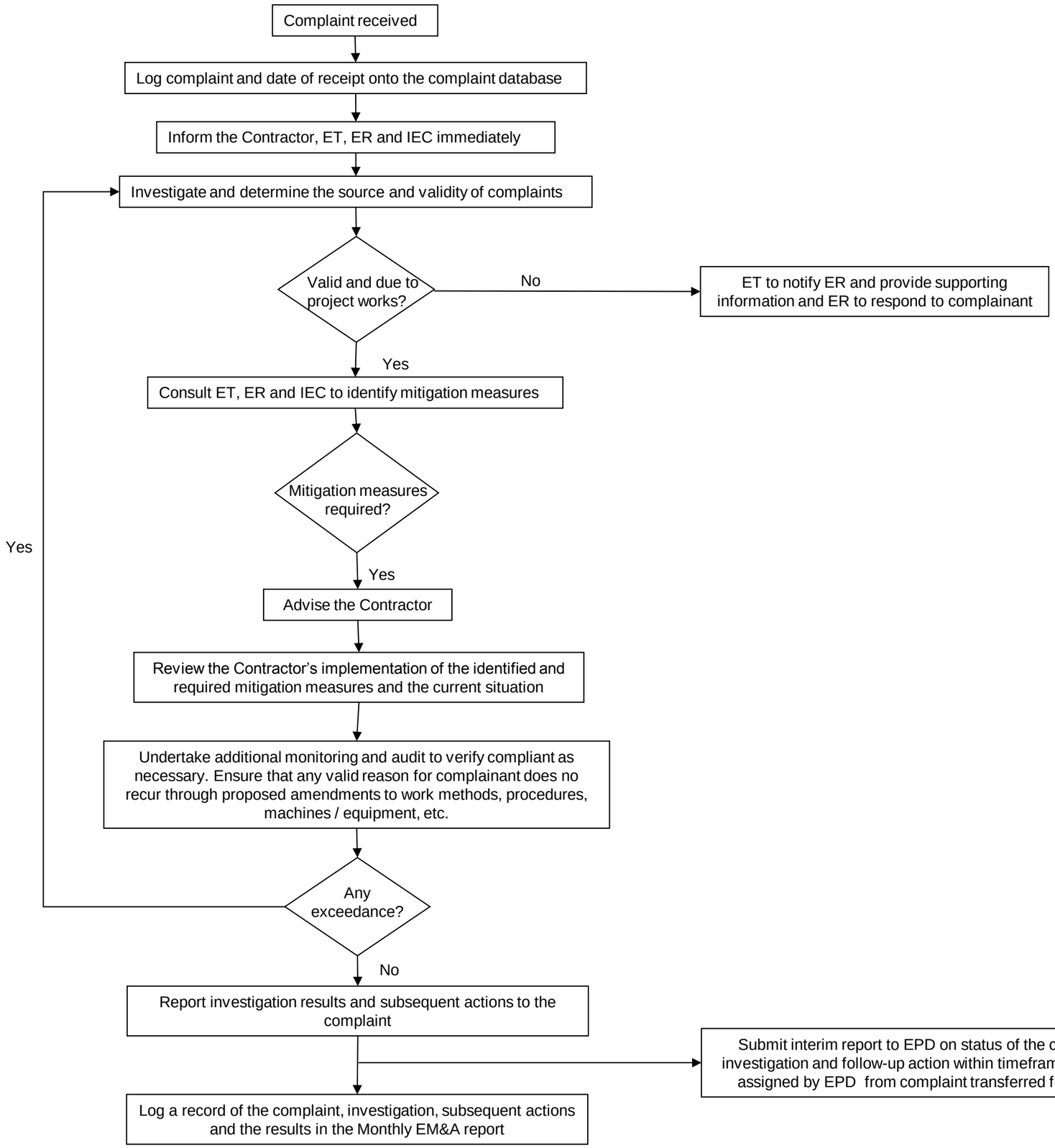

Notes

Key to symbols

Reference drawings

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

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Project

PROPOSED INTERIM SEWAGE TREATMENT PLANT AND EFFLUENT REUSE FACILITY AT WO SHANG WAI, YUEN LONG

Title

FLOW CHART OF COMPLAINT INVESTIGATION PROCEDURES

Designed			Eng check		
Drawn			Coordination		
Dwg check			Approved		
Scale at A1 N.T.S.		Status		Rev	

Drawing Number

FIGURE 8.1

Appendices

A. Implementation Schedule for Environmental Mitigation Measures

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Air Quality Impact – Construction Phase									
3.6.1	2.2	General Practices for Dust Control It is recommended that the following dust mitigation measures are implemented to maintain dust emissions at acceptable levels during the construction phase: • Any dusty activities should be regularly sprayed with water to maintain damp conditions of the works area. • Any dusty materials should be covered with tarpaulin or similar material during transportation. • Any dusty materials stockpiles should be either (i) covered entirely by impervious sheeting; or (ii) sprayed with water. Best Practices for Dust Control It is recommended that the relevant best practices for dust control as stipulated in the Air Pollution Control (Construction Dust) Regulation should also be adopted to further reduce the construction dust impacts of the Project. These best practices include: 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 standard of housekeeping to prevent emission 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 emissions. 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. 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 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 so that it remains wet when it is dumped.	Project construction site / Duration of the construction phase / Prior to commencement of operation	Contractor		✓			EIA Recommendation and Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		Transportation of Dusty Materials • Vehicle 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 project site exit. Immediately before leaving the project site, every vehicle should be washed to remove any dusty materials from its body and wheels. Use of vehicles • Immediately before leaving the project site, every vehicle should be washed to remove any dusty materials from its body and wheels. • Where a vehicle leaving the project 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 2.4m 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. Odour control measures During excavation works, the following mitigation measures are recommended in order to contain potential odour from excavated sediment: • all malodorous excavated material should be placed as far as possible from any ASRs; • the stockpiled malodorous materials should be removed from site as soon as possible; and • the stockpiled malodorous materials should be covered entirely by plastic tarpaulin sheets.							
Air Quality Impact – Operation Phase									
3.6.2	2.3	For the potential odour impact due to the proposed on-site STP, it is recommended to implement the following measures to contain and mitigate the potential odour impact: • The STP will be totally enclosed; • Negative pressure ventilation will be provided within the enclosure to avoid any fugitive odorous emission from the STP; • Further odour containment will be achieved by covering or confining the sewage	Duration of the operation phase	Future Operator			✓		EIA Recommendation and EPD's Guidelines for the Design of Small Sewage

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		channels, sewage tanks, and equipment with potential odour emission; • Proper mixing will be provided at the equalization and sludge holding tanks to prevent sewage septicity; • Chemical or biological deodorization facilities with 99.5% odour removal efficiency will be provided to treat potential odorous emissions from the STP including sewage channels / tanks, filter press and screening facilities so as to minimize any potential odour impact to the nearby ASRs. • The deodorization facilities should be regularly maintained so as to ensure a minimum of 99.5% odour removal efficiency. • The deodorization facilities should be designed such that the discharge point is directed away from nearby ASRs.							Treatment Plants
Noise Impact – Construction Phase									
4.9.1	3.2	Good Site Practice Good site practice and noise management can significantly reduce the impact of construction site activities on nearby NSRs. The following package of measures should be followed during each phase of construction: • 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.	Within the Project site / During construction phase / Prior to commencement of operation.	Contractor		✓			EIAO and Noise Control Ordinance
4.9.1	3.2	Adoption of QPME • QPME should be adopted as far as applicable.	Within the Project site / During construction phase / Prior to commencement of operation.	Contractor		✓			EIAO and Noise Control Ordinance
4.9.1	3.2	Use of Noise Enclosure/ Acoustic Shed • Noise enclosure or acoustic shed should be used to cover stationary PME such as air compressor and generator.	Within the Project site / During construction phase / Prior to commencement of operation.	Contractor		✓			EIAO and Noise Control Ordinance
4.9.1	3.2	Use of Noise Insulating Fabric • Noise insulating fabric can also be adopted for certain PME.	Within the Project site / During construction phase / Prior to commencement of operation.	Contractor		✓			EIAO and Noise Control Ordinance

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
4.9.1	3.2	Schedule of the Use of PME • The construction activities should be scheduled, where applicable, to prevent the use of multiple PMEs simultaneously.	Within the Project site / During construction phase / Prior to commencement of operation.	Contractor		✓			EIAO and Noise Control Ordinance
Noise Impact – Operation Phase									
4.8.2	3.3	Specification of the maximum allowable sound power levels of the STP should be followed. Appropriate noise reduction design at source at the louver opening will be considered (such as acoustic louver blade or ventilation silencers, etc.) during the detailed design stage to ensure the required maximum allowable SWLs is achieved.			✓		✓		EIAO and Noise Control Ordinance
4.8.2	3.3	Noise commissioning test prior to the operation of the STP is required to ensure noise criteria compliance.					✓		EIAO and Noise Control Ordinance
Water Quality – Construction Phase									
5.6.1.1	4.2	Construction Site Runoff Good site practices should be adopted, including but not limited to the following: • Temporary site drainage facilities shall be designed and implemented prior to commencement of construction. The design of the silt/ sand removal traps and sediment basins shall follow the design in ProPECC Note PN1/94 • Perimeter cut-off drains shall be installed in advance of any excavation and site formation works to convey site runoff from the works areas to the silt removal facilities; • Runoff into the excavation areas during rainstorm events shall be minimised as far as practicable. Any wastewater pumped out of the excavation areas shall be treated to remove suspended solids prior to discharge; • Maintenance and inspection of the drainage system and sediment removal facilities should be carried out regularly to remove any sediment and blockages, especially when rainstorms are forecast; • Final surface levels should be compacted and final surface protections installed to prevent erosion by rainstorms; • Open stockpiles of material should be covered on site with waterproof layers such as tarpaulin. • The wheels of all vehicles and plant should be cleaned before leaving the works areas. The washwater should be treated to remove any suspended sediment; • Surface water from concrete batching areas and the rest of the site should be separated as far as possible. Wastewater from any concrete batching plant (if required) shall be treated to the required standards including pH adjustment and settlement of suspended sediments before discharging to stormwater drains; • Manholes (including those constructed as part of the Project) should be adequately	Within the Project site / During construction phase	Contractor		✓			ProPECC Note PN1/94 Water Pollution Control Ordinance Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		covered and temporarily sealed at all times. Precautionary measures relating to inclement weather should also be adopted, including but not limited to the following: • Silt removal facilities, channels and manholes should be maintained and deposited silt and grit should be removed regularly; • Temporarily exposed slope surfaces should be covered; • Temporary access road should be protected by crushed stone or gravel; • Intercepting channels should be provided to prevent storm runoff from washing across exposed soil surfaces; and • Trenches should be dug and backfilled in short sections. Measures should be taken to minimize the ingress of rainwater into trenches.							
5.6.1.2	4.2	Accidental Spillage of Chemicals The following measures shall be observed: • The labelling and storage of chemicals should be in accordance with the "Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes" and maintained at all times by the Contractor; • Oils and fuels should only be stored in designated areas which have appropriate pollution prevention control facilities such as oil and grease traps and petrol interceptors; • The maintenance of vehicles should only be undertaken in areas of the site served by these pollution prevention measures; and • All fuel tanks and storage areas should be locked and located on sealed areas of the site, within bunded areas with a capacity equal to 110% of the storage capacity of the largest container. The bund should be drained of surface water after each rainfall event.	Within the Project site / During construction phase	Contractor		✓			Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
5.6.1.3	4.2	Sewage from Construction Workforce Portable toilets shall be provided throughout construction phase and shall be regularly maintained, collected and disposed by a licensed waste collector.	Within the Project site / During construction phase	Contractor		✓			Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
									Waters
5.6.1.4	4.2	General Construction Activities Mitigation measures to be adopted include the following: • Construction waste, debris and refuse generated onsite should be stored in designated areas and properly contained. • Waste materials should be regularly removed offsite. • Stockpiles of construction materials such as cement and excavated material should be covered when not in use.	Within the Project site / During construction phase	Contractor		✓			EIAO
Water Quality Impact – Operation Phase									
5.6.2.1	4.3	Reclaimed Water Use Onsite The following measures shall apply: • The onsite STP shall comprise MBR technology with post-process disinfection via ultraviolet (UV) treatment and chlorine dosing; • Sewage effluent shall be treated to meet the Water Supplies Department's reclaimed water standards specified in the EIA for non-portable uses. Samples of reclaimed water shall be taken regularly and tested by a HOKLAS or other internationally accredited laboratory to ensure the effluent quality meets the required reuse standard. In addition, preventive measures for cross-contamination and mis-use of reclaimed water shall include the following: Engineering Measures • Water to be supplied for portable use, toilet flushing and irrigation should be stored in three different tanks in different colors and clearly labeled; • All pipes and fittings used for the reclaimed water supply and associated distribution system should be purple in color (exact color code to be reviewed) for distinguishing them from the pipes and fittings used for the fresh water supply and its distribution systems; • Regular checking/inspections of the reclaimed water supply and associated distribution systems should be carried out to identify any possible cross connection to the fresh water supply and distribution system. Non-toxic dye may be adopted in the checking/inspections; • Non-return valves should be installed on both the inlet pipes feed from reclaimed water storage tank and WSD's supply mains, to the toilet flushing and irrigation waters storage tanks; and • All precaution measures should be clearly stated in the O&M manual of the STP, toilet flushing and irrigation systems. Management Measures	At the onsite STP and associated sewage / reclaimed water network / Throughout operation of the onsite STP	Project Proponent / Estate Manager			✓		Water Supplies Department Inter-departmental Working Group on the Implementation of Reclaimed Water Supply in Sheung Shui and Fanling "no net gain" in pollution load as specified in the Town Planning Board Guidelines No. 12C

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• Warning plate with sign and letter "NOT FOR PORTABLE USE 不能飲用" would be shown on the toilet flushing and irrigation water storage tanks, and tagged on all accessible water taps supplying reclaimed water if any within the developments, notifying the staff, visitors and the public at large that reclaimed water is being used and is not suitable for drinking; • All water taps of reclaimed water at communal areas, if any should be locked in order to avoid mis-use of reclaimed water for other non-planned use; • Proper signage, promotion and training workshops will be provided periodically to all management and operation staffs of the Development, as well as future land owners on the proper use of reclaimed water and portable water; and • All precaution measures should be clearly stated in the management manual of the Development.							
5.6.2.2	4.3	Discharge of Reclaimed Water to Deep Bay WCZ • The following measures shall be incorporated as part of the onsite STP: • Provision of a minimum capacity of 1,180 m3 reclaimed water storage tank to store excessive reclaimed water in case of emergency (e.g. extreme adverse weather) or maintenance of landscape area; • Reclaimed water storage tank should be partitioned into several compartment to allow partial shut-down of the tank for maintenance; • The operation of the project will maintain the reclaimed water demands for toilet flushing and landscape irrigation as detailed in the SIA in Appendix 2.1 to ensure the reclaimed water can be totally reused. A minimum of 50,850m2 landscape areas within the development will be maintained (as committed in the Town Planning Board application for this development) using reclaimed water for irrigation; • Level sensors connected with alarm signalizing system should be installed to keep monitoring on storage volume of reclaimed water to avoid overflow of reclaimed water. The warning signal should be automatically generated and sent to the Estate Manager when the flow in the tank reaches a pre-set level. The Estate should arrange and mobilize tanker service to tank away the excessive reclaimed water as necessary to maintain 1-day reclaimed water storage capacity reserved as contingency. • As a last resort and when irrigation is stopped due to continuous adverse weather or prolonged suspension of irrigation or flushing water supply systems for maintenance / repairing, any further excessive reclaimed water shall be tanked away to the public STW for offsite treatment and disposal. For prevention of excessive irrigation leading to surface runoff, the following measures shall be adopted: • A pre-set semi-automatic control irrigation system with underground drip pipes would be	At the onsite STP / Throughout operation of the onsite STP	Project Proponent / Estate Manager			✓		Water Pollution Control Ordinance "no net gain" in pollution load as specified in the Town Planning Board Guidelines No. 12C

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		installed in the private garden and managed by the Deed of Mutual Covenant manager to ensure that reclaimed water would be used properly for irrigation. • Installation of flow meters to monitor the irrigation water demand, with daily cut-off limits applied to prevent excessive irrigation using the reclaimed water. All the recommended measures for collection, treatment and disposal to ensure no net increase in Pollution to Deep Bay shall be incorporated in the Project contract document.							
5.6.2.3	4.3	Emergency Discharge of Untreated Sewage Effluent from the Onsite STP The following measures shall be incorporated as part of the onsite STP: • Regular test, maintenance and replacement of membranes or equipment will be carried out according to the recommendations from manufacturers to lower the chances of facilities breakdown; • Provision of equalization tank to store three times of ADWF for a period of 4 hours (i.e. minimum 241 m^3); • Provision of emergency storage tank to store the overflow of raw sewage with a capacity of approximate 130 m^3 based on the latest information (actual size to be confirmed in the detailed design stage). • Dual or standby power supply; • Standby unit for major equipment to allow for partial shut down for maintenance; and • Installation of flow measurement and level sensors connected with alarm signalizing system to keep monitoring on inflow rate to avoid sewage overflow. In case operation of the STP cannot be resumed after all the above mitigation measures have been exhausted, raw sewage shall be tanked away to the public STW for offsite treatment and disposal. Details of these and other specific contingency measures shall be documented in a contingency plan to be prepared by the operator of the STP. The contingency plan shall cover situations when the reclaimed water cannot meet the proposed criteria as well as situations when the STP is out of service, and shall be implemented throughout operation of the onsite STP.	At the onsite STP / Throughout operation of the onsite STP	Project Proponent / Estate Manager			✓		Water Pollution Control Ordinance "no net gain" in pollution load as specified in the Town Planning Board Guidelines No. 12C
5.6.3	4.4	Decommissioning Phase • The onsite STP shall not be decommissioned until the sewerage connection to the Government sewer has been fully established and implemented. Any wastewaters generated from the decommissioning process and any residual untreated sewage or reclaimed water would be pumped out and tanked away to the public sewage treatment work for offsite treatment and disposal.	At the onsite STP / before decommissioning of the onsite STP	Project Proponent / Estate Manager				✓	Water Pollution Control Ordinance "no net gain" in pollution load as specified in the Town Planning Board Guidelines

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
									No. 12C
Waste Management Implications – Construction Phase									
6.5.1.1.	5.2	Good Site Practice 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	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor		✓			
6.5.1.2	5.2	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 • Segregation and storage of different types of waste in different containers or skips or stockpiles to enhance reuse or recycling of 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	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor		✓			
6.5.1.	5.2	Inert and Non-inert C&D Materials	Project construction site /	Contractor		✓			

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3		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	Throughout construction stage / Until completion of all construction activities						
6.5.1.4	5.2	Excavated Sediment • The loading, unloading, handling, transfer or storage of treated and untreated sediment should be carried out in such a manner to prevent or minimise dust emissions; • Temporary stockpiling shall be avoided as far as possible. In case temporary storage is needed, the untreated sediment should be placed at a designated area paved with either concrete or liner and covered properly with tarpaulins; • Speed control shall be implemented for vehicles carrying untreated sediment within the site to minimise dust emission; and • All necessary measures should be employed to prevent cross-contamination of untreated sediment with other excavated / fill materials	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor		✓			
6.1.15	5.2	Chemical Waste If chemical wastes are produced at the construction site, the 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)	Project construction site / Throughout construction stage / Until completion of all construction activities	Contractor		✓			

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		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							
6.5.1.6	5.2	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		✓			
Waste Management Implications – Operation Phase									
6.5.2.1	5.3	Screening and Grits • Screens should be cleaned regularly to remove any accumulated organic debris; • Screening and grit transfer system should be flushed regularly with water to remove organic debris; • Screening and grits generated should be transferred to closed containers before transportation and disposal at designated landfill sites.	Project area / On a regular basis / Throughout operation stage	Future user			✓		
6.5.2.2	5.3	Sludge • Frequent sludge withdrawal from tanks is necessary to prevent the production of gases; • Sludge should be transferred to closed containers before transportation and disposal at designated landfill sites or public sewage treatment works by designated sewage tankers; • Sludge tankers and containers should be flushed with water regularly; • Sludge tankers should be washed thoroughly before leaving the proposed sewage treatment plant to avoid any odour nuisance during transportation; • All wastewater, if any, generated from the sludge dewatering process should be diverted to the proposed sewage treatment plant for proper treatment.	Project area / On a regular basis / Throughout operation stage	Future user			✓		
6.5.2.3	5.3	General Reuse General refuse should be collected on daily basis and delivered 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.	Project area / On a regular basis / Throughout operation stage	Future user			✓		
6.5.2.4	5.3	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	Project area / On a regular basis / Throughout operation stage	Future user			✓		

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		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.							
Ecological Impact									
		No specific ecological mitigation measure is required.							EIAO and EIAO-TM
Landscape and Visual Impacts – Construction Phase									
Table 8.14	Table 7.1	CP1 – Integration of Construction Programme with that of the WSW Development – The construction programme should be carefully integrated into the overall programme of the WSW Development, so that the construction of the Project will not cause any delay and thereby lengthen the construction period of the WSW Development.	Project area / During design stage and construction phase	Project Proponent via Design Team & Contractor		✓			
Table 8.14	Table 7.1	CP2 – Advance Planting – Proposed landscape planting should be undertaken at the earliest practicable stage of the construction phase of the Project.	Project area / During design stage and construction phase	Project Proponent via Contractor		✓			
Table 8.14	Table 7.1	CP3 – Dust and Erosion Control for Exposed Soil – Exposed soil shall be covered or "camouflaged" and watered frequently as dust suppression. 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 to minimize dust impact.	Project area / During construction phase	Project Proponent via Contractor		✓			
Landscape and Visual Impacts – Operation Phase									
Table 8.15	Table 7.2	OP1 – Sensitive Design and Disposition – The above-ground structure of the Sewage Treatment Plant should be sensitively designed in a manner that responds to the planned landscape context of the WSW Development to minimize potential adverse visual impacts. The structural design should seek to reduce the apparent visual mass. Subdued tones should be considered for the colour palette with non-reflective finishes to reduce glare effect. The layout of buildings and their windows should take into account the location of the proposed Sewage Treatment Plant so as to avoid and minimize any potential views of the Sewage Treatment Plant by potential VSRs.	Project area / During design stage	Project Proponent via Design Team	✓	✓			EIAO-TM; PNAP 152 – Sustainable Building Design Guidelines; Hong Kong Planning Standards and Guidelines; Urban Design Guidelines
Table 8.15	Table 7.2	OP2 – Visual Screening – Visual screening such as boundary fences / walls at the periphery of the swimming pool should be considered as far as practicable to obstruct the	Project area / During design stage	Project Proponent via Design Team		✓			EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location/Duration of measures / Timing of completion of measures	Implementation Agent	Implementation Stages				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		views of the above-ground structure of the proposed Sewage Treatment Plant from the VSRs.							
Table 8.15	Table 7.2	OP3 – Screen Planting – Trees with mature height of at least 10 m should be planted around the proposed Sewage Treatment Plant as far as practicable for screening purpose to minimize the visual impact to the VSRs.	Project area / During design stage and construction phase	Project Proponent via Design Team		✓			EIAO-TM
Table 8.15	Table 7.2	OP4 – Enhancement Planting – Other than screen planting, additional trees, shrubs and groundcovers should also be considered to maximize greening within the Project site upon completion of the Project.	Project area / During design stage and construction phase	Project Proponent via Design Team		✓			EIAO-TM; DEVB TC(W) No. 2/2012 - Allocation of Space for Quality Greening on Roads
Table 8.15	Table 7.2	OP5 – 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 the above-ground structure of the proposed Sewage Treatment Plant.	Project area / During design stage and construction phase	Project Proponent via Design Team		✓			EIAO-TM; PNAP 152 – Sustainable Building Design Guidelines; Hong Kong Planning Standards and Guidelines; Urban Design Guidelines

Notes: Des = Design; C = Construction; O = Operation; Dec = Decommissioning

B. Sample Template for the Interim Notification

Sample template for the interim notifications of

Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

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

Location Plan

Prepared by:

Designation:

Signature:

Date: