

Environmental Impact Assessment for Development of an EcoPark in Tuen Mun Area 38

Final EM&A Manual



環境保護署

Environmental
Protection
Department

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1 INTRODUCTION

1.1 General

- 1.1.1 The Chief Executive announced in his 2005 Policy Address that the Government will formulate a policy to provide concessions to assist the development of the environmental industry. He has pledged to build an EcoPark in Tuen Mun for exclusive use by recycling industries. The first phase of EcoPark will be commissioned in late-2006.
- 1.1.2 Prior to this announcement, in October 2003, Scott Wilson Limited, in association with BMT Asia Pacific, and supported by The Dougherty Group, David C Lee Surveyors Limited and Cheung Macpherson Consultants Limited, was appointed by the Waste Facilities Business Unit (WFBU) of the Environmental Protection Department (EPD) to conduct further studies into the development of EcoPark (formerly the EcoPark) in Tuen Mun Area 38.
- 1.1.3 The EcoPark is a Designated Project (DP) under G.4(b) of Part 1, Schedule 2 of the EIAO. As a DP under Schedule 2, EcoPark requires an Environmental Permit (EP) to allow a range of recycling processes to be undertaken within the facility.
- 1.1.4 The further studies under the current agreement include conducting an Environmental Impact Assessment (EIA) Study to obtain the EP and a zoning amendment submission that includes a Road Traffic Impact Assessment (RTIA) and Marine Traffic Impact Assessment (MTIA) to secure approval for the necessary zoning amendment.
- 1.1.5 This Report presents the approach to and findings of the EIA study for EcoPark, and follows the requirements of the EIA Study Brief (ESB) No. ESB-104/2002.

1.2 Purpose of this Manual

- 1.2.1 This Environmental Monitoring and Audit (EM&A) Manual (the Manual) is a supplementary document to the EIA Study for the Development of an EcoPark in Tuen Mun Area 38 (the Project), carried out by Scott Wilson Ltd.
- 1.2.2 The Manual has been prepared in accordance with the EIA Study Brief (No. ESB-104/2002) and the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO TM). The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation of EcoPark. It provides systematic procedures for monitoring and auditing of potential environmental impacts that may arise.

1.3 Project Description

Background to the Study

- 1.3.1 Hong Kong's landfills are filling up faster than expected and society is producing much more waste now than 15 years ago, when the landfills were being planned. Government provides facilities for collecting waste plastic bottles, aluminium cans, paper and mobile 'phone batteries. These materials, together with electronics, glass, food waste, ferrous metals, textiles, rubber tyres and wood can be recycled into new products. These recycling operations not only reduce the amount of waste to be disposed of in landfills but also provide employment and stimulate the economy.
- 1.3.2 Government has devoted considerable effort to encouraging people to reduce waste. A Waste Reduction Committee was formed in 1999 to introduce new initiatives and in May 2001 the Chief Secretary Committee endorsed a package of measures to further promote the prevention, separation and recycling of municipal solid waste. Recycling programmes have been set up in housing estates, schools, hospitals, hotels, the airport, public transport facilities and public places and venues. Short-term land has been set aside for use by



recyclers and businesses have been encouraged to initiate waste reduction activities through the Wastewi\$e scheme, which recognises their efforts.

- 1.3.3 The challenge facing Hong Kong is similar to that in many developed cities. Increasing wealth has brought increasing wastage. Over the past 15 years, municipal waste has increased by about 50% while the population has increased by just 20%, and by the end of 2003 although Hong Kong was recycling 41% of municipal waste, less than 4% was being recycled locally. Thus, further measures need to be taken to improve the level of recycling.
- 1.3.4 The long-term availability of affordable land provided with basic infrastructure has been identified as one such measure to promote the growth of the waste recycling industry in Hong Kong. To this end, EcoPark in Tuen Mun Area 38 is to be established, and in his 2005 Policy Address the Chief Executive committed to its commissioning in late-2006. Figure 1.1 shows the location of EcoPark in Tuen Mun Area 38.

The Project

- 1.3.5 The land on which EcoPark is proposed to be developed is already formed and already has a seawall in place, therefore further reclamation works are not necessary. Although a conceptual layout for EcoPark has already been developed, the detailed design of EcoPark will be developed by under the follow-on D&C consultancy.
- 1.3.6 Construction of EcoPark (by the Works Contractor) will involve the following activities :
- Construction of basic infrastructure, including roads, drainage, sewers, utilities, etc.
 - Provision of empty, serviced lots (initially grassed, open ground) to be developed by qualifying tenants for their own use.
 - Construction of an Administration Building containing management offices, a visitor centre, etc., and facilities for management of the marine frontage.
 - On-site Wastewater Treatment Facility (WTF) and waste collection/storage facilities.
 - Berthing facilities (e.g. bollards) for loading/unloading at the marine frontage.
 - Environmental Monitoring and Audit (EM&A) and implementation of necessary mitigation measures to meet any EP conditions.
- 1.3.7 Operation of EcoPark (by the Operator) will comprise the following activities :
- Development of promotional and advertising materials.
 - Preparation of contractual/ easing arrangements with individual tenants and allocation of lots to tenants for construction of their facilities.
 - Preparation and implementation of management procedures/emergency procedures.
 - Management of the marine frontage allocated to EcoPark.
 - Maintenance of common infrastructure, plant, management office, etc.
 - EM&A and implementation of necessary mitigation measures to meet any EP conditions.

Construction Programme

- 1.3.8 It has been decided that EcoPark is to be constructed as a Public Works project. The completed infrastructure would then be awarded through open tender to a Management Contractor who would be responsible for the daily operation and marketing activities. The Design and Construction (D&C) consultancy to develop the detailed design, implement the Works Contract and develop the Management Contract is due to be awarded in early-2005.
- 1.3.9 The construction period for Phase I will commence in early-2006 and is expected to last around 10 months, with EcoPark opening for business in late-2006, towards the end of the construction period. At the southeast portion of the Phase I site, CEDD currently operate a tipping hall for transferring public fill to East Sha Chau. It is understood that the tipping hall will be removed in late-2005, prior to commencement of Phase I construction works. The programme is shown in Figure 1.2.



- 1.3.10 The construction period for Phase II is expected to last up to 12 months. The land for Phase II is currently occupied by the Fill Bank (and its planned extension) and by the Pilot C&D Material Recycling Facility (which will soon be replaced by a proposed Crushing Facility). Within the area to be occupied by Phase II, these facilities will operate until end-2008, after which Phase II of EcoPark can be developed, subject to user demand. The Fill Bank will, however, continue within the remaining area until March 2009.
- 1.3.11 Notwithstanding, for the purposes of assessment under this Study, a 10-month (Phase I) plus 12-month (Phase II) = up to 22-month (non-contiguous) construction period has been assumed to encompass both Phase I and Phase II construction works.

1.4 Objectives of the EM&A Programme

- 1.4.1 For the purposes of this Manual, “Works Contractor” refers to the Construction Contractor awarded the Public Works contract to construct EcoPark infrastructure. “Operator” refers to the Management Contractor who operates EcoPark on behalf of EPD under a separate Management Contract.
- 1.4.2 One of the key outputs of the EIA Study has been recommendations on mitigation measures to be undertaken in order to ensure that residual impacts comply with regulatory requirements plus the requirements of the EIAO-TM.
- 1.4.3 No unacceptable environmental impacts have been identified as occurring during the construction or operation phases, nevertheless, the EM&A programme covers both phases. To ensure effective and timely implementation of the mitigation measures, it is considered necessary to develop EM&A procedures and mechanisms by which the Implementation Schedule (Appendix A) may be tracked and its effectiveness assessed.
- 1.4.4 Furthermore, the EM&A programme includes a Process Review of all activities to be carried out in EcoPark. The purpose of this is to ensure that the EP conditions and EIA recommendations are applied to all processes, even if they have not been considered under the “umbrella” approach to this EIA. Not only does this apply to new processes coming into EcoPark (whether from new or existing tenants), but also to any changes to existing processes. Full details of the scope and requirements of the Process Review are provided in Section 7.2.
- 1.4.5 This Manual provides the EM&A requirements that have been recommended in the EIA Report in order to ensure compliance with the specified mitigation measures. The main objectives of the EM&A programme are to :
- Provide a database against which any short- or long-term environmental impacts of EcoPark can be determined.
 - Provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards.
 - Monitor the performance of EcoPark and the effectiveness of mitigation measures.
 - Verify the environmental impacts predicted in the EIA Study.
 - Carry out Process Reviews of all new processes to be operated within EcoPark to ensure that the recommendations of the EIA are met and that the conditions of the EP are complied with.
 - Determine EcoPark compliance with regulatory requirements, standards and Government policies.
 - Take remedial action if unexpected problems or unacceptable impacts arise.
 - Provide data against which environmental audits may be undertaken.



1.5 Scope of the EM&A Programme

Construction Phase

- 1.5.1 It is necessary to ensure proper implementation of the dust control measures as required under the Air Pollution Control (Construction Dust) Regulation, and therefore regular site audit of the construction activities is recommended. However, no specific construction dust monitoring is necessary.
- 1.5.2 The implementation of good construction works practice as well as the mitigation measures identified in Appendix A are important to prevent pollution of marine water in the construction phase and therefore regular site audit of the construction activities is recommended. However, no specific construction water quality monitoring is necessary. Should the Contractor need a Discharge License under the WPCO, then regular monitoring at the discharge point will be required under the WPCO to demonstrate compliance with the License requirements. As monitoring of is provided for under the WPCO, it does not form part of this EM&A programme, however, the results of monitoring should be made available in the EM&A reporting if appropriate.
- 1.5.3 During the construction phase, no significant waste management impacts have been predicted, providing that good site practice is maintained. However, regular auditing of the implementation of good site practice will be carried out as part of the construction EM&A programme.
- 1.5.4 LFG monitoring shall only be carried out when excavations of 1m depth or more are carried out. Monitoring shall be conducted through the use of an intrinsically safe and portable instrument, appropriately calibrated and capable of measuring methane, carbon dioxide and oxygen. Safety precautions should be made available during trenching and excavation, and training and breathing apparatus/gas detection equipment shall be provided for confined spaces or deep trenching.
- 1.5.5 The scope of this EM&A programme during the construction phase is therefore to :
- Implement monitoring and inspection requirements for any LFG monitoring programme.
 - Implement, where appropriate, measures for avoiding any contaminated groundwater.
 - Provide environmental advice (as requested or when otherwise necessary) to the Contractor on the implications of the environmental monitoring data.
 - Identify and resolve environmental issues and other functions as they may arise from construction of EcoPark.
 - Check and quantify the Contractor's overall environmental performance, implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects as they may arise from the works.
 - Conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and to undertake additional *ad hoc* monitoring and auditing as required by special circumstances.
 - Evaluate and interpret all environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA.
 - Manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process.
 - Conduct regular site inspections of a formal or informal nature to assess :
 - the level of the Contractor's general environmental awareness
 - the Contractor's implementation of the recommendations in the EIA
 - the Contractor's performance as measured by the EM&A
 - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed



- Advise the site staff of any identified potential environmental issues.
- Submit monthly EM&A reports which summarise monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

Operation Phase

- 1.5.6 Part IV of the APCO provides regulatory control on Specified Processes (SPs) described in Schedule 1 of the Ordinance. A SP license is required to operate the specified process under the APCO.
- 1.5.7 The initially considered processes within EcoPark are controlled by "Specified Process" SP licenses issued under *APCO and Air Pollution Control (Furnaces, Ovens and Chimneys) (Installation and Alteration) Regulations*. As SP monitoring is provided for under the APCO, it does not form part of this EM&A programme, however, the results of any SP Licence monitoring should be made available in the EM&A reporting if appropriate.
- 1.5.8 The WTF will treat industrial effluents arising from various activities within EcoPark and the Operator will need to obtain a Discharge License under the WPCO for the WTF. As regular monitoring at the discharge point will be required under the WPCO to demonstrate compliance with the License requirements, it does not form part of this EM&A programme, however, the results of monitoring should be made available in the EM&A reporting if appropriate.
- 1.5.9 It is recommended that compliance auditing should be carried out to determine whether wastes are being managed in accordance with the Operator's EMP. This audit, together with the adherence to good operational practice, will also minimise the chance of land contamination. These audits should address all aspects of waste management, including waste generation, storage, recycling, transportation and disposal.
- 1.5.10 The scope of this EM&A programme during the operation phase is therefore to :
- Implement monitoring and inspection requirements for the operation phase LFG monitoring programme.
 - Carry out Process Reviews of all new processes to be operated within EcoPark to ensure that the recommendations of the EIA are met and that the conditions of the EP are complied with.
 - Provide environmental advice (as requested or when otherwise necessary) to the Operator on the implications of the environmental monitoring data.
 - Identify and resolve environmental issues and other functions as they may arise from the operation of EcoPark.
 - Check and quantify the Operator's overall environmental performance, implementation of EAPs, and remedial actions taken to mitigate adverse environmental effects as they may arise from operation of EcoPark.
 - Conduct monthly reviews of monitored impact data, if any, as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and to undertake additional *ad hoc* monitoring and auditing as required by special circumstances.
 - Evaluate and interpret environmental monitoring data, if any, to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA.
 - Conduct regular site inspections to assess :
 - the level of Operator's general environmental awareness
 - Operator's implementation of the recommendations in the EIA
 - Operator's performance as measured by the EM&A
 - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed



- Advise the Operator of any identified potential environmental issues.
- Submit quarterly EM&A reports which summarise monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.
- Submit Process Review Checklists confirming that the findings of the EIA have been met.

Environmental Management Plan (EMP)

- 1.5.11 To ensure effective implementation and reporting on compliance with the stated mitigation measures, as well as the monitoring and auditing requirements and remedial actions defined in the EIA, an appropriate contractual and supervisory framework needs to be established. The basis of the framework within which implementation should be managed overall is through the preparation of Environmental Management Plan (EMPs) by the Contractor and Operator for the construction and operation phases, respectively.
- 1.5.12 An EMP is similar in nature to a quality plan and provides details of the means by which the Contractor and Operator will implement the recommended mitigation measures and achieve the environmental performance standards defined in Hong Kong environmental legislation, the contract and in the EIA documentation. The primary reason for adopting the EMP approach is to make the Contractor and Operator aware of their environmental responsibilities and to be pro-active about the commitment to achieve the standards specified, rather than relying on the EM&A programme.
- 1.5.13 The EMP approach is grounded on the principle that the Contractor and Operator shall define the means by which the environmental requirements of the EIA process, and the contractual documentation shall be met. In particular, the Contractor and Operator must be placed under a clear obligation to identify and control any implications arising from changes to the working methods assumed in the EIA. The EMP submitted by the Operator shall include a description of his proposed design audit.
- 1.5.14 The EMP also provides opportunities for the Contractor and Operator to draw upon the strengths of other institutional processes, such as ISO 9000/14000, so as to ensure that the achievement of the required standards and fulfilment of commitments are documented.
- 1.5.15 Each tender (for both the Construction Contract and the Management Contract) shall include an outline EMP for submission as part of the tendering process, which will demonstrate the determination and commitment of the tenderer and indicate how the environmental performance requirements laid out in the EIA Report, EM&A Manual and EP will be met. It is recommended that this aspect be included as a specific criterion in the assessment of tender documents, since this will act as a clear indication of WFBU's commitment to the pro-active management and minimisation of environmental impacts throughout the construction and operating life of EcoPark.
- 1.5.16 The contractual requirement for an EMP would generally comprise appropriate extracts from (and references to) the EIA Report and this EM&A Manual, and include such typical elements as the relevant statutory environmental standards, general environmental control clauses and specific environmental management clauses, as well as an outline of the scope and content of the proposed EMP. The tenderer's Environmental Team (ET) shall certify the outline EMP.
- 1.5.17 Upon award of the Construction and Operation Contracts, the Contractor and Operator shall be required to submit a draft and final version of the EMP, certified by their ET and verified by the Independent Environmental Checker (IEC), for the approval of WFBU.
- 1.5.18 During operation of EcoPark, the Operator's EMP will be subject to continuous review to ensure that it contains sufficient provision to provide environmental protection and design audit for the wide range of processes to be carried out within EcoPark, particularly for future processes using technologies not commercially available and, hence, not examined in the EIA.



Emergency Response Plan (ERP)

- 1.5.19 An Emergency Response Plan (ERP) will be formulated by the Management Contractor to address various scenarios within EcoPark. The ERP will be certified by the Environmental Team ET and verified by the IEC under the operation EM&A programme.
- 1.5.20 Based on the range of processes assessed in the EIA report, it has been assumed in this Manual that the ERP will be required in the event of liquid/DG spillages, damage to the WTF for fire. However, depending on the recommendations of the design audits to be carried out by the ET, the ERP may be expanded by the Operator to cover accidents that could potentially have significant air quality implications. In this case, any additions to the ERP will be certified by the Environmental Team ET and verified by the IEC under the operation EM&A programme.

1.6 Organisation and Structure of the EM&A

General

- 1.6.1 The Contractor and Operator shall each appoint an ET to conduct the EM&A works and to provide specialist advice on the undertaking and implementation of environmental responsibilities. All submissions made by the Contractor and Operator shall be certified by their ET and verified by the IEC prior to WFBU approval.
- 1.6.2 The ET shall have previous relevant experience in managing similarly sized EM&A programmes and the Environmental Team Leader (ET Leader) shall be a recognised environmental professional, preferably with a minimum of seven years relevant experience in impact assessments and impact monitoring programmes. The ET shall be nominated in the tender and their competence and experience shall form part of the tender assessment.
- 1.6.3 To maintain strict control of the EM&A process, WFBU shall appoint the consultant for the follow-on D&C assignment to act as the IEC to verify and validate the environmental performance of the Contractor, Operator and their respective ETs.

Project Organisation

- 1.6.4 The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following sections and summarised in Figure 1.3. For the avoidance of doubt, the ET Leader shall be responsible for, and in charge of, the ET and shall be the person responsible for executing the EM&A requirements.

Contractor and Operator

- 1.6.5 The Contractor and Operator shall :
- Work within the scope of their respective construction and management contracts.
 - Employ an ET, as necessary, to undertake any monitoring, laboratory analysis and reporting of the EM&A requirements outlined in this Manual.
 - Provide assistance to the ET in conducting the required EM&A.
 - Participate in the site inspections undertaken by the ET and the IEC, as required, and undertake any corrective actions instructed by WFBU.
 - Provide information/advice to the ET or IEC regarding construction or operation activities which may be contributing to adverse environmental conditions.
 - Implement measures to reduce impact where Action and Limit (A/L) levels are exceeded.
 - Take responsibility and strictly adhere to the guidelines of the EM&A programme and complementary protocols developed by their project staff.
 - The Operator shall work together with the ET to initiate the Process Review when approached by potential tenants, or at the request of WFBU.



Project Proponent (WFBU)

1.6.6 WFBU, or their representative, shall :

- Monitor the Contractor's and Operator's compliance with contract specifications, including the effective implementation and operation of environmental mitigation measures and other aspects of the EM&A programme.
- Comply with the agreed EAP in the event of any exceedance.
- Employ an IEC to verify the results of the EM&A works carried out by the ET.
- Instruct the Contractor and Operator to follow the agreed protocols, or those in the Contract Specifications, in the event of exceedances or complaints.
- Approve the Process Review Checklist that has been prepared and certified by the ET and verified by the IEC.

Environmental Team (ET)

1.6.7 The duties of the ET and ET Leader are to :

- Monitor any environmental parameters as required by the EM&A Manual.
- Assess the EM&A data and review the success of the EM&A programme determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise.
- Conduct weekly site inspections (during construction) or monthly site inspections (during operation) to investigate and inspect the Contractor's and Operator's equipment and work methodologies with respect to pollution control and environmental mitigation, monitor compliance with the environmental protection specifications in the Contract, and to anticipate environmental problems that may require mitigation before they arise.
- Audit any environmental monitoring data and report the status of the general site environmental conditions and the implementation of mitigation measures resulting from site inspections.
- Review Contractor's working programme and methodology (during the construction phase) and comment as necessary (Contractor's ET only).
- Investigate and evaluate complaints, and identify corrective measures.
- Advise the Contractor and Operator on environmental improvement, awareness, enhancement matters, etc.
- Report on the environmental monitoring and audit results and the wider environmental issues and conditions to the IEC, Contractor/Operator, WFBU and EPD.
- Adhere to the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints.
- Certify that all submissions made by the Contractor and Operator meet the requirements of the EIA, EM&A Manual and EP, as well as all contractual requirements.
- Carry out Process Reviews (during the operation phase) of all new processes to be operated within EcoPark to ensure that the recommendations of the EIA are met and that the conditions of the EP are complied with (ET only) and certify the Process Review Checklist (PRC).

1.6.8 The ET shall be led and managed by the ET leader. The ET leader shall have relevant education, training, knowledge, experience and professional qualifications subject to the approval of the Director of Environmental Protection.

1.6.9 Suitably qualified staff shall be included in the ET, and ET should not be in any way an associated body of the IEC, Contractor or Operator.



Independent Environmental Checker (IEC)

1.6.10 The duties of the IEC are to :

- Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme.
- Validate and confirm the accuracy of any monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers.
- Carry out random sample check and audit on any monitoring data and sampling procedures, etc.
- Conduct random site inspections (no less frequently than monthly).
- Audit the EIA recommendations and requirement against the status of implementation of environmental protection measures on site.
- Review the effectiveness of environmental mitigation measures and EcoPark environmental performance.
- On a need basis, verify and certify the environmental acceptability of the Contractor's construction methodology (both temporary and permanent works), relevant design plans and submissions under the EP. Where necessary, the IEC shall seek the least impact alternative in consultation with ET leader and WFBU (during construction).
- Verify the investigation results of complaint cases and the effectiveness of corrective measures.
- Verify that all submissions made by the Contractor and Operator meet the requirements of the EIA, EM&A Manual and EP, as well as all contractual requirements.
- Feedback audit results to ET and WFBU according to the EAP in the EM&A Manual.
- Verify the PRC that has been prepared and certified by the ET.

1.6.11 The IEC team shall be led and managed by the IEC. The IEC leader shall have relevant education, training, knowledge, experience and professional qualifications subject to the approval of the Director of Environmental Protection.

1.6.12 Suitably qualified staff shall be included in the IEC team, and the IEC should not be in any way an associated body of the ET, Contractor or Operator.

Evolution of the EM&A Manual

1.6.13 The EM&A Manual is an evolving document that should be updated to maintain its relevance as EcoPark progresses.

1.6.14 It is suggested that the first revision to the EM&A Manual takes place when a) the monitoring locations have been agreed with WFBU, IEC and EPD, and b) when the proposed work processes and activities have been determined following any supplementary environmental reviews which may be required. The primary focus for these reviews will be to ensure the impacts predicted and the recommended mitigation measures remain consistent and appropriate to the manner in which the works are to be carried out.

1.6.15 It is suggested that subsequent revisions of the Manual take place at the commencement of the operation phase and then whenever there are significant changes to the composition of recyclers operating within EcoPark, or when new processes are introduced into EcoPark that were not assessed in the EIA Report and that have the potential for generating greater environmental impacts than those that were assessed in the EIA Report – such revisions shall be recommended, where appropriate, in the design audit submissions.

Figure 1.1 : Location of the Proposed EcoPark and Other Users in Tuen Mun Area 38

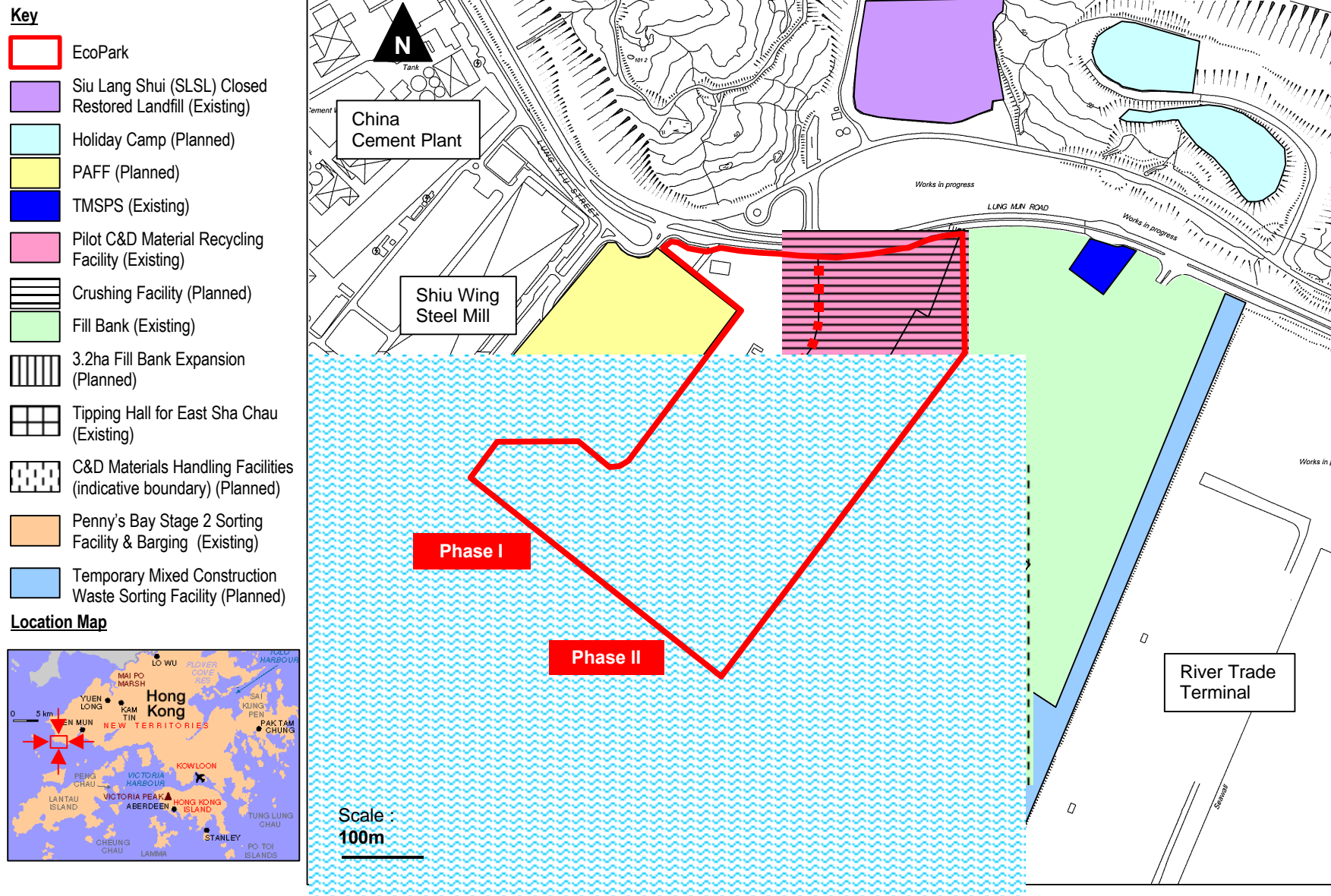
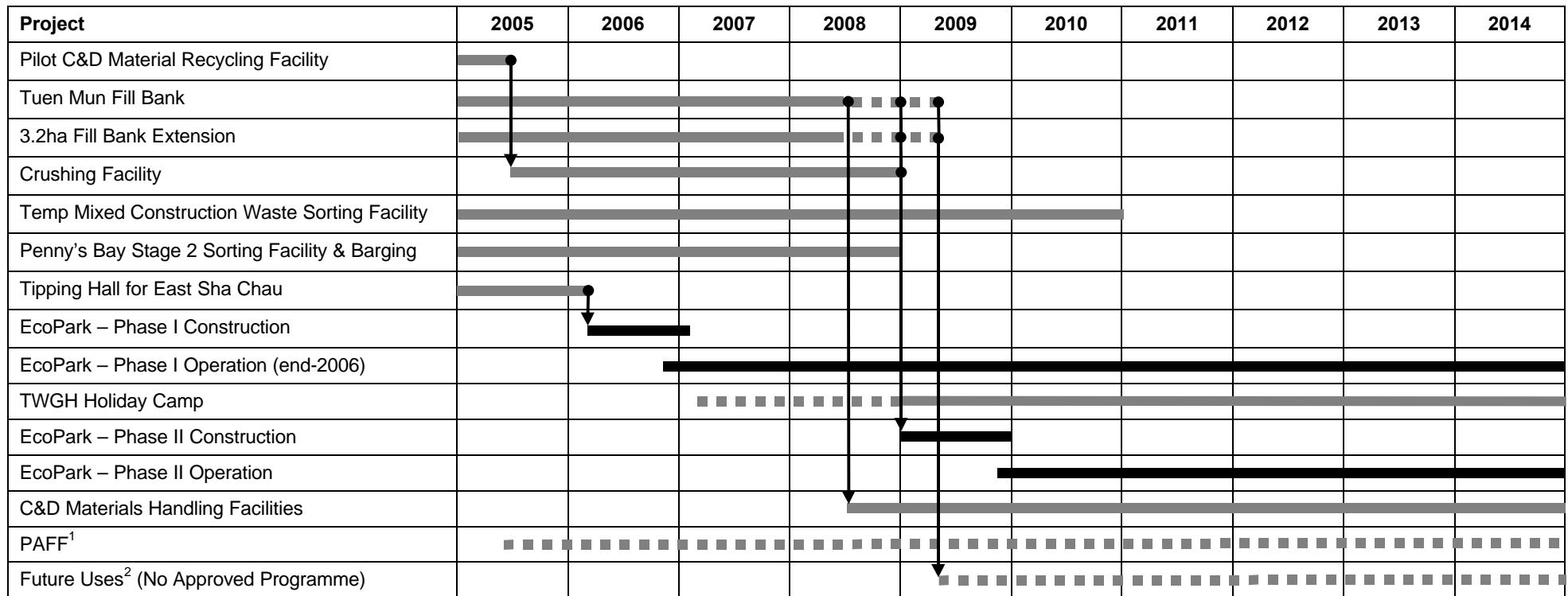




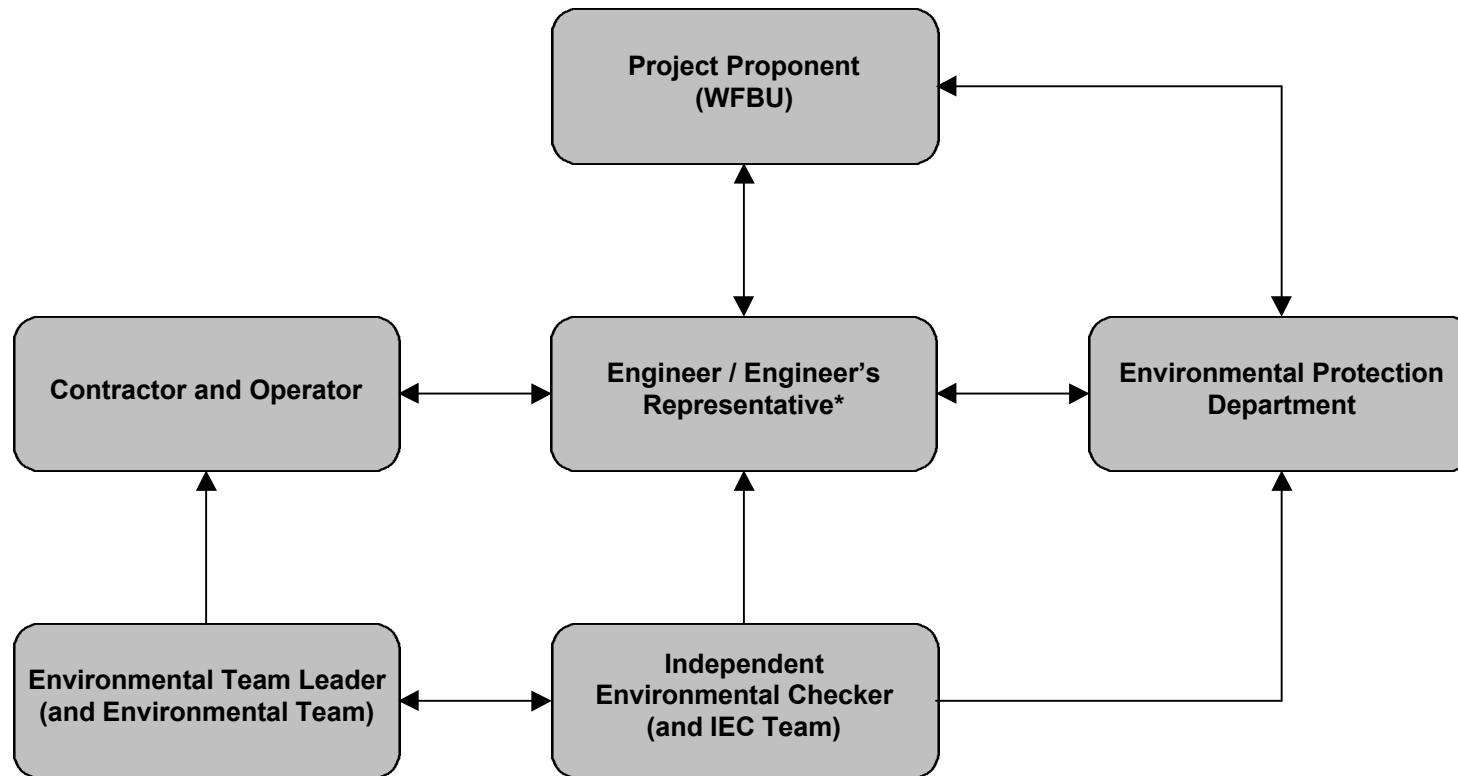
Figure 1.2 : Proposed Programme for EcoPark and Other Nearby Projects



- Notes :
1. According to the tentative programme shown in the *PAFF EIA Report*,
 2. Proposed future uses (post-2009) for Area 38 will likely include facilities related to waste management, but no approved projects, programmes or site particulars are available for these uses at this time.



Figure 1.3 : EM&A Organisation



Note : * During the Construction Phase Only. These responsibilities transferred to Project Proponent during Operation Phase



2 EM&A GENERAL REQUIREMENTS

2.1 Introduction

2.1.1 In this section, the general requirements of the EM&A programme are presented with reference to the findings of the EIA Report that have formed the basis of the scope and content of the programme.

2.2 Environmental Monitoring & Audit

2.2.1 Key environmental issues associated with EcoPark will be addressed through monitoring and controls specified in this Manual and also in the Construction Contract and Management Contract for the construction and management of EcoPark. Air quality, effluent quality, waste management and LFG issues will be subject to EM&A, the details of which are outlined in subsequent sections of this Manual.

2.2.2 Notwithstanding the requirements specified in subsequent sections, it should be noted that monitoring requirements (including parameters, location, frequency, etc.) may be subject to future review by EPD and may be reduced if no adverse environmental impacts are actually encountered.

2.2.3 Monitoring the effectiveness of mitigation measures will be achieved through environmental monitoring programme as well as through site inspections. The inspections will include within their scope mechanisms to review and assess the Works Contractor's and Operator's environmental performance, thereby ensuring that the recommended mitigation measures have been properly implemented and that timely resolution of complaints are managed and controlled in a manner consistent with the recommendations of the EIA Report.

Construction Phase

2.2.4 EM&A during the construction phase will be carried out by the ET and the IEC and will comprise predominantly auditing of dust control measures under the Air Pollution Control (Construction Dust) Regulation, auditing of measures to prevent water pollution and auditing of good site practice as it applies to waste management. LFG monitoring shall only be carried out when excavations of 1m depth or more are carried out.

Operation Phase

2.2.5 EM&A during the operation phase will be carried out by the ET and the IEC and will comprise predominantly auditing of air quality mitigation measures installed by tenants, auditing of measures to prevent water pollution and auditing of good site practice as it applies to waste management. Regular LFG monitoring at mobile offices, equipment stores, etc. shall be carried out quarterly.

2.2.6 Also carried out during the operation phase will be the Process Review for all new processes, which is described fully in Section 7.2

2.3 Action and Limit Levels

2.3.1 A/L Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. The A/L Levels are quantitatively defined later in the relevant sections of this EM&A Manual and described in principle below :

- **Action Level.** Level beyond which there is a clear indication of a deteriorating ambient environment. Appropriate remedial actions are likely to be necessary to prevent environmental quality from falling to the Limit Level.



- **Limit Level.** Statutory and/or contractual level (stipulated in the relevant pollution control ordinances, *Hong Kong Planning Standards and Guidelines*, Environmental Quality Objectives, or EcoPark construction and management contract documents) below which environmental conditions are considered unacceptable. If these levels are exceeded, works should not proceed without appropriate remedial action, including a critical review of plant and working methods.

2.4 Event and Action Plans

- 2.4.1 The purpose of EAPs is to provide procedures for ensuring that any exceedances of A/L Levels, or substantiated complaints, can be quickly addressed and to ensure that the risk of a similar events recurring is reduced.
- 2.4.2 EAPs define the events (i.e. exceedances of A/L Levels) that trigger actions for each party in the EM&A programme (i.e. the Contractor, Operator, ET and IEC, Engineer and WFBU, as appropriate). EAPs are applied to monitored parameters during the construction and operation phases.

2.5 Site Audit

- 2.5.1 In addition to carrying out regular monitoring of specified parameters as a means of assessing the ongoing performance of the Works Contractor and the Operator, the ET shall also undertake regular site inspections and audits of on-site practices and procedures. The IEC shall carry out (less frequent) inspections that coincide with one of the ET's inspections, to confirm that the ET's inspections are carried out in compliance with this Manual.
- 2.5.2 Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures and to ensure that appropriate environmental protection and pollution control mitigation measures are implemented.
- 2.5.3 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.
- 2.5.4 Section 7.1 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols should address.

2.6 Enquiries, Requests for Information and Complaints

- 2.6.1 Enquiries and requests for information can be expected from a wide range of individuals and organisations including members of the public, Government departments, the press and television media and community groups.
- 2.6.2 During construction and operation of EcoPark, the vast majority of such correspondence is likely to be received directly by WFBU. All enquiries or requests for information, irrespective of the recipient, shall be reported to WFBU for record purposes.
- 2.6.3 Any complaints should be handled according to the complaints handling procedure detailed in Section 7.5.



2.7 Reporting

Construction Phase

- 2.7.1 Monthly and Final reports shall be prepared and certified by the ET, verified by the IEC and submitted to WFBU for approval.
- 2.7.2 Monthly reports shall be submitted within the first 10 working days of the following month. The Final Report (at the end of construction of each Phase) shall be submitted within 10 working days of the completion of construction works.
- 2.7.3 Full details on Construction EM&A reporting protocols are presented in Section 8.2.

Operation Phase

- 2.7.4 Quarterly and Annual EM&A reports shall be prepared and certified by the ET, verified by the IEC and submitted to WFBU for approval.
- 2.7.5 Quarterly reports shall be prepared and submitted within the first 10 working days of the following month. Annual reports shall cover one calendar year (or part thereof) and shall be submitted before the end of January of the following year.
- 2.7.6 *Ad hoc* PRCs shall be prepared and certified by the ET, verified by the IEC and submitted to WFBU for approval before any new processes commences operation within EcoPark.
- 2.7.7 Full details on Operation EM&A reporting protocols are presented in Section 8.3.

2.8 Cessation of EM&A

Construction Phase

- 2.8.1 The ET and the IEC shall discharge their EM&A duties until completion of each phase of the construction works and shall request and receive written confirmation from EPD before ceasing the construction EM&A programme.

Operation Phase

- 2.8.2 The ET and the IEC shall discharge their EM&A duties throughout the operation phase of EcoPark.



3 AIR QUALITY

3.1 Monitoring and Audit

3.1.1 The following sub-sections provide details of the air quality EM&A to be carried out by the ET during construction and operation.

Construction Phase

3.1.2 Because of the close proximity of EcoPark to CEDD's C&D Materials facilities, which have the potential to generate dust, it would be difficult to determine whether any exceedance was solely attributable to EcoPark construction or to the operations of CEDD's facilities and therefore difficult to identify the responsible party in sufficient time for them to take necessary remedial action.

3.1.3 Therefore, it is not proposed to carry out any air quality monitoring during EcoPark construction but, instead, it is proposed that dust control measures recommended in the Air Pollution Control (Construction Dust) Regulation should be implemented, as appropriate (see Section 3.2 for details).

3.1.4 It is suggested that the implementation of these measures should be audited on a weekly basis by the ET and verified by the IEC during the construction period. By ensuring that these measures are implemented at all times, dust generation will be minimised to the greatest possible extent, thereby obviating the need for actual monitoring.

Operational Phase

3.1.5 Part IV of the APCO provides regulatory control on "Specified Processes" (SPs) described in Schedule 1 of the Ordinance. A SP license is required to operate the specified process under the APCO. The initially considered processes within EcoPark are controlled by SP licenses issued under *APCO and Air Pollution Control (Furnaces, Ovens and Chimneys) (Installation and Alteration) Regulations*

3.1.6 When applying for approval to carry out a process in EcoPark (under the Process Review) an individual tenant will need to apply for a SP Licence under the APCO where appropriate, e.g. for or the installation of chimney. In this case, the tenant should carry out a separate air quality impact assessment to demonstrate the compliance of relevant statutory requirements and guidelines (i.e. *Guidance Note on the Best Practicable Means*). Upon issue of the SP License, regular monitoring of chimney emission may be required in accordance with the SP licence conditions.

3.1.7 As SP monitoring is provided for under the APCO, it does not form part of this EM&A programme, however, the results of any SP Licence monitoring should be made available in the EM&A reporting if appropriate.

3.2 Mitigation Measures

Construction Phase

3.2.1 Dust control measures recommended in the Air Pollution Control (Construction Dust) Regulation should be implemented, as appropriate. Typical dust control measures include :

- Restricting heights from which materials are dropped, as far as practicable to minimise the fugitive dust arising from unloading/loading;
- All stockpiles of excavated materials or spoil of more than 50m³ should be enclosed, covered or dampened during dry or windy conditions;
- Effective water sprays should be used to control potential dust emission sources such as unpaved haul roads and active construction areas;



- Vehicles that have the potential to create dust while transporting materials should be covered, with the cover properly secured and extended over the edges of the side and tail boards;
- Materials should be dampened, if necessary, before transportation;
- Travelling speeds should be controlled to reduce traffic induced dust dispersion and re-suspension within the site from the operating haul trucks;
- Vehicle washing facilities will be provided to minimise the quantity of material deposited on public roads;
- Erection of hoarding of not less than 2.4m high from ground level along the perimeter of EcoPark site (tenants will also be responsible for implementing dust control measures within their allocated lots); and
- Dusty activities should be re-scheduled to avoid high-winds weather.

3.2.2 The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.



4 WATER QUALITY

4.1 Monitoring and Audit

4.1.1 The following sub-sections provide details of the effluent quality monitoring and audit to be carried out by the ET and IEC during construction and operation of EcoPark.

Construction Phase

4.1.2 The implementation of good construction works practice as well as the mitigation measures identified in Appendix A are important to prevent pollution of marine water in the construction phase and therefore regular site audit of the construction activities is recommended.

4.1.3 The ET is not required to carry out any marine water quality monitoring during the construction phase, although the ET should audit the works to ensure that mitigation measures listed in Section 4.2 have been implemented as appropriate.

4.1.4 Should the Works Contractor need a Discharge License under the WPCO, then regular monitoring at the discharge point will be required under the WPCO to demonstrate compliance with the License requirements. As monitoring is provided for under the WPCO, it does not form part of this EM&A programme, however, the results of monitoring should be made available in the EM&A reporting if appropriate.

4.1.5 As groundwater below the site may be contaminated with leachate from SLSL, prior to any dewatering, the Works Contractor should carry out water quality testing to confirm that any discharge to stormwater drains or direct to the sea will meet the relevant WPCO-TM standard. Should the standard (at the proposed discharge rate) be exceeded then discharge rates should be modified to ensure compliance. Alternatively, any extracted water that cannot comply with the WPCO-TM standard should be taken off site for treatment at an appropriate facility or recharged on-site based on a method agreed by the authority. The ET shall prepare and certify reporting on such water quality testing for verification by the IEC and approval by WFBU.

Operation Phase

4.1.6 The Operator will be required to apply for a Discharge Licence under the WPCO for the effluent from the EcoPark WTF and regular monitoring at the discharge point will be required under the WPCO to demonstrate compliance with the License requirements. As monitoring is provided for under the WPCO, it does not form part of this EM&A programme, however, the results of monitoring should be made available in the EM&A reporting if appropriate.

4.1.7 The ET is not required to carry out any marine water quality monitoring during the operation phase, although the ET should audit the works to ensure that mitigation measures listed in Section 4.2 have been implemented as appropriate.

4.2 Mitigation Measures

Construction Phase

4.2.1 General construction activities on land should be governed by standard good working practice. Specific measures to be written into the works contracts include the following, and these should be audited by the ET during inspections to ensure compliance :

- Wastewater from temporary site facilities shall be controlled to prevent direct discharge to surface or marine waters.
- Portable chemical toilets shall be provided. The use of soakaways shall be avoided.



- Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers shall be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels shall be constructed in advance of site formation works and earthworks.
 - Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.
 - Temporary access roads shall be surfaced with crushed stone or gravel.
 - Rainwater pumped out from trenches or foundation excavations shall be discharged into storm drains via silt removal facilities.
 - Measures shall be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.
 - Open stockpiles of construction materials (e.g. aggregates and sand) on site shall be covered with tarpaulin or similar fabric during rainstorms.
 - Manholes (including any newly constructed ones) shall be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.
 - Discharges of surface run-off into foul sewers shall be prevented in order not to unduly overload the foul sewerage system.
 - All vehicles and plant shall be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay shall be provided at every site exit.
 - Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.
 - The section of construction road between the wheel washing bay and the public road shall be surfaced with crushed stone, coarse gravel or similar.
 - Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.
 - Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO, or collected for off-site disposal.
 - Surface run-off from bunded areas shall pass through oil/grease traps or pollutant trap prior to discharge to the stormwater system.
- 4.2.2 The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.
- Operation Phase**
- 4.2.3 Other than provision of the WTF, another important mitigation measure is the use of a specific stormwater system for land uses with recovery process identified as potentially high level of contamination in the event of accident. As referred above, stop-logs should be installed into the perimeter drainage system of each lot to avoid pollutant discharge into the stormwater drains in the event of chemical spills.
- 4.2.4 Other mitigation measures are to be included in the Operator's Emergency Response Plan (ERP) that provides contingency procedures to ensure containment and safe disposal of any contaminants leaking from the recovery processes, treatment plants or pipework. Suitable absorbent materials (e.g. sand or 'vermiculite') shall be kept on site to deal with chemical spillages.



- 4.2.5 An ERP will be formulated by the Operator to address various scenarios within EcoPark. The ERP will be certified by the ET and verified by the IEC. The ERP will include actions in the event of spillage to :
- Contain the contaminants and prevent their escape and/or dispersion.
 - Retrieve and treat the contaminated materials as soon as possible.
- 4.2.6 In the event of an emergency caused by accidental spillage of contaminants within a recycler's lot or at the marine frontage, the ERP should cover :
- Contact personnel and the means to contact.
 - Evacuation procedure in the case of risk to life.
 - Procedures to contain contaminants and prevent their escape and/or dispersion, e.g., through closing the stop-logs to isolate in the lot's perimeter drainage system from EcoPark's stormwater drainage system.
 - Procedures to divert/transport the contaminated materials to a designated temporary storage area or appropriate treatment facility.
 - Procedures to clear up the lot and/or perimeter drainage system prior to opening the stop-logs.
- 4.2.7 In the event of an emergency caused by a malfunction of the WTF, the ERP should cover :
- Contact personnel and the means to contact.
 - Procedures to initiate emergency repairs.
 - Procedures to temporarily divert the incoming effluent to any designated temporary holding facility, or to engage a bypass to discharge untreated effluent to PPSTW via TMSPS (only to avoid loss of life).
 - Procedures to partially/fully treat effluents at an alternative treatment facility.
- 4.2.8 These contingency requirements will be developed further in the follow-on D&C consultancy when the detailed design of the WTF and lot infrastructure has been developed. By following the ERP, the risk to the surrounding environment from any accidental spillage or malfunction of the WTF will be minimised.



5 WASTE MANAGEMENT AND PREVENTION OF CONTAMINATED LAND

5.1 Monitoring and Audit

5.1.1 The following sub-sections provide details of the waste management audit and prevention of land contamination audit to be carried out by the ET during construction and operation.

Construction Phase

5.1.2 During the construction of EcoPark, waste management and land contamination impacts to the surrounding environment are considered unlikely and do not warrant a construction monitoring programme.

5.1.3 The ET is not required to carry out any waste or land contamination monitoring during the construction phase, although the ET should audit the works on a regular basis to ensure that mitigation measures listed in paragraphs 5.2.1 to 5.2.3 have been implemented as appropriate.

Operation Phase

5.1.4 During the operation of EcoPark, waste management and land contamination impacts to the surrounding environment are considered unlikely and do not warrant an operation monitoring programme.

5.1.5 The ET is not required to carry out any waste or land contamination monitoring during the operation phase, although the ET should audit the works on a regular basis to ensure that mitigation measures listed in paragraphs 5.2.4 and 5.2.5 and Section 5.3 have been implemented as appropriate.

5.2 Mitigation Measures for Waste Management

Construction Phase

5.2.1 General construction activities on land should be governed by standard good working practice. Specific measures to be written into the works contracts include the following, and these should be audited by the ET during inspections to ensure compliance :

- As it is unlikely that surplus excavated C&D materials will be generated by EcoPark, there will be no impacts caused by the handling, collection, transportation and disposal of these materials, other than during stockpiling. In this case, stockpiled material shall be covered (e.g. by a tarpaulin) until used in order to prevent wind-blown dust during dry weather, and to reduce muddy runoff during wet weather. If any topsoil-like materials need to be stockpiled for any length of time, consideration should be given to hydroseeding the topsoil on the stockpile to improve its visual appearance.
- Relevant Technical Circulars, such as *WBTC No. 19/2001*, *ETWB TC(W) No. 31/2004* and *ETWB TC(W) No. 15/2003* that relate to environmentally-responsible construction methods, Waste Management Plans, waste reduction, reuse and recycling shall be followed. The Works Contractor shall prepare and implement the Waste Management Plan to the satisfaction of the Engineer.
- Plant/equipment maintenance schedules shall be designed to optimise maintenance and thereby minimise the generation of chemical wastes.
- Chemical waste that is collected shall be transported off-site for treatment by a Licensed collector. The contractor will need to register with EPD as a chemical waste producer. Where possible, chemical wastes (e.g. waste lubricants) should be recycled at an appropriate facility.
- The Works Contractor shall implement an education programme for workers relating to avoiding, reducing, reusing and recycling general waste. This could include provision



of three-colour recycling bins (to allow paper, plastic and aluminium to be collected separately) and posters and leaflets advising on the correct use of recycling bins.

- All recyclable materials (separated from the general waste) shall be stored on-site in appropriate containers prior to collection by a local recycler for subsequent reuse and recycling. Residual, non-recyclable, general waste should be stored in appropriate containers (that contain odours, in the case of putrescible waste).

5.2.2 In order to monitor the disposal of C&D and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included, as promulgated in. ETWB TC(W) No. 31/2004.

5.2.3 The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.

Operation Phase

5.2.4 Operation should be governed by standard good operational practice. Specific measures to be written into the operation contracts include the following, and these should be audited by the ET during inspections to ensure compliance :

- Tenants within EcoPark shall be encouraged by the Operator to reduce, reuse and recycle wastes they generate such that within a business the "waste" product from one process can be used as the feedstock of another process. This concept should be further expanded such that the "waste" product from one business can be used as the feedstock of another business. The Operator could take this into account when allocating areas for processing.
- The Operator shall register with EPD as a chemical waste producer and provide on-site collection and storage. Where possible, it is recommended that waste lubricants are recycled into new products at an appropriate facility. Solid chemical wastes that cannot be recycled shall be disposed at an appropriate facility.
- The Operator shall implement an education programme for tenants relating to avoiding, reducing, reusing and recycling general waste. This should include provision of three-colour recycling bins throughout the site (to allow paper, plastic and aluminium to be collected separately) and posters and leaflets advising on the correct use of recycling bins.
- Collected materials that are recyclable within EcoPark shall be passed to the appropriate recycler(s) for use as a feedstock. Recyclables that cannot be used by EcoPark tenants should be sold to off-site recyclers.
- Where it is not possible to recover/recycle wastes within EcoPark and where materials cannot be exported for processing then residual non-chemical waste shall be stored in appropriate containers (that contain odours, in the case of putrescible waste) prior to collection for off-site disposal.
- Chemical wastes shall be stored in appropriate containers in a covered area. "No Smoking" signs will be clearly displayed to prevent accidental ignition of any flammable materials. Drip trays capable of storing 110% of the volume of the largest container will be used to mitigate possible leakage. Whenever the drip trays contain the maximum number of containers, a registered chemical waste collector shall transport the containers to the appropriate treatment or disposal facility.
- Sludge shall be collected by a Licensed collector at regular intervals, as determined by the operation of the EcoPark WTW and sent to WENT Landfill or other appropriate facility for disposal.

5.2.5 The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.





5.3 Mitigation Measures for Prevention of Land Contamination

5.3.1 Measures for the prevention of land contamination during operation are relatively simple, relying mainly on good engineering practice, well developed waste management strategies and established industrial guidelines, such as those that will likely be imposed by the Operator on its tenants.

5.3.2 The following practices are recommended to prevent land contamination during operation :

- Any areas within the lot to be used for recycling processes shall be concrete paved before recycling activities commence. Any spillages of contaminating material shall be cleaned up immediately through the use of an absorbent material. Any such used material should then be considered chemical waste and disposed of appropriately.
- Management of chemical waste shall be implemented through the control of waste storage, labelling of waste, transportation and treatment of chemical waste at an appropriate facility.
- Chemical wastes shall be collected, stored and disposed of in accordance with the Regulations. Disposal of other construction waste shall be undertaken by licensed contractors in accordance with applicable statutory requirements under the *Waste Disposal Ordinance* and subsidiary Regulations.
- Chemical wastes shall be handled according to the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Spent chemicals shall be stored and collected by an approved operator for disposal at a licensed facility in accordance with the *Chemical Waste (General) Regulation*.
- Containers used for storage of chemical waste shall :
 - be suitable for the substance they are holding, resistant to corrosion, maintained in good condition, and securely closed
 - have a capacity of less than 450 unless approved by EPD
 - display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations
- The storage area for chemical waste shall:
 - be clearly labelled and used solely for the storage of chemical waste
 - be enclosed on at least 3 sides
 - be provided with locks
 - have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container stored in that area
 - be covered to prevent rainfall entering (water collected within the bund shall be tested and disposal as chemical waste if necessary)
 - be arranged so that incompatible materials are adequately separated
- Metallic fines may be generated by processes that involve crushing, cutting or melting metals. It is therefore important for recyclers who carry out such processes to ensure that such materials are collected and disposed of in an appropriate manner. Since these materials will likely have an economic value, this provides further incentive for their collection and reclamation.
- Appropriate practices include the provision of a collection device attached to the plant/equipment that generates the metal fines. This can be as simple as a container to catch fines as they are emitted from a process, or could include a suction and filter bag combination – the specifics will depend on the process and plant/equipment in use.

5.3.3 The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.



6 LANDFILL GAS

6.1 Introduction

6.1.1 Under Section 6.5, Chapter 9 of the *Hong Kong Planning Standards and Guidelines*, an evaluation of the risk posed by landfill gas (LFG) is required for any development proposed within a 250m Landfill Consultation Zone. The EcoPark falls within this category as it is approximately 150m from Siu Lang Shui Landfill (SLSL) at its closest point (see Figure 6.1).

6.1.2 The qualitative LFG risk assessment in Section 8 of the EIA Report has indicated the risks associated with LFG at EcoPark during both construction and operation are LOW. As such, some precautionary measures (“passive control”) will be required to ensure EcoPark is safe. Definitions of “passive control” are annotated in Chapter 4 of the *Landfill Gas Hazard Assessment Guidance Note* issued by EPD. The following precautionary and protection measures are considered appropriate :

- Design Stage :
 - Cut-off barrier to seal any service trench entering the site. Figure B.6 in the *Guidance Note* provides details of a suitable design
 - Service entries into buildings should be made above ground level
 - Prefabricated offices should be elevated from the ground (raised floor of 500mm)
- Construction Phase
 - All workers should be aware of potential presence of LFG
 - Safety precautions should be made available during trenching and excavation
 - Train and provide breathing apparatus and gas detection equipment for confined spaces or deep trenching
- Operational Phase
 - Alert workers and visitors of possible LFG hazards
 - Prohibit smoking and open fires on site
 - Conduct regular LFG monitoring at mobile offices, equipment stores, etc.

6.1.3 Baseline monitoring is not required and impact monitoring is required only on an *ad hoc* basis during the construction phase (when excavations of 1m depth or more are carried out) and quarterly during the operation phase. However, should EPD alert the Operator that high LFG levels had been detected during monthly monitoring under the SLSL restoration contract, then the Operator may be required to increase LFG monitoring to monthly until such time as EPD inform the Operator that quarterly monitoring can be resumed.

6.2 LFG Parameters

6.2.1 LFG monitoring shall be carried out to identify any migration between the landfill and EcoPark site and to ensure the safety of the Contractor's personnel, Operator's personnel, recyclers and any other person within EcoPark site.

6.2.2 The following parameters shall be monitored :

- Methane.
- Oxygen.
- Carbon Dioxide.
- Barometric Pressure.

6.2.3 Monitoring should be carried out and reported in a similar manner to that for the *NWNT Landfills and Gin Drinkers Bay Landfill Restoration* contract to provide comparable data. The presentation format for LFG monitoring shall be agreed with EPD in advance.



6.3 Monitoring Equipment

6.3.1 LFG monitoring shall be carried out using intrinsically-safe, portable multi-gas monitoring instruments. The gas monitoring equipment shall :

- Where possible, comply with BS6020 and be approved by BASEEFA as intrinsically safe, suitable for use in a Zone 2 are to BS5345.
- Be capable of continuous monitoring of methane, oxygen and carbon dioxide.
- Be capable of continuous barometric pressure and gas pressure measurements.
- Normally operate in diffusion mode unless required for spot sampling, when it should be capable of operating by means of an aspirator or pump.
- Have low battery, fault and over range indication incorporated.
- Store monitoring data, and shall be capable of being down-loaded directly to a PC.
- Measure in the following ranges :
 - methane 0-100% LEL & 0-100% v/v
 - oxygen 0-25% v/v
 - carbon dioxide 0-100% v/v
 - barometric pressure mBar (absolute)

6.3.2 The monitoring equipment shall alarm (both audibly and visually) in the event that the concentrations of the following are exceeded :

- Methane – rise to 10% LEL.
- Oxygen – fall to 18% by volume.
- Carbon monoxide – maximum short term (1-hour) exposure of 300ppm with long term average (8-hours) not to exceed 50ppm.

6.4 Monitoring Locations and Frequency

Construction Phase

6.4.1 During construction, excavations of 1m depth or more should be monitored before entry and periodically during the Works. If drilling is required, the procedures for safety management and working procedures described in the *Guidance Note* should be adopted.

6.4.2 Both the monitoring locations and frequency will be *ad hoc* and instructed by the Engineer.

Operation Phase

6.4.3 Following construction, routine monitoring is required at service voids and utility boxes. As the exact location of these will be dependent upon the detailed design of EcoPark (to be developed by consultants to be engaged under the follow-on Design and Construction (D&C) consultancy), these locations cannot be specified prior to completion of the detailed design.

6.4.4 Routine monitoring shall be carried out on a quarterly basis, however, should EPD alert the Operator that high LFG levels had been detected during monthly monitoring under the SLSL restoration contract, then the Operator may be required to increase LFG monitoring to monthly until such time as EPD inform the Operator that quarterly monitoring can be resumed.



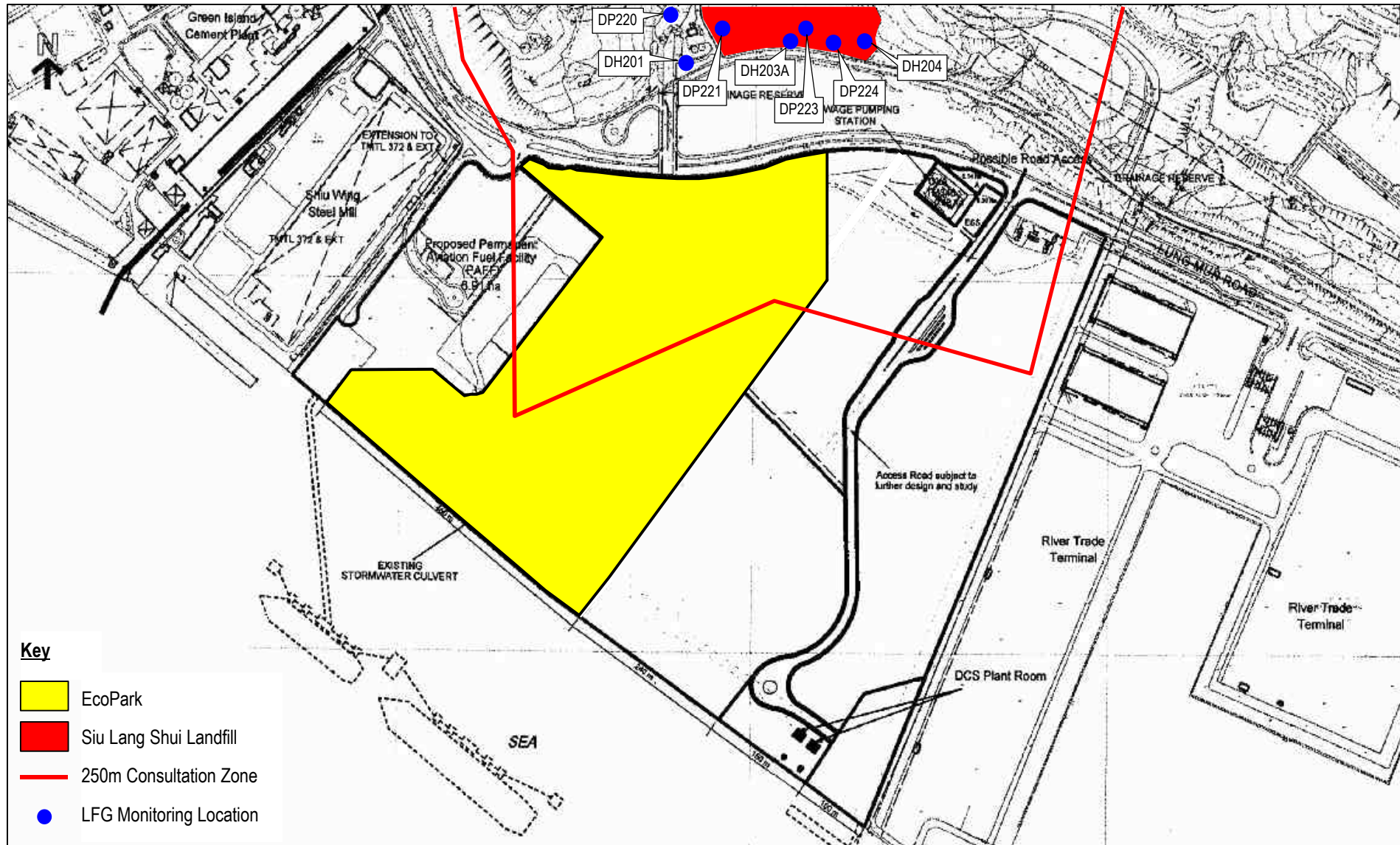
6.5 Limit Levels and Event and Action Plan For LFG

6.5.1 The Limit levels and EAP for LFG detected in excavations, utilities and any enclosed on-site areas are shown in Table 6.1 below :

Table 6.1 : Action Levels, Limit Levels and Event and Action Plan for LFG

Parameter	Level	Action
Oxygen (O ₂)	Action Level <19% O ₂	Ventilate trench/void to restore O ₂ to > 19%
	Limit Level <18% O ₂	Stop works Evacuate personnel/prohibit entry Increase ventilation to restore O ₂ to > 19%
Methane (CH ₄)	Action Level >10% LEL	Post "No Smoking" signs Prohibit hot works Increase ventilation to restore CH ₄ to <10% LEL
	Limit Level >20% LEL	Stop works Evacuate personnel/prohibit entry Increase ventilation to restore CH ₄ to <10% LEL
Carbon Dioxide (CO ₂)	Action Level >0.5% CO ₂	Ventilate to restore CO ₂ to < 0.5%
	Limit Level >1.5% CO ₂	Stop works Evacuate personnel / prohibit entry Increase ventilation to restore CO ₂ to <0.5%

Figure 6.1 : EcoPark and Siu Lang Shui Landfill





7 AUDITING

7.1 Site Inspections

7.1.1 Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures and shall be undertaken routinely by the ET to inspect construction activities and operational practice to ensure appropriate environmental protection and pollution control mitigation measures are implemented.

7.1.2 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.

7.1.3 The ET is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspections. The IEC shall also carry out inspections with the ET, albeit less frequently.

7.1.4 The areas of inspection shall include but not be limited to the pollution control and mitigation measures within the site. It shall also review the environmental situation outside the site area which is likely to be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection :

- EIA recommendations and EM&A Manual recommendations relating to environmental protection and pollution control mitigation measures.
- During the construction phase :
 - works progress and Works Contractor's work programme
 - Individual works methodology proposals (which shall include proposal on associated pollution control measures)
- During the operation phase :
 - number and types of processes active within EcoPark
 - pollution control measures adopted by individual tenants
 - throughput of materials with EcoPark
- Relevant environmental protection and pollution control laws.
- Previous site inspection results for follow-up audit.

Construction Phase

7.1.5 Regular site inspections shall be carried out by the ET once per week, and he shall be accompanied by the IEC once per month (on the same inspection). *Ad hoc* site inspections shall also be carried out 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, as specified in the EAP.

7.1.6 The Works Contractor shall update his ET with all relevant information of the construction contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the Engineer and the Works Contractor for reference and for taking immediate action. The Works Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection.

Operation Phase

7.1.7 Regular site inspections shall be carried out by the ET once per month, and he shall be accompanied by the IEC once per quarter (on the same inspection). *Ad hoc* site inspections shall also be carried out 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, as specified in the EAP.



- 7.1.8 The Operator shall update his ET with all relevant information pertaining to the operation contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the WFBU and the Operator for reference and for taking immediate action. The Operator shall follow the procedures and time-frame as stipulated in the environmental site inspection.

7.2 Process Review

- 7.2.1 The purpose of the process review is to confirm that all processes to be carried out within EcoPark comply with the conditions of the EP, to ensure that the findings of the EIA are met and to confirm that the risk posed by any storage or transportation of DGs is acceptable. The process review is carried out predominantly by the ET, on behalf of the tenant, although the IEC and WFBU can be consulted during the process as appropriate.

- 7.2.2 All processes will require WFBU approval to operate within EcoPark. When a tenant applies to lease space in EcoPark, he will be requested by the Operator to submit details of the materials he intends to process, the recycling processes(s) he intends to carry out, the throughput of materials he anticipates he will process and any need for transportation or storage of DGs. For each proposed process submitted, a ten-step process review is carried out. Figure 7.1 summarises the process review in the form of a flowchart.

Process Review Checklist

- 7.2.3 In the process review, reference is made to a Process Review Checklist (PRC). The PRC will be proposed by the Operator in his tender for the Management Contract, however, it is envisaged that the PRC will comprise a single sheet of paper (with attachments if necessary) and will include at least the following details :

- A Reference No. and references to other related processes (if any).
- Name of the tenant.
- Name and description of the process.
- Throughputs of materials associated with the process (including DGs if any).
- A tick box to indicate that the process has already been assessed in the EIA.
- A tick box to indicate that the process is unlikely to warrant a full design audit.
- A tick box to indicate that there are no unacceptable environmental impacts.
- A tick box to indicate that there are unacceptable environmental impacts.
- Signature/chop of the ET with date and recommendation.
- Signature/chop of EPD's IEC with date indicating verification.
- Signature/chop of WFBU with date indicating approval.
- Signature/chop of the Operator with date indicating tenant has been informed of result.

Ten-step Process Review

- 7.2.4 The process review comprises ten steps, as follows (see Figure 7.1) :
- **Step 1 – Has the Process Already Been Assessed in the EIA ?** The ET will initially determine whether the proposed process has already been assessed in the EIA – reference may be made to Appendix B. The ET shall also confirm that proposed throughputs are no greater than those assessed in the EIA. If the process has already been assessed in the EIA, then the PRC will be completed to indicate that environmental impacts are no greater than those already assessed and to recommend that the process should be approved for operation in EcoPark. It should also be determined whether the storage or transportation of DGs poses a risk, and if so a hazard to life assessment should be carried out confirm that any risk is acceptable in terms of the *Hong Kong Risk Guidelines* (Annex 4 of the EIAO-TM).



- **Step 2 – Is the Process Likely to Warrant a Design Audit ?** If the proposed process is minor in nature and, in the professional judgement of the ET, will not cause adverse environmental impact (including cumulative impacts with existing processes) or unacceptable risk (in terms of the *Hong Kong Risk Guidelines*) then the PRC will be completed to indicate that a Design Audit is not warranted and to recommend that the process should be approved for operation in EcoPark. Additional information shall be appended to the PRC providing full justification of this conclusion. It is suggested that the ET should obtain the IEC's informal agreement to this conclusion before officially requesting verification (Step 8). If in the opinion of the IEC a Design Audit should be carried out, then the ET should consider proceeding to Step 3.
- **Step 3 – Assessment.** The actual methodology shall be proposed by the Operator in his tender for the Management Contract but shall incorporate the following (additional assessments may be specified by the IEC or WFBU as appropriate) :
 - assessment of likely impacts to air quality in terms of TSP, RSP, SO₂, NO₂, CO, VOC, TAP (including but not limited to heavy metals, halogen compounds, dioxin and furans) and odour. Any other existing and planned/committed air pollution sources within 500m from the boundary of EcoPark should be included in determining the cumulative air quality impact at ASRs.
 - waste management implications in terms of quantities and composition of recyclable by-products, potential for vertical integration within processes already operating within EcoPark, quantity and composition of any non-recyclable materials that require off-site disposal / treatment.
 - potential for process to cause land contamination in terms of normal operations or accident.
 - determine the need for a hazard to life assessment and confirm that risk posed by the transportation or storage of any DGs is acceptable in terms of *Hong Kong Risk Guidelines*.

Each assessment shall not be carried out in isolation but shall take into consideration an overview of all other processes currently operating within EcoPark and those that are anticipated, based on the feedback from the Operator's promotional efforts. By considering the environmental impacts and/or risks of each process in this holistic manner, the Operator shall develop EcoPark as a single, integrated facility, rather than simply as a collection of disparate recycling operations. In this way, the flexibility inherent in the Umbrella Approach and Design Audit Approach can be fully utilised, while demonstrating and ensuring environmental protection and compliance with the findings of the EIA Report and the conditions of the EP.

- **Step 4 – Does the Assessment Indicate that Impacts or Risks are Acceptable ?** If the assessment indicates that environmental impacts are acceptable (using the same criteria that were used in the EIA) or that risks are acceptable in terms of the *Hong Kong Risk Guidelines*, then the PRC will be completed to indicate that there are no unacceptable environmental impacts and/or risks and to recommend that the process should be approved for operation in EcoPark. Additional information (such as the assessment itself) shall be appended to the PRC providing full justification of this conclusion. It is suggested that the ET should obtain the IEC's informal agreement to this conclusion before officially requesting verification (Step 8). If in the opinion of the IEC impacts are not acceptable, then the ET should consider proceeding to Steps 5 and/or 6. Note that Step 6 can be carried out before Step 5, or in parallel, if required.
- **Step 5 – Can Processes be Modified to Reduce Impacts and/or Risks ?** Working with the tenant, the ET shall propose modifications to the tenant's intended process such that environmental impacts and/or risks are avoided or reduced to an acceptable level. Modification could be through adoption of cleaner technology, reduction of throughputs, elimination of DGs, etc. The tenant's agreement to modification of the process should be obtained (in writing) together with an agreed timetable, if appropriate. The modified process shall then be re-assessed (Step 3).
- **Step 6 – Can Mitigation Measures Reduce Impacts and/or Risks ?** Working with the tenant, the ET shall propose additional mitigation measures such that the environmental impacts and/or risks are reduced to an acceptable level. Mitigation could include air



pollution control equipment (such as bag filters, electrostatic precipitators, etc.), agreement to develop the tenant's lot in such a way as to avoid potential for land contamination (such as provision of hard standing and/or shelters), provision of improved storage facilities for DGs, etc. The tenant's agreement to install proposed mitigation should be obtained (in writing) together with an agreed timetable, if appropriate. The mitigated process shall then be re-assessed (Step 3).

- **Step 7 – Unacceptable Environmental Impacts and/or Risks Identified.** Steps 3 to 6 can be repeated as many times as necessary, in an iterative manner. However, should the ET and/or tenant conclude that the process cannot be further modified or mitigated such that there are no unacceptable environmental impacts and/or risks, then the PRC will be completed to indicate that environmental impacts (individual and/or cumulative) and/or risks are unacceptable and to recommend that the process should not be approved for operation in EcoPark.
- **Step 8 – IEC Verification.** The ET shall pass the completed PRC to the IEC for verification. The IEC shall verify that the conclusions reach by the ET are sound and that any justifications are sufficient to support the conclusions. Should the IEC disagree with the ET's conclusions or recommendations, then this shall be resolved between the IEC and ET.
- **Step 9 – WFBU Approval.** The IEC shall pass the completed and verified PRC to WFBU for approval. WFBU shall approve the conclusions and recommendations of the ET based on the verification of the IEC. Should WFBU disagree with the ET's conclusions or recommendations, or with the IEC's verification, then this shall be resolved between the three parties.
- **Step 10 – Inform Tenant Whether Process is Approved.** WFBU shall pass the completed, verified and approved PRC to the Operator and the Operator shall inform the tenant whether the proposed process is approved for operation in EcoPark or if approval has not been given. If the latter, the Operator shall give an explanation to the tenant as to why. Should the tenant make improvements to one or more parts of the process at a later date, then the process can be resubmitted for process review.

- 7.2.5 For cases where processes have already been assessed (Step 1) or are unlikely to warrant a Design Audit (Step 2) and unacceptable risks are not anticipated, the process review provides a streamlined mechanism for approval to be given quickly without the need for a Design Audit, and for the tenant informed within a matter of days. Given the broad scope of the Umbrella Approach, it is anticipated that the majority of tenants initially relocating to EcoPark will fall into one of these two categories and, as such, the Process Review will not cause undue delays.
- 7.2.6 Where a process is not covered by the umbrella EIA and a Design Audit is required, the time taken to carry this out should be minimised as far as possible to reduce delays to the tenant requesting approval.
- 7.2.7 Copies of PRCs shall also be included in the Quarterly EM&A Operation Reports, as described in Section 8.3. The Operator, ET, IEC and WFBU may also keep copies of PRCs for their records.

Wastewater Generation and Treatment

- 7.2.8 The generation and treatment of wastewater has not been included in the Process Review described above because the WTF will treat EcoPark industrial wastewater to meet the conditions of the Discharge Licence under the WPCO, not the EIAO, and this is the responsibility of the Operator, not the tenants.
- 7.2.9 However, as an administrative/management procedure, the Operator will need to ensure that the maximum influent criteria for the WTF (to be determined during the follow-on D&C consultancy) is not exceeded by effluents discharged by tenants. It is therefore recommended that lease conditions should specify that the tenant is required to install an appropriate level of wastewater pre-treatment within their premises prior to discharge to the EcoPark foul sewerage system if their untreated wastewater would exceed the maximum influent criteria of the WTF.



7.3 Environmental Management Plan

- 7.3.1 For the construction and operation of EcoPark, it is envisaged that the Works Contract and the Management Contract to be prepared under the follow-on D&C consultancy will require the Works Contractor and the EcoPark Operator (i.e. WFBU's Management Contractor) to define mechanisms for achieving environmental targets. This will most likely be achieved by requiring preparation and implementation of an Environmental Management Plan (EMP). A primary reason for adopting the EMP approach is to make sure that the Works Contractor and Operator are fully aware of their environmental responsibilities and to ensure commitment to achieving specified standards.
- 7.3.2 The EMP approach is grounded on the principle that the Works Contractor and Operator shall define the means by which the environmental requirements of the EIA process, and the contractual documentation shall be met. The Operator's EMP shall include reference to the Design Audit and to the Emergency Response Plan (ERP) for fire, spills and other accidents, although the EM does not strictly form part of the EMP or EM&A programme.
- 7.3.3 Each tender for the Works Contract and Management Contract shall include an outline EMP for submission as part of the tendering process, which will demonstrate the determination and commitment of the tenderer and indicate how the environmental performance requirements laid out in the EIA Report, EM&A Manual and EP will be met. It is recommended that this aspect be included as a specific criterion in the assessment of tender documents, since this will act as a clear indication of WFBU's commitment to the pro-active management and minimisation of environmental impacts throughout the construction and operating life of EcoPark.
- 7.3.4 Subsequent to award of the Works Contract and Management Contract, the Works Contractor and Operator shall be required to submit a draft and final version of the EMP for the approval of WFBU. During operation of EcoPark, the Operator's EMP will be subject to continuous review to ensure that it contains sufficient provision to provide environmental protection and Process Review for the wide range of processes to be carried out within EcoPark, particularly for future processes using technologies not commercially available and, hence, not examined in this EIA.

7.4 Compliance with Legal Requirements

Construction Phase

- 7.4.1 The ET Leader shall review the works method statements, the progress and programme of the works to confirm that environmental laws have not been violated, and that any foreseeable violations can be avoided.
- 7.4.2 The Works Contractor shall regularly copy relevant documents to his ET Leader so that the checking of works can be carried out. These documents shall include the updated Work Progress Reports, the updated Works Programme, application letters for various Licences/permits and copies of all Licences/permits issued. The site diary shall also be available for the ET inspection upon request.
- 7.4.3 After reviewing the documents, the ET Leader shall advise the Engineer and the Works Contractor of any potential non-compliance with legal requirements (relating environmental protection and pollution control) for them to take follow-up actions. If the ET Leader's review concludes that the current status of Licence/permit application and environmental mitigation works may result in potential violation of environmental laws, he shall advise the Engineer and the Works Contractor accordingly.
- 7.4.4 Upon receipt of the advice the Works Contractor shall undertake immediate action to remedy the situation. The Engineer shall follow up to ensure that appropriate action has been taken by the Works Contractor in order that the construction works are carried out in a legal manner.



Operation Phase

- 7.4.5 The ET Leader shall review the proposed method statements for recovery processes that are submitted to the Operator by recyclers (either existing recyclers who are modifying their processes, or potential new recyclers) to check that environmental laws will not be violated, and that any foreseeable violations can be avoided.
- 7.4.6 The Operator shall regularly copy relevant documents to the ET Leader so that the checking of ongoing recovery operations can be carried out. These documents shall include application letters for various Licences/permits and copies of all Licences/permits issued.
- 7.4.7 After reviewing the documents, the ET Leader shall advise WFBU and the Operator of any potential non-compliance with legal requirements (relating to environmental protection and pollution control) for them to take follow-up actions. If the ET Leader's review concludes that the current status of Licence/permit application and environmental mitigation works may result in potential violation of environmental laws, he shall advise WFBU and the Operator accordingly.
- 7.4.8 Upon receipt of the advice the Operator, together with the recycler in question, shall undertake immediate action to remedy the situation. WFBU shall follow up to ensure that appropriate action has been taken by the Operator in order that the recovery operations are carried out in a legal manner and within the limitations of EcoPark EP.

7.5 Environmental Complaints

- 7.5.1 Complaints shall be referred to the ET for carrying out complaint investigation procedures, in accordance with Figure 7.2.
- 7.5.2 Upon receipt of a complaint, the ET Leader shall undertake the following procedures :
- Log complaint and date of receipt into the "Complaints Log", maintained by the ET.
 - Notify all parties that a complaint has been received and provide details thereof.
 - Within 5 working days, investigate the complaint to determine its validity, and to assess whether the source of the problem is due to the activities being carried out at EcoPark.
 - If a complaint is not substantiated (i.e. not caused by activities being carried out within EcoPark) then explain to the complainant why, close-out the entry in the "Complaints Log" and notify all parties accordingly.
 - If the complaint is substantiated then implement the EAP to the satisfaction of the ET and IEC, advise the complainant of the actions carried out to mitigate the problem, complete the entry in the "Complaints Log" and notify all parties accordingly.
- 7.5.3 The "Complaints Log" shall be proposed and developed by the ET and shall be agreed by all parties as being sufficient for recording all pertinent complaint information and follow-up actions. The actions to be carried out in the event of a valid complaint are indicated in the EAPs for "Action Level Exceedance" for each measured parameter.
- 7.5.4 During the complaint investigation work, all parties shall co-operate with the ET in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor and Operator shall promptly carry out the mitigation.

Figure 7.1 : Flowchart for Process Review

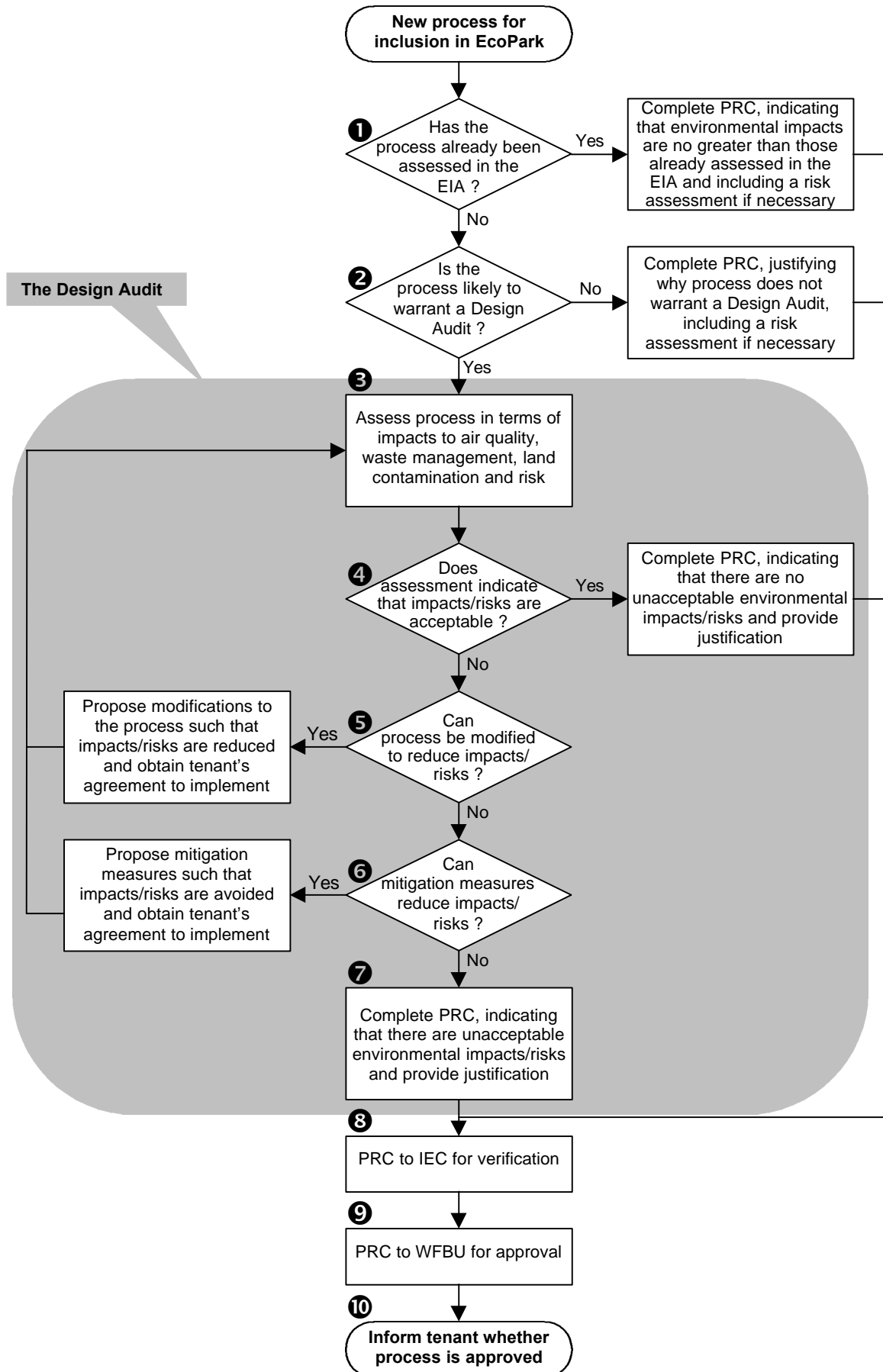
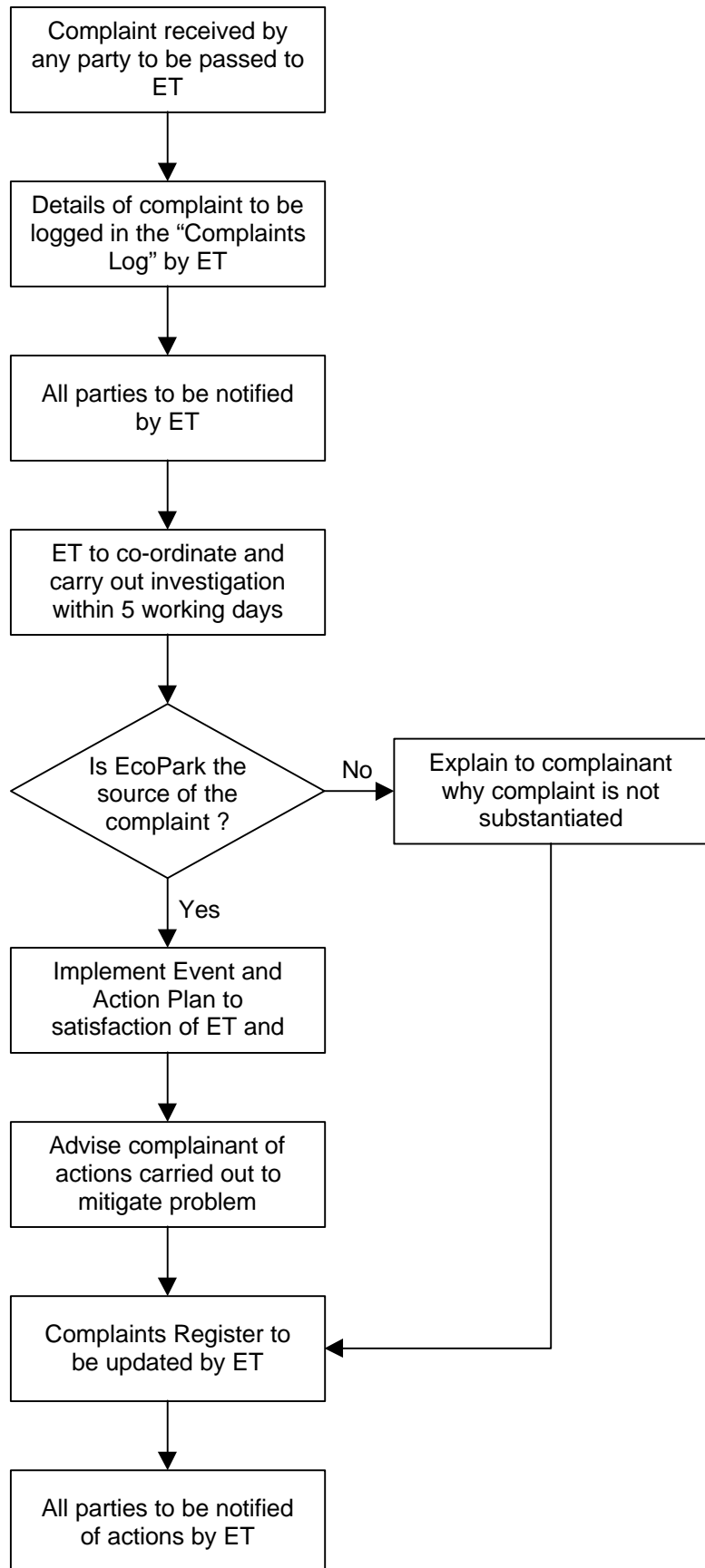




Figure 7.2 : Complaints Handling Procedure





8 REPORTING

8.1 General

8.1.1 Reports can be provided in an electronic medium upon agreeing the format with EPD. This would enable a transition from a traditional paper-based reactive approach to an electronic real-time proactive approach. The circulation of reports by email in .pdf format is suggested.

8.1.2 For the avoidance of doubt, all reports shall be prepared and certified by the ET, verified by the IEC and approved by WFBU.

8.2 EM&A Reporting During Construction

8.2.1 The results and findings of all EM&A work required in this Manual shall be recorded in the monthly EM&A Reports and shall be prepared by the ET Leader. The reports shall be submitted to EPD's EIAO Office within ten working days of the end of each calendar month, with the first report due within the first 10 working days of the second month of construction.

8.2.2 Copies shall also be submitted to the Works Contractor, Engineer, IEC and WFBU for information. The ET Leader shall liaise with the relevant parties to confirm the exact number and format of monthly reports in both hard copy and electronic format.

8.2.3 The following requirements refer to construction of both Phase I and Phase II of EcoPark.

Monthly Construction EM&A Report

8.2.4 The monthly EM&A report shall include, but not be limited to, the following :

- Executive summary (1-2 pages), including :
 - exceedances of any A/L Levels
 - summary of complaints
 - notifications of any summons and successful prosecutions
 - reporting changes
 - future key issues
- Basic project information, including :
 - EcoPark staff organisation including key personnel contact details
 - construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures (to be provided by Contractor)
 - EM&A management structure
- Summary of EM&A requirements, including :
 - any monitoring parameters
 - environmental quality performance limits (e.g. A/L Levels, etc.)
 - EAPs
 - environmental audit of non-monitored parameters
 - environmental mitigation measures recommended in the EIA Report
 - environmental requirements in contract documents
- Construction status, including :
 - works undertaken during the month (to be provided by Works Contractor)
 - updated drawings showing the as-built EcoPark site area
 - an account of the future key issues as reviewed from the works programme and work method statements
- Records of the quantities of waste materials taken off-site for recycling/treatment/disposal (e.g. copies/counterfoils from trip-tickets/receipts, etc.) shall be kept for record purposes and may be audited.



- Implementation status of environmental protection and pollution control/mitigation measures, including :
 - measures recommended in the EIA Report (summarised in an updated implementation schedule to be included as an Appendix)
 - list of all current Licences, permits, etc. required to comply with environmental legislation
- Any monitoring results, including :
 - monitoring methodology
 - name of laboratory and types of equipment used and calibration details
 - parameters monitored
 - monitoring locations
 - monitoring date, time, frequency and duration
 - record of all non-compliance (exceedances) of the A/L Levels
 - QA/QC results and detection limits
 - review of the reasons for and the implications of any non-compliances and any follow-up procedures related to any earlier non-compliances
- Summary of environmental audit, based on ET Leader's regular inspection reports.
- Report on complaints, notifications of summons and successful prosecutions (full details to be included in the "Complaints Log").
- ET Leader's conclusions regarding the implementation of the EM&A programme over the past month, together for suggestions for improvements (to be agreed with IEC before implementation).
- Appendices, including :
 - the "Complaints Log", including :
 - records of all complaints received (written or verbal) including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
 - records of notifications of summons and successful prosecutions for breaches of environmental protection/pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
 - review of the reasons for and the implications of complaints, summons and prosecutions including review of pollution sources and working procedures
 - description of the actions taken in the event of non-compliance and deficiency reporting
 - submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection (audit) proforma and complaint log summarising the EM&A of the period

Final Construction EM&A Report

- 8.2.5 The Construction EM&A programme shall be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact. The proposed termination should only be implemented after the proposal has been endorsed by the Works Contractor, and WFBU following final approval from EPD.
- 8.2.6 The Final Construction EM&A Report for each phase shall be submitted within 10 working days of the termination of construction EM&A. It shall follow the same format as the Monthly Construction EM&A Report, except that it shall relate to the entire construction EM&A period and not just the preceding month. In addition, it shall include the following :
- Provide clear-cut decisions on the environmental acceptability of EcoPark with reference to the specific impact hypothesis.
 - Review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures) recommend any improvement in the EM&A programme to be implemented in any subsequent development phases (e.g. the Phase II works).





8.3 EM&A Reporting During Operation

- 8.3.1 The results and findings of all EM&A work required by this Manual shall be recorded in the Quarterly Operation EM&A Reports. At the end of each calendar year an Annual EM&A Operation Report shall also be prepared.
- 8.3.2 The reports shall be submitted to EPD's EIAO Office within ten working days of the end of each quarter, with the first report due 10 working days after the first 3 months of operation.
- 8.3.3 Copies shall also be submitted to the Operator, IEC and WFBU for information. The ET Leader shall liaise with the relevant parties to confirm the exact number and format of monthly reports in both hard copy and electronic format.

Quarterly Operation EM&A Report

- 8.3.4 The quarterly EM&A report shall include, but not be limited to, the following :
- Executive summary (1-2 pages), including :
 - throughput of materials / waste generated
 - exceedances of any measured A/L Levels
 - summary of complaints
 - notifications of any summons and successful prosecutions
 - reporting changes
 - future key issues
 - Basic project Information, including :
 - EcoPark staff organisation including key personnel contact details
 - operation programme showing the inter-relationship with environmental protection/mitigation measures (e.g. location of new activities, pollution control equipment operated by new recyclers, etc.)
 - EM&A management structure
 - Summary of EM&A requirements, including :
 - all monitoring parameters
 - environmental quality performance limits (e.g. A/L Levels, etc.)
 - EAPs
 - environmental audit of non-monitored parameters
 - environmental mitigation measures, as recommended in the EIA Report
 - environmental requirements in lease documents
 - Operation status, including :
 - the number of recyclers and the recovery processes operating in EcoPark
 - quantities of incoming materials (stating whether by marine or road transport), the throughput of materials within individual processes within EcoPark, the quantities of materials recovered/goods manufactured, and the quantities of solid/liquid waste generated (to be provided by Operator)
 - drawings showing EcoPark site area and the locations of monitoring stations
 - Implementation Status of environmental protection and pollution control/mitigation measures including measures as recommended in the EIA Report, summarised in the updated implementation schedule
 - Monitoring results, including :
 - monitoring methodology
 - name of laboratory and types of equipment used and calibration details
 - parameters monitored
 - monitoring locations
 - monitoring date, time, frequency and duration
 - record of all non-compliance (exceedances) of the A/L Levels
 - QA/QC results and detection limits
 - review of the reasons for and the implications of any non-compliances and any follow-up procedures related to any earlier non-compliances



- Records of the quantities of waste materials taken off-site for recycling/treatment/disposal (e.g. copies/counterfoils from trip-tickets/receipts, etc.) shall be kept for record purposes and may be audited.
- Summary of environmental audit, based on ET Leader's regular inspection reports.
- Report on complaints, notifications of summons and successful prosecutions (full details to be included in the "Complaints Log").
- ET Leader's conclusions regarding the implementation of the EM&A programme over the past quarter, together for suggestions for improvements (to be agreed with IEC before implementation).
- Appendices, including :
 - material and waste throughputs within EcoPark (to be provided by Operator)
 - raw monitoring data, if any (in table form)
 - graphical plots of monitored parameters in the current quarter, if any, showing trends and annotated against :
 - significant recovery processes in operation during the quarter
 - weather conditions that may affect the results
 - other factors which might affect the monitoring results
 - the "Complaints Log", including :
 - records of all complaints received (written or verbal) including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
 - records of notifications of summons and successful prosecutions for breaches of environmental protection/pollution control legislation, including locations and nature of the breaches, investigation, follow-up action taken, results and summary
 - review of the reasons for and the implications of complaints, summons and prosecutions including review of pollution sources and working procedures
 - description of actions taken in the event of non-compliance and deficiency reporting
 - submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarising the EM&A of the period

Annual Operation EM&A Report

8.3.5 The Annual Operation EM&A Report shall follow the same format as the Quarterly Operation EM&A Report, except that it shall relate to the previous calendar year and not just the preceding quarter. In addition, it shall include the following :

- Compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies.
- Provide clear-cut decisions on the environmental acceptability of EcoPark with reference to the specific impact hypothesis.
- Review the monitoring methodology adopted and, with the benefit of hindsight, comment on its effectiveness (including cost-effectiveness).
- Review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures) recommend any improvement in the EM&A programme.

Ad Hoc Process Review

8.3.6 PRCs shall be prepared in a format to be proposed by the Operator in his tender, subject to the agreement of WFBU. PRCs shall be issued as and when required and shall contain in full the details described in Section 7.2.



8.4 Data Keeping

- 8.4.1 Documentation such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the Monthly Construction EM&A reports for submission. However, such documents shall be kept by the ET Leader and Works Contractor (as appropriate) for a minimum of one year after completion of construction and shall be available for inspection upon request. All relevant information shall be clearly and systematically recorded in the documents.
- 8.4.2 Monitoring data shall also be recorded in full on CD-ROM and shall be included with the Final Construction EM&A Report (for each construction phase) and with the Annual Operation EM&A Report (during the operation phase).

8.5 Interim Notification Of Environmental Quality Limit Exceedances

- 8.5.1 Interim notifications of exceedances of Limit levels shall be issued to all parties within 24 hours of the identification of an exceedance. The notification shall be followed up with advice from the ET to the Works Contractor or Operator and to WFBU on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals.
- 8.5.2 The Monthly/Quarterly Reports will contain all available details concerning measures exceedances and complaints, their causes and those steps taken to control impacts and prevent their recurrence.

8.6 Web-based EM&A

- 8.6.1 To facilitate public inspection of the Baseline Monitoring Report, Monthly Construction EM&A Reports and Quarterly Operation EM&A Reports, Project Websites shall be set up by the Works Contractor and Operator. Electronic copies of these reports shall be prepared by the ET in HTML and/or PDF format and shall be uploaded to the website at the same time as the hardcopies are submitted. Alternatively, relevant extracts from the reports may be uploaded as deemed appropriate by WFBU. It is not suggested that PRCs be made publicly available since these may contain details of a commercially sensitive nature.
- 8.6.2 For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the uploaded document shall be included at the beginning of the document. Where figures, drawings and tables are uploaded, hyperlink references shall be included in the appropriate sections of the main text. Where entire reports are uploaded to the website, their content shall be same as the hard copies.
- 8.6.3 All environmental monitoring data shall be uploaded to the Project Websites no later than 2 weeks after the corresponding report has been endorsed by the IEC.
- 8.6.4 The Project Websites shall enable user-friendly public access to the monitoring data with features capable of :
- Providing access to all environmental monitoring data collected since the commencement of works.
 - Searching by date.
 - Searching by types of monitoring data.
 - Hyperlinks to relevant monitoring data after searching.



Appendix A

Implementation Schedule



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	

General

5.5.23 to 5.5.25, 10.2.24 and 10.2.37	4.2.5 to 4.2.8	The Operator shall develop and implement an Emergency Response Plan (ERP) that lists the procedures to be followed in case of fire, fuel or chemical spillage or other emergency within the EcoPark.	Throughout the duration of the operation.	Operator			✓		
12.2	7.2	No process shall be allowed to operate within EcoPark without approval from WFBU. Approval will be based on the ten-step Process Review, which may include a Design Audit if deemed to be necessary.	Throughout the duration of the operation.	ET IEC WFBU			✓		
	8.1.2	All reports (including Process Review Checklists and any Design Audits) shall be prepared and certified by the ET, verified by the IEC and approved by WFBU.	Throughout the duration of construction works until construction is substantially completed. Throughout the duration of the operation.	ET IEC WFBU		✓	✓		
12.3	7.3	The Operator shall prepare and implement an Environmental Management Plan (EMP) to define mechanisms for achieving the environmental requirements specified in the EIA, EP and in statutory regulations.	Throughout the duration of the operation.	Operator			✓		

Air Quality

3.5.7	3.2.1	Ensure proper implementation of the dust control measures via regular site audit of the construction activities. Measures to include: <ul style="list-style-type: none"> Restricting heights from which materials are dropped, as far as practicable to minimise the fugitive dust arising from unloading/loading; All stockpiles of excavated materials or spoil of more than 50m³ should be enclosed, covered or dampened during dry or windy conditions; 	Throughout the duration of construction works until construction is substantially completed.	Works Contractor Works Contractor Works Contractor		✓ ✓ ✓			Air Pollution Control (Construction Dust) Regulation
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EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
		<ul style="list-style-type: none"> • Effective water sprays should be used to control potential dust emission sources such as unpaved haul roads and active construction areas; • Vehicles that have the potential to create dust while transporting materials should be covered, with the cover properly secured and extended over the edges of the side and tail boards; • Materials should be dampened, if necessary, before transportation; • Travelling speeds should be controlled to reduce traffic induced dust dispersion and re-suspension within the site from the operating haul trucks; • Vehicle washing facilities will be provided to minimise the quantity of material deposited on public roads; • Erection of hoarding of not less than 2.4m high from ground level along the perimeter of EcoPark site (tenants will also be responsible for implementing dust control measures within their allocated lots); and • Dusty activities should be re-scheduled to avoid high-winds weather. 		<p>Works Contractor</p> <p>Works Contractor</p> <p>Works Contractor</p> <p>Works Contractor</p> <p>Works Contractor</p> <p>Works Contractor</p>		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>			
	3.2.2	The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
13.2		The Operator shall ensure that the EcoPark “base case” assumptions for air quality shown in Table 13.1 of the Final EIA Report are met by tenants, as a whole.	Throughout the duration of the operation.	Operator			✓		Table 13.1 of the Final EIA Report



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
5.4.3	4.1.5	Prior to any dewatering, the Works Contractor should carry out water quality testing to confirm that any discharge to stormwater drains or direct to the sea will meet the standard for COD.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			WPCO-TM Standards for Standards for Effluents Discharged into the Inshore Waters of NWWCZ
5.4.4		Portable chemical toilets be used by construction workers on site.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
5.4.5		Soakaways and other similar drainage systems will not be permitted within EcoPark.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
5.4.8		Industrial Wastewater (from tenant's lots) that meets the influent standards of the WTF will be connected into a dedicated internal sewer leading to the WTF.		Consultant for follow-on D&C consultancy	✓				
5.4.8		Domestic Wastewater (from washrooms, kitchens, etc.) will be connected into a dedicated internal sewer leading to TMSPS		Consultant for follow-on D&C consultancy	✓				
5.4.11 & 5.6.7		To minimise the chance of accidental spillage during loading and unloading, and thereby reduce marine water quality impacts, well established cargo handling guidelines should be followed.	Adjacent to EcoPark marine frontage when loading or unloading goods.	Operator Operators of bulk carriers			✓		Sections 5 and 6 of <i>IMO Code of Practice for the Safe Loading and Unloading of Bulk Carriers</i>
5.5.19		A stop-log should be installed at a suitable location(s) in the perimeter drainage system so that contaminants can be contained in the event of a spill.		Consultant for follow-on D&C consultancy	✓				
5.5.19		Contaminated water collected in the surface drainage systems shall be treated at the WTF or other appropriate treatment facility.	Within EcoPark throughout the life of the facility.	Operator			✓		
5.5.22		The marine frontage area shall be constructed on a slight gradient such that any water flows away from the sea and towards the surface drains at the edge of the access road		Consultant for follow-on D&C consultancy	✓				



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
5.5.23 to 5.5.25	4.2.5 to 4.2.7	An Emergency Response Plan (ERP) will be formulated to address various accident scenarios. The ERP will be certified by the Environmental Team (ET) and verified by the Independent Environmental Checker (IEC) under the operation EM&A programme.	Within EcoPark throughout the life of the facility.	Operator			✓		
5.6.1	4.2.1	<p>The following control measures are stipulated in the <i>Practice Note for Professional Persons</i> with regard to site drainage and shall be implemented to minimise water quality impacts :</p> <ul style="list-style-type: none"> All wastewater generated on the site shall be collected, removed from site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance. Chemical or mulching toilets for tankering away the effluent shall be provided where there is no provision for making connection to the sewerage system. The Works Contractor shall construct, maintain, remove and reinstate, as necessary, temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the works. The Works Contractor shall also provide adequate precautions to ensure that no spoil or debris of any kind is allowed to be pushed, washed down, fall or be deposited on land or on the seabed adjacent to the site. 	Throughout the duration of construction works until construction is substantially completed.	<p>Consultant for follow-on D&C consultancy Works Contractor</p> <p>Works Contractor</p>	✓	✓			Practice Note for Professional Persons with regard to site drainage (ProPECC PN 1/94)



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
		<ul style="list-style-type: none"> The Works Contractor shall not permit any sewage, waste water or other effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land or allow any solid waste to be deposited anywhere within the site or onto any adjoining land and shall have all such materials removed from the site. The Works Contractor shall not discharge directly or indirectly (by runoff) or cause or permit to be discharged into any public sewer, storm-water drain, channel, stream-course or sea, any effluent or foul or contaminated water or cooling water without the prior consent of the relevant Authority who may require the Works Contractor to provide, operate and maintain at the Works Contractor's own expense, within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated or cooling or hot water. All Works Contractor's equipment shall be designed and maintained to minimise the risk of silt and other contaminants being released into the water column or deposited in other than designated locations. 		Works Contractor		✓			
				Works Contractor		✓			
				Works Contractor		✓			
5.6.1		<p>The <i>Water Quality Objectives</i> also provide measures to reduce water quality impacts from construction sites :</p> <ul style="list-style-type: none"> Reduce the amount of water used to dampen any surfaces or stockpiles. Prevent uncontrolled runoff from site by provision of perimeter drains at the seaward extremity of the site. 	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			Water Quality Objectives



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
		<ul style="list-style-type: none"> Any liquid generated on-site shall be treated and disposed of in accordance with the provisions of the WPCO-TM. Any special works areas which may be provide for material storage or mixing, shall be surrounded by bunds and have drainage collection systems to contain any spillages. 							WPCO-TM on Standards for Effluents Discharged into Drainage, Sewerage, Inland and Coastal Waters
5.6.3		Any covered areas within lots will be connected directly to the WTF through the foul sewers.		Consultant for follow-on D&C consultancy	✓				
5.6.4		For uncovered areas where recovery process identified as causing potentially high level of contamination are located, stop-logs will be installed in the perimeter drainage system to isolate contamination.	Within EcoPark throughout the life of the facility.	Consultant for follow-on D&C consultancy Operator	✓		✓		
	4.2.2	The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.	Throughout the duration of construction works until construction is substantially completed. Within EcoPark throughout the life of the facility.	ET IEC		✓	✓		

Waste Management

6.3.8	5.2.1	Prepare an enhanced Waste Management Plan to minimise C&D Material generation.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			ETWB TC(W) No. 15/2003
6.3.8	5.2.1 & 5.2.2	A trip-ticket system should be included to monitor the disposal of C&D and solid wastes at public filling facilities and landfills and to control fly-tipping	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			ETWB TC(W) No. 31/2004
6.5.2 to 6.5.4		Ensure a material balance in terms of excavated C&D Materials in the design of EcoPark. The contract documents should specify that no excavated materials shall be removed from the site, but should instead be reused as appropriate.		Consultant for follow-on D&C consultancy	✓				



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
6.7.6	5.2.1	The Works Contractor shall register with EPD as a chemical waste producer.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			Waste Disposal (Chemical Waste) (General) Regulation
6.7.11		Any stockpiled material will be covered (e.g. by a tarpaulin) until used in order to prevent wind-blown dust during dry weather, and to reduce muddy runoff during wet weather.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
6.8.7	5.2.4	The Operator should register with EPD as a chemical waste producer.	Within EcoPark throughout the life of the facility.	Operator			✓		Waste Disposal (Chemical Waste) (General) Regulation
6.8.16		The dust collected by any air pollution control equipment installed by tenants must be tested to ensure compliance for landfill disposal.	Within EcoPark throughout the life of the facility.	Operator			✓		Practice Note for disposal of dusty waste at landfill sites and the Admission Ticket System
6.8.18 & 6.8.22	5.2.4	Sludge will be disposed of at WENT landfill, or at any future dedicated sludge treatment facility. Sludge will be collected by a Licensed collector at regular intervals, as determined by the operation of the WTF	Within EcoPark throughout the life of the facility.	Operator			✓		
6.8.21	5.2.4	Chemical wastes shall be stored in appropriate containers in a covered area. "No Smoking" signs will be clearly displayed to prevent accidental ignition of any flammable materials. Drip trays capable of storing 110% of the volume of the largest container will be used to mitigate possible leakage.	Within EcoPark throughout the life of the facility.	Operator			✓		Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
	5.2.3 & 5.2.5	The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.	Throughout the duration of construction works until construction is substantially completed. Within EcoPark throughout the life of the facility.	ET with IEC		✓	✓		



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
Prevention of Contaminated Land									
7.3.1	5.3.2	Any spillages of contaminating material shall be cleaned up immediately through the use of an absorbent. Any such used material should then be considered chemical waste and disposed of appropriately.	Within EcoPark throughout the life of the facility.	Operator			✓		
7.3.3		Any areas within the lot to be used for recycling processes shall be concrete paved before recycling activities commence.	Within EcoPark throughout the life of the facility.	Operator			✓		
5.5.23 & 7.3.4		Petrol interceptors/grease traps will be used prior to discharge of surface water off-site.		Consultant for follow-on D&C consultancy	✓				
7.3.5	5.3.2	During operation, the greatest risk of land contamination will come from the storage of chemical wastes, therefore the following measures should be followed : <ul style="list-style-type: none">All chemical storage areas shall be provided with locks and be sited on sealed areas. The storage areas shall be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled oil and chemicals from contaminating the ground.	Within EcoPark throughout the life of the facility.	Operator			✓		
		<ul style="list-style-type: none">Management of chemical waste is implemented through the control of waste storage, labelling of waste, transportation and treatment of chemical waste at an appropriate facility.Chemical wastes will be collected, stored and disposed of in accordance with the Regulation. Disposal of other construction waste will be undertaken by Licensed contractors in accordance with applicable statutory requirements in the WDO.							Waste Disposal (Chemical Waste) (General) Regulation



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
		<ul style="list-style-type: none"> Chemical wastes shall be handled according to the relevant code of practice. Spent chemicals shall be stored and collected by an approved operator for disposal at a licensed facility in accordance with the relevant regulation. 							Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes Chemical Waste (General) Regulation.
	5.3.3	The ET should develop an audit checklist, with the agreement of the IEC, to ensure that each mitigation measure is implemented when appropriate and operated correctly when implemented.	Within EcoPark throughout the life of the facility.	ET with IEC			✓		

Landfill Gas

8.7.10	6.1.2	<ul style="list-style-type: none"> Cut-off barrier to seal any service trench entering the site. Figure B.6 in the <i>Guidance Note</i> provides details of a suitable design. Service entries into buildings should be made above ground level. Prefabricated offices should be elevated from the ground (raised floor of 500mm). 		Consultant for follow-on D&C consultancy	✓				Guidance Note on Landfill Gas Hazard Assessment
8.7.10	6.1.2	<ul style="list-style-type: none"> All workers should be aware of potential presence of LFG. Safety precautions should be made available during trenching and excavation. Train and provide breathing apparatus and gas detection equipment for confined spaces or deep trenching. 	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
8.7.10 & 8.7.11	6.1.2	<ul style="list-style-type: none"> Alert workers and visitors of possible LFG hazards Prohibit smoking and open fires on site Conduct regular (quarterly) LFG monitoring at mobile offices, equipment stores, etc. 	Within EcoPark throughout the life of the facility.	Operator			✓		



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
	6.4.1	During construction excavations of 1m depth or more shall be monitored before entry and periodically during the works. If drilling is required, the procedures for safety management and working procedures described in the <i>Guidance Note</i> shall be adopted.	Any excavation >1m in depth	Works Contractor		✓			Guidance Note on Landfill Gas Hazard Assessment
	6.4.3	Following construction, routine monthly monitoring may be required at service voids and utility boxes. The monitoring requirement and specific locations of monitoring points shall be established based on the findings of the monitoring carried out during construction (i.e. if no LFG is detected during construction then no routine monitoring is required). The need for continued monitoring shall, however, be reviewed through discussion with EPD.	Within EcoPark throughout the life of the facility.	Operator			✓		

Hazard to Life

10.4.3		Building height limit within EcoPark shall be applied to structures within which people may work at elevated levels.	Within EcoPark throughout the life of the facility.	Consultant for follow-on D&C consultancy Operator	✓		✓		EIA Report Table 10.2
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Landscape and Visual

9.4.1		Ensure all site compounds and works areas are shielded from view during construction, e.g. by use of standard site hoardings as typically used in Hong Kong.	Throughout the duration of construction works until construction is substantially completed.	Works Contractor		✓			
9.4.2		The design intention of EcoPark should promote harmony between the low-rise buildings to be constructed and the landscaped areas.		Consultant for follow-on D&C consultancy	✓				



EIA Ref.	EM&A Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation and Guidelines
					Des	Con	Op	Dec	
9.4.3		<p>Measures to be considered in the design should include :</p> <ul style="list-style-type: none"> • Designing the landscape hard works to blend in with the existing environment (this will include the natural landscape of the area north of Lung Mun Road). • Proposed landscape slope/strip should be at an appropriate angle suitable for landscape planting. • Allow a landscaped buffer in front of each lot that will provide screening from the internal roads and median strip planting within the main access road, if appropriate. • Provide landscaped grounds around the Administration Building and perimeter planting along the northern boundary, eastern boundary (after decommissioning of the Fill Bank) and north of the marine frontage access road to provide screening of EcoPark from all directions. • Incorporate effective landscape design and treatments to ensure that the landscaped environment can be easily maintained during the operation phase by the Operator. 		Consultant for follow-on D&C consultancy	✓				
9.4.4		It is recommended that consideration be given to developing a commonality in the architectural design and a harmonised colour theme.		Consultant for follow-on D&C consultancy	✓				
9.4.4		It recommended that this commonality be promoted throughout EcoPark by the Operator and adopted by tenants, if practicable.	Within EcoPark throughout the life of the facility.	Operator			✓		



Appendix B

“Base Case” Assumptions



B. “BASE CASE” ASSUMPTIONS

B.1 General

B.1.1 In order to provide a basis for comparison during the Design Audit of new processes, this section contains the design assumptions for the “base case” assessment carried out in this EIA, i.e., the design envelope within which all processes must be carried out in order to meet the findings of the EIA Report and EIAO-TM requirements.

B.1.2 It should be noted that these design assumptions relate only to development within EcoPark that is not controlled by existing legislation – the Operator and tenants are also required to comply with other statutory requirements, such as the Air Pollution Control Ordinance, the Water Pollution Control Ordinance, the Waste Disposal Ordinance, etc.

B.2 Air Quality

B.2.1 The required chimney parameters, maximum permissible pollutant emission rates and the fresh air intake restriction for the “base case” are summarised below in Table B.1. This table provides the basis for future comparison in terms of air quality assumptions.

B.2.2 The footnote to Table B.1 should also be noted, as this will have a significant effect on the requirements for future tenants in terms of chimney parameters, maximum permissible pollutant emission rates and fresh air intake restrictions. The reason for this caveat is that if the “holiday camp” does not go ahead, then there will be no ASRs at this elevated location and so there is no need to limit the stack height, diameter, efflux velocity of exit temperature. As such, this allows greater flexibility to tenants in the design of their premises, although the maximum permissible emission rates must still be met to ensure that existing air quality will not be worsened significantly.

Table B.1 : Air Quality “Base Case” Assumptions

Chimney Location	
Any locations other than the Chimney Restricted Area (as shown in Figure 3.3) within EcoPark	
Operating Hours	
07:00 to 19:00 Daily	
Recovery Process	
Electronics Crush-and-sieve of fluorescent lamp	Stack height* : 6m above ground
	Stack diameter* : 0.25m
	Efflux velocity* : 16.4m/s
	Exit temperature* : 23.5°C
Max. Permissible Emission Rate (g/s)	
	Hg : 2.4167×10^6
Glass Melting / forming and finishing of glass	Stack height* : 30m above ground
	Stack diameter * : 1m
	Efflux velocity* : 9m/s
	Exit temperature* : 80°C
Max. Permissible Emission Rate (g/s)	
	PM : 0.0202
Non-ferrous Metals – metal recovery (sweating, melting, refining)	Stack height* : 30m above ground
	Stack diameter * : 1m
	Efflux velocity* : 9m/s
	Exit temperature* : 80°C
Max. Permissible Emission Rate (g/s)	
	PM : 0.0407
	SO ₂ : 1.5432



Recovery Process (continued)		
Non-ferrous Metals – metal recovery (sweating, melting, refining) (continued)	Max. Permissible Emission Rate (g/s) (continued)	
	Cl ₂ : 0.0177	
	HCl : 0.3550	
	F : 0.0444	
	White P : 0.0081	
	Pb : 0.0389	
	Be : 1.63 × 10 ⁻⁶	
	Cd : 0.0008	
	Hg : 0.0008	
	Ni : 0.0081	
	As : 0.0016	
	Sn : 0.0122	
	Mo : 0.0081	
	Cu : 0.0163	
	Sb : 0.0041	
Cr ⁶⁺ : 3.58 × 10 ⁻⁵		
Pt : 0.0016		
Se : 0.0016		
Rh : 0.0008		
Plastic Moulding and Extrusion	Stack height* : 30m above ground	
	Stack diameter* : 1m	
	Efflux velocity* : 9m/s	
	Exit temperature* : 23.5°C	
Max. Permissible Emission Rate (g/s)		
PM : 8.9580 × 10 ⁻³		
Rubber Tyres Grinding	Stack height* : 30m above ground	
	Stack diameter * : 1m	
	Efflux velocity* : 9m/s	
	Exit temperature* : 23.5°C	
Max. Permissible Emission Rate (g/s)		
PM : 9.1986 × 10 ⁻³		
Wood Plastic-wood composite manufacturing (extruding)	Stack height* : 30m above ground	
	Stack diameter * : 1m	
	Efflux velocity* : 9m/s	
	Exit temperature* : 23.5°C	
Max. Permissible Emission Rate (g/s)		
PM : 8.9580 × 10 ⁻³		
Fuel Combustion Emissions		
	Stack height* : 30m above ground	
	Stack diameter * : 1m	
	Efflux velocity* : 9m/s	
	Exit temperature* : 80°C	
	Sulphur Content : ≤ 0.005% sulphur by weight	
	Max. Permissible Emission Rate (g/s)	
	PM : 0.5000	
	SO ₂ : 0.1963	
	NO _x : 6.0000	
	CO : 1.2500	
Max. Permissible Emission Rate (g/s)		
PM : 0.5000		
SO ₂ : 0.1963		
NO _x : 6.0000		
CO : 1.2500		
Fresh Air Intake Restriction in EcoPark and Future Uses in the Existing Fill Bank Area		
Maximum allowable elevation of fresh-air intake location is 22.5mPD		

Note : * These values are to be considered minimum values to be achieved if the proposed “holiday camp” on the hillside adjacent to EcoPark is not developed. However, if the “holiday camp” is developed then these values are to be considered exact values to be achieved.





B.3 Water Quality

- B.3.1 The key assumption for water quality is that the WTF will be designed and operated such that it is capable of meeting the requirements of the Discharge Licence issued under the WPCO. As the WTF will be connected to a foul sewer running below Lung Mun Road that leads to the Pillar Point Sewage Treatment Works, the Discharge Licence will likely stipulate that effluent from the WTF must meet *Standards for Effluents Discharged into Foul Sewers Leading into Government Sewage Treatment Plants*. Thus, there is no need to carry out a Design Audit for the WTF under the context of the EIAO.

B.4 Waste Management

- B.4.1 There are no quantitative assumptions for waste management, but each tenant is assumed to adopt the waste management hierarchy (i.e., avoid, reduce, reuse, recycle, treat and dispose, in order of preference). It is also assumed that the Operator and tenants should endeavour to promote and implement, respectively, the vertical integration of businesses within EcoPark.

B.5 Prevention of Land Contamination

- B.5.1 Again, there are no quantitative assumptions, but it has been assumed that land contamination will be prevented by adopting suitable designs within lots. These include the placement of impermeable hardstanding in any areas within the lot to be used for recycling processes before recycling activities commence.
- B.5.2 Any spillages of contaminating material shall be cleaned up immediately through the use of an absorbent material. Any such used material should then be considered as chemical waste and disposed of accordingly.

B.6 Landfill Gas

- B.6.1 The risks associated with LFG have been classified as LOW and appropriate precautionary and protection measures have been assumed.
- B.6.2 Within the LFG Consultation Zone, it has been assumed that tenants will elevate from the ground any prefabricated offices (raised floor of 500mm) and that service entries into buildings should be made above ground level. The tenant is also assumed to be familiar with possible LFG Hazards.

B.7 Hazard to Life

- B.67.1 Based on the Hazard to Life assessment it has been assumed that the following DGs will not result in risk to off-site populations :
- Battery Fluid.
 - Oxygen & Acetylene.
 - Zinc Dust.
 - Hydrogen Peroxide.
 - Rubber Tyres.
 - Sludge or Spent Acid.
 - Ultra Low Sulphur Diesel.
- B.7.2 For other substances that may be hazardous in nature, an assessment of risk in accordance with the *Hong Kong Risk Guidelines* may be deemed necessary during the Design Audit.



B.7.3 It has also been assumed that buildings constructed within EcoPark adjacent to the boundary with the PAFF will be set back as indicated in Table B.2, below, in order to avoid any possible smoke impacts from a fire at the PAFF. Based on this approach, the proposed building height limit is shown in Table B.2 will only be applied to structures within which people will work at elevated levels, such as the Administration Building.

Table B.2 : Building Height Restrictions Within EcoPark

Distance (D) of EcoPark Building from closest PAFF Boundary (m)	Maximum Height (H) of EcoPark Building (where workers may be at elevated levels) (m)
0	0.0
10	5.8
20	11.5
30	17.3
40	23.1
50	28.9

Note : $H = D \times \tan(30^\circ)$, based on a 60° tilt angle for aviation fuel flames and smoke, *Tung Chung Cable Car EIA*.



Table B.3 : Recovery Processes Remaining After Initial Screening

Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
Batteries					
Lead-acid	Mechanical / Physical separation of battery into separate components	Fugitive dust from the dust attached on the battery surface (not from the components)	<ul style="list-style-type: none"> • Good site practice to minimise fugitive dust emission • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No
Zinc-carbon / Alkaline	Shredding, Electromagnetic separation & neutralization (of electrolyte) – will be within the enclosed machine	Fugitive dust from discharge point of shredded material	<ul style="list-style-type: none"> • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No
Lithium	Shredding and Electromagnetic/ Physical separation/ Hydrosaline deactivation – will be within the enclosed machine	Fugitive dust from discharge point of shredded material	<ul style="list-style-type: none"> • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No
NiCd/ NiMH/ Li ion	Cadmium (13-22%); Cobalt (0.5-2%); Lithium Hydroxide (0-4%); Nickel (20-32%); Potassium Hydroxide (0-4%) and Sodium Hydroxide (0-4%) ⁶ ; Others (assume polymers, metals; 32%)	Fugitive dust from discharge point of shredded material	<ul style="list-style-type: none"> • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No
Electronics					
CRT Recovery	Separation and Testing	Nil	N/A	Nil	N/A
	Shredding, electromagnetic and electrostatic sorting – will be within the enclosed machine	Fugitive dust from discharge point of shredded material	<ul style="list-style-type: none"> • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No
Computer/ Electronics Recovery	Separation and Testing	Nil	N/A	Nil	N/A
	Shredding and Separation (Electromagnetic and electrostatic) – will be within the enclosed machine	Fugitive dust from discharge point of shredded material	<ul style="list-style-type: none"> • Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) • Enclosed system with active air extraction system with dust control system 	Negligible	No



Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
White Goods Dismantling	Separation and Testing	Nil	N/A	Nil	N/A
	Manual Dismantling and Separation	CFC emitted from old type air conditioner and refrigerator	<ul style="list-style-type: none"> Good site practice to remove residual CFC before dismantling. As the use of CFC for refrigerant is fading out, the white good with CFC will become less in the future. 	Negligible	No
Fluorescent Lamp Recovery	Crush-and-Sieve/ Volatization/ Cyclone / magnetic separation in the enclosed mercury recovery machine for fluorescent lamp	Fugitive dust from any opening of the recovery machine	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) 	Negligible	No
		Hg from the mercury recovery machine for fluorescent lamp	<ul style="list-style-type: none"> Cyclones, dust filter and carbon filter package as specified in the technical information of the mercury recovery machine for fluorescent lamp. 	TBD	Yes
Glass					
	Manual/ Automated Sorting	Nil	N/A	Nil	N/A
	Crusher – to reduce the glass to smaller size to improve the melting efficiency of glass will be within the enclosed machine	Fugitive dust from discharge of glass particles to the melting furnace	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) Enclosed system with active air extraction system with dust control system 	Negligible	No
	Melting furnace/ Moulding/ Forming and Finishing	Fugitive dust and VOC	<ul style="list-style-type: none"> Baghouse with 99% PM control efficiency VOC control equipment such as condensation and/or activated carbon adsorption with 90% control efficiency 	TBD	Yes
	Fuel Combustion	PM, SO ₂ , NO ₂ , CO & VOC	<ul style="list-style-type: none"> Ultra-low sulphur diesel (ULSD) with 0.005% by weight of sulphur 	TBD	Yes
Organic Food Waste					
In-vessel Composting	Handling/ delivery of organic food waste	Odour	<ul style="list-style-type: none"> All the containers should be covered The handling and delivery area should be enclosed and equipped with odour control device such as bio filter or activated carbon filter to remove odour before discharge to the atmosphere. Negative pressure should be provided for the enclosed space to avoid any un-controlled odour emit to the atmosphere 	Negligible	No



Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
	Curing : Organic waste will be placed in a sealed container with heat and moisture controlled. Air is circulated through out the material to maintain the necessary porosity for even maturing. When the air temperature rises above the optimal operating range, air is drawn off through the exhaust passes through bio-filter to remove odour.	Odour	<ul style="list-style-type: none"> Bio filter or activated carbon filter to remove odour before discharge to the atmosphere 	Negligible	No
	Fuel combustion	PM, SO ₂ , NO ₂ , CO & VOC	<ul style="list-style-type: none"> Ultra-low sulphur diesel (ULSD) with 0.005% by weight of sulphur 	TBD	Yes
Ferrous Metals					
	Sorting	Nil	N/A	Nil	N/A
	Baling	Nil	N/A	Nil	N/A
	Mechanical shearing and shredding	Nil	N/A	Nil	N/A
Non-ferrous Metals					
	Sorting – materials are sorted by visual inspection into various grades according to industry specifications	Nil	N/A	Nil	N/A
	Baling	Nil	N/A	Nil	N/A
	Processing (sweating, smelting, refining)	PM, SO ₂ , heavy metals, halogens, TAP, Dioxin	<ul style="list-style-type: none"> Baghouse or ECP with 99.9% dust control efficiency, wet-scrubber with 80% SO₂ removal efficiency 	TBD	Yes
	Fuel combustion	PM, SO ₂ , NO ₂ , CO & VOC	<ul style="list-style-type: none"> Ultra-low sulphur diesel (ULSD) with 0.005% by weight of sulphur 	TBD	Yes
Paper					
	Automated sorting via conveyors, optical sensors and chutes	Nil	N/A	Nil	N/A
	Baling	Nil	N/A	Nil	N/A
	Pulping (e.g. boiler and dryer) / Cleaning/ De-inking/ Flotation – based on the reference document on Best Available Technique in the Pulp and Paper Industry published by European Commission in December 2001, VOC emission from pulping process are very small	VOC	Nil	Negligible	No
	Bleaching – generally oxygen, ozone, peroxide and peracetic acid will be used in the bleaching process. (ref: <i>Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques in the Pulp and Paper Industry</i> , EU Directive, Dec 2001)	NIL	<ul style="list-style-type: none"> Non-chlorine bleaching agents include oxygen, ozone, peroxide and peracetic acid. 	NIL	No



Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
	Fuel combustion	PM, SO ₂ , NO ₂ , CO & VOC	<ul style="list-style-type: none"> Ultra-low sulphur diesel (ULSD) with 0.005% by weight of sulphur 	TBD	Yes
Plastics					
	Sorting	Nil	N/A	Nil	N/A
	Crushing and Baling	Nil	N/A	Nil	N/A
	Clean plastic flakes	Nil	N/A	Nil	N/A
	Blending – dried flakes and pellets (virgin material)	Nil	N/A	Nil	N/A
	Moulding/ Extrusion by electric moulding machine and extruder	Fugitive dust and VOC from moulding machine and extruder odour from moulding machine and extruder	<ul style="list-style-type: none"> Localised collection hood at point of moulding and extrusion in the moulding machine and extruder with control devices Baghouse with 99% PM control efficiency VOC control equipment such as condensation and/or activated carbon adsorption with 90% control efficiency Bio filter or activated carbon filter to remove odour before discharge to the atmosphere with 90% control efficiency 	TBD Negligible	Yes No
Textiles					
	Sorting	Nil	N/A	Nil	N/A
	Baling	Nil	N/A	Nil	N/A
Rubber Tyres					
	De-beading	Fugitive dust from the dust attached on the tyre surface	<ul style="list-style-type: none"> Good site practice to minimise fugitive dust emission Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) enclosed facility with active air extraction system with dust control system 	Negligible	No
	Shredding – enclosed mechanical shredding	Fugitive dust from discharge of shredded rubber	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) Enclosed system with active air extraction system with dust control system 	Negligible	No



Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
	Mechanical Crumbing / Cryogenic Processing within the enclosed system	Fugitive dust from grinded fine rubber particles	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) Enclosed system with active air extraction system with dust control system 	TBD	Yes
	Magnetic separation and air separator within the enclosed system/ Sieving	Fugitive dust attached on the tyre surface from sieving	<ul style="list-style-type: none"> Good site practice to minimise fugitive dust emission Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) Enclosed system with active air extraction system with dust control system 	Negligible	No
	Re-treading – within the enclosed system and electric heating will be used for vulcanisation/ autoclave	Fugitive dust, VOC and odour emissions are localised at the re-treading machine	<ul style="list-style-type: none"> To connect a collection system venting the fugitive dust and VOC from the enclosed re-treading machine to the control equipment before removing the re-treaded tyres out from the machine. Localised collection hood with control devices (e.g. baghouse, with 99% dust control efficiency and activated carbon filter or bio-filter with 90% control efficiency to control odour and VOC or wet scrubber to control both the fugitive dust and VOC emissions) VOC control equipment such as condensation and/or activated carbon adsorption with 90% control efficiency Enclosed system with active air extraction system with control system 	Negligible	No
Wood					
	Dismantling / Sorting	Nil	N/A	Nil	N/A
	Hydraulic compaction/ Mechanical shearing	Nil	N/A	Nil	N/A
	Pallet refurbishment	Nil	N/A	Nil	N/A
	Process – chipping within the enclosed machine	Fugitive dust from the discharge of wood chips	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) Enclosed system with active air extraction system with control system 	Negligible	No



Material Type	Process	Potential Emissions	Available Control Equipment/ Measures	Level of impact	Included in Assessment ?
	Bleaching – generally oxygen, ozone, peroxide and peracetic acid will be used in the bleaching process. (ref: <i>Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques in the Pulp and Paper Industry</i> , EU Directive, Dec 2001)	NIL	<ul style="list-style-type: none"> Non-chlorine bleaching agents include oxygen, ozone, peroxide and peracetic acid. 	NIL	No
	Process – magnetic separation	Nil	N/A	Nil	N/A
	Plastic Wood Composite (PWC) Manufacturing – plastic and wood chips will mix together and heat up by electric power. PWC will then form by extrusion	Fugitive dust and VOC from the point of PWC extrusion from the extruder odour from the point of PWC extrusion from the extruder	<ul style="list-style-type: none"> Localised dust/ particles collection hood with dust control device (e.g. baghouse, with 99% control efficiency) VOC control equipment such as condensation and/or activated carbon adsorption with 90% control efficiency Bio filter or activated carbon filter with 90% control efficiency to remove odour before discharge to the atmosphere 	TBD Negligible	Yes No
	Fuel combustion	PM, SO ₂ , NO ₂ , CO & VOC	<ul style="list-style-type: none"> Ultra-low sulphur diesel (ULSD) with 0.005% by weight of sulphur 	TBD	Yes
Spent Copper Etchant					
	Electrolytic Process	Nil	N/A	Nil	N/A
	Chemical Treatment Process	Nil	N/A	Nil	N/A