

Hong Kong Offshore LNG Terminal - Works associated with the subsea gas pipeline for Lamma Power Station (LPS) and the associated Gas Receiving Station (GRS) in LPS

Waste Management Plan

23 June 2020

Project No.: 0505354

Document details	
Document title	Hong Kong Offshore LNG Terminal - Works associated with the subsea gas pipeline for Lamma Power Station (LPS) and the associated Gas Receiving Station (GRS) in LPS
Document subtitle	Waste Management Plan
Project No.	0505354
Date	23 June 2020
Version	1
Author	RC
Client Name	The Hongkong Electric Company Limited

Document history

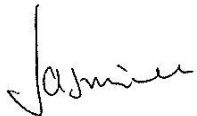
	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
	0	SC	RC	JN	14/5/2020	N/A
	1	RC	RC	JN	23/6/2020	N/A

Signature Page

23 June 2020

Hong Kong Offshore LNG Terminal - Works associated with the subsea gas pipeline for Lamma Power Station (LPS) and the associated Gas Receiving Station (GRS) in LPS

Waste Management Plan



Dr Jasmine Ng
Partner

ERM-Hong Kong, Limited
2507, 25/F One Harbourfront
18 Tak Fung Street
Hung Hom
Kowloon
Hong Kong

© Copyright 2020 by ERM Worldwide Group Ltd and / or its affiliates ("ERM").
All rights reserved. No part of this work may be reproduced or transmitted in any form,
or by any means, without the prior written permission of ERM.



Hong Kong Offshore LNG Terminal - Works associated with the subsea gas pipeline for Lamma Power Station (LPS) and the associated Gas Receiving Station (GRS) in LPS

Environmental Certification Sheet

FEP-02/558/2018


Reference Document/Plan

Document/ Plan to be Certified/ Verified:	Waste Management Plan
Date of Report:	23 June 2020
Date received by ET:	23 June 2020
Date received by IEC:	23 June 2020


Reference EP Requirement

EP Condition:	Condition No. 2.11 of FEP-02/558/2018
Content:	<i>Waste Management Plan</i>
The Permit Holder shall, no later than 1 month before the commencement of construction of the Project, deposit with the Director 3 hard copies and 1 electronic copy of a waste management plan (WMP) for the construction of the Project.	

ET Certification

I hereby certify that the above referenced document/ plan complies with the above referenced condition of FEP-02/558/2018.	
Mr Raymond Chow, Environmental Team Leader:	 Date: 23 June 2020

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition of FEP-02/558/2018.	
Mr Arthur Lo, Independent Environmental Checker:	 Date: 23 June 2020

CONTENTS

1.	INTRODUCTION	1
1.1	Background	1
1.2	Objectives of the Waste Management Plan	1
1.3	Waste Management Regulations and Guidelines	2
1.3.1	General	2
1.3.2	Statutory Requirements	2
1.3.3	Other Relevant Guidelines	4
1.3.4	Permits and Licenses	5
1.4	Structure of the Waste Management Plan.....	5
2.	ORGANIZATION STRUCTURE.....	7
2.1	Overall Organizational Structure.....	7
2.1.1	HK Electric	7
2.1.2	Environmental Team (ET)	7
2.1.3	Independent Environmental Checker (IEC).....	7
2.2	Organizational Structure of the Contractor	7
2.3	Roles and Responsibilities of the Contractor	8
2.3.1	Project Director (Head Office)	8
2.3.2	Environmental Manager.....	8
2.3.3	Environmental Officer	9
2.3.4	HSSE Engineers	9
2.3.5	HSSE Supervisor / Environmental Supervisor.....	9
2.3.6	Subcontractors	10
2.3.7	Other staff / Workers.....	10
3.	CATEGORY OF WASTE MATERIALS AND MEASURES ON WASTE MANAGEMENT.....	11
3.1	Expected Sources of Waste Generation	11
3.2	Waste Management Hierarchy	11
3.3	Waste Management Options	11
3.4	Measures of Good Site Management	12
3.5	Waste Reduction Measures	13
3.5.1	C&D Materials	13
3.5.2	Chemical Waste	13
3.5.3	General Refuse	13
3.5.4	Dredged Marine Sediment	13
3.6	Reuse and Recycling.....	13
3.6.1	Inert C&D materials	13
3.6.2	Non-Inert C&D material.....	14
3.7	Material Control and Maintenance.....	14
3.8	Waste Target Summary	14
3.9	Waste Management Records.....	14
3.9.1	Waste Flow Table (WFT)	15
3.10	Training for Waste Management	15
3.11	Waste Monitoring and Audit	15
4.	DISPOSAL ARRANGEMENT, LOCATION AND PROCEDURES.....	19
4.1	Estimated Quantities of C&D Materials & Other Wastes	19
4.2	Acceptance Criteria for the Government Disposal Facilities	20
4.2.1	Acceptance Criteria for Fill Banks (Tuen Mun Area 38 Fill Bank or Tseung Kwan O Area 137 Fill Bank).....	20
4.2.2	Acceptance Criteria for WENT Landfill (West New Territories Landfill) and NENT Landfill (North East New Territories).....	20

4.3	Procedures of the Trip Ticket System	21
4.4	Measures to be Implemented during Transportation of Wastes	22
4.5	Disposal of C&D Materials to Alternative Disposal Ground(s)	22
4.6	Chemical Waste / Hazardous Waste Handling and Disposal	23
4.6.1	Chemical Waste Handling and Disposal	23
4.7	General Refuse	24
4.7.1	Handling the General Refuse	24
4.7.2	Handling of Recyclables	24
4.8	Dredged Marine Sediments.....	24
4.8.1	Disposal of Sediment.....	25

Annexes

Annex A	Mitigation Measures for Waste Management
Annex B	Proforma for Waste Management
Annex C	Flow Charts of the Trip Ticket System

List of Tables

Table 3.1	Waste Management Checklist	17
Table 4.1	Summary of Estimated Waste Arising and Recommended Waste Management Arrangements.....	19
Table 4.2	Waste Acceptance Criteria for Landfill and Sorting Facilities for Non-inert C&D Materials	20

List of Figures

Figure 1.1	Indicative Location of Key Project Components
Figure 2.1	The Organisational Structure for Waste Management

1. INTRODUCTION

1.1 Background

To support the increased use of natural gas in Hong Kong from 2020 onwards, Castle Peak Power Company Limited (CAPCO) and The Hongkong Electric Co., Ltd. (HK Electric) have identified that the development of an offshore liquefied natural gas (LNG) receiving terminal in Hong Kong using Floating Storage and Regasification Unit (FSRU) technology ('the Hong Kong Offshore LNG Terminal Project') presents a viable additional gas supply option that will provide energy security through access to competitive gas supplies from world markets. The Hong Kong Offshore LNG Terminal Project will involve the construction and operation of an offshore LNG import facility to be located in the southern waters of Hong Kong, a double berth jetty, and subsea pipelines that connect to the gas receiving stations (GRS) at the Black Point Power Station (BPPS) and the Lamma Power Station (LPS).

The Environmental Impact Assessment (EIA) Report for the Hong Kong Offshore LNG Terminal Project was submitted to the Environmental Protection Department (EPD) of the HKSAR Government in May 2018. The EIA Report (EIAO Register No. AEIAR-218/2018) was approved by EPD and the associated Environmental Permit (EP) (EP-558/2018) was issued in October 2018. An application for Further Environmental Permits (FEP) was made on 24 December 2019 to demarcate the works between the different parties. The following FEPs were issued on 17 January 2020 and the EP under EP-558/2018 was surrendered on 5 March 2020:

- the double berth jetty at LNG Terminal under the Hong Kong LNG Terminal Limited, joint venture between CAPCO and HK Electric (FEP-01/558/2018);
- the subsea gas pipeline for the BPPS and the associated GRS in the BPPS under CAPCO (FEP-03/558/2018); and
- the subsea gas pipeline for the LPS and the associated GRS in the LPS under HK Electric (FEP-02/558/2018).

The location plan for the works associated with the subsea gas pipeline for the LPS and the associated GRS in the LPS ('the Project') is provided in *Figure 1.1*.

1.2 Objectives of the Waste Management Plan

This *Waste Management Plan (WMP)* for the Project has been prepared in accordance with Condition 2.11 of the Further Environmental Permit FEP-02/558/2018.

FEP No. FEP-02/558/2018, Condition 2.11:

"The Permit Holder shall, no later than 1 month before the commencement of construction of the Project, deposit with the Director 3 hard copies and 1 electronic copy of a waste management plan (WMP) for the construction of the Project. The WMP shall describe the arrangements for avoidance, reuse, recovery and recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities and shall include the recommended mitigation measures on waste management in the approved EIA Report (Register No. AEIAR-218/2018). The WMP shall describe the disposal arrangements and locations of the dredged marine sediments and construction and demolition materials arising from the construction of the Project. Marine dumping permit system and trip ticket system shall be described in the WMP. The deposited WMP shall be fully and properly implemented during construction of the Project."

The key objectives of this WMP are to:

- describe the arrangements for avoidance, reuse, recovery and recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities;

- include the recommended mitigation measures on waste management in the approved EIA Report;
- describe the disposal arrangements and locations of the dredged marine sediments and construction and demolition materials arising from the construction of the Project; and
- describe marine dumping permit system and trip ticket system.

The WMP will be reviewed and updated as appropriate, throughout the course of the construction works to confirm that it remains current with the latest detailed information and works practice.

1.3 Waste Management Regulations and Guidelines

1.3.1 General

Various types of wastes would be generated during the course of the Project and each waste type requires different approach for management and disposal as stipulated in the waste legislation and guidelines. The relevant statutory and non-statutory requirements regarding waste management are summarised in the sections below.

1.3.2 Statutory Requirements

The following legislation relates to the handling, treatment and disposal of wastes in Hong Kong, and would be observed with regard to all wastes generated and requiring disposal, where applicable:

- Waste Disposal Ordinance (Cap 354)
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354C)
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354N)
- Buildings Ordinance (Cap 123)
- Land (Miscellaneous Provisions) Ordinance (Cap 28)
- Public Health and Municipal Services Ordinance (Cap 132) - Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-Laws
- Dumping at Sea Ordinance (Cap 466)
- Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap 413)
- Summary Offences Ordinance (Cap 228)

1.3.2.1 Waste Disposal Ordinance (Cap 354)

The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of waste. Construction waste is not directly defined in the WDO, but is considered to fall within the category of “trade waste”. Under the WDO, wastes can only be disposed of at sites licensed by EPD.

1.3.2.2 Waste Disposal (Chemical Waste) (General) Regulation (Cap 354C)

Under the Waste Disposal (Chemical Waste) (General) Regulation all producers of chemical wastes (including asbestos) must register with EPD and treat their wastes either utilising on-site plant licensed by EPD, or arranging for a licensed collector to take the wastes to a licensed facility. The regulation also prescribes the storage facilities to be provided on site, including labelling and warning signs, and requires the preparation of written procedures and training to deal with emergencies such as spillages, leakages, or accidents arising from the storage of chemical wastes.

1.3.2.3 Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354N)

The current policy related to the dumping of construction and demolition (C&D) materials is documented in the Development Bureau (Works) Technical Circular No. 09/2011, 'Enhanced Control Measures for Management of Public Fill'. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling areas, which usually form part of reclamation schemes.

Under the WDO and the Charging Regulation, wastes can only be disposed of at designated waste disposal facilities licensed by EPD. For construction work with a value of more than HK\$1M, the main contractor is required to establish a billing account at EPD before transporting the construction waste to the designated waste disposal facilities (e.g. landfill, public fill etc.). The vessels for delivering construction waste to public fill reception facility would need prior approval from EPD. Breach of these regulations can lead to a fine and/or imprisonment.

1.3.2.4 Buildings Ordinance (Cap 123)

Regulation of private projects, as opposed to government public works projects, is subject to the Buildings Ordinance (BO) and relevant Practice Notes for Authorised Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAPs). Measures have been introduced under PNAP ADV-19 Construction and Demolition Waste, to enhance the management of C&D materials, and to minimise its generation at source. The enhancement measures include:

- Identifying opportunities to prevent waste during both the project planning and design stage as well as construction stage; and
- Requiring the Contractor to prepare a WMP including areas described in PNAP ADV-19 and submit to the Project Proponent for agreement.

1.3.2.5 Land (Miscellaneous Provisions) Ordinance (Cap 28)

The Land (Miscellaneous Provisions) Ordinance requires that dumping licences be obtained by individuals or companies who deliver public fill to public filling areas. The Civil Engineering & Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.

1.3.2.6 Public Health and Municipal Services Ordinance (Cap 132) - Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-Laws

The Public Cleansing and Prevention of Nuisances By-Laws provide further controls on the illegal tipping of wastes on unauthorized (unlicensed) sites.

1.3.2.7 Dumping at Sea Ordinance (Cap 466)

Dredged sediment may be dumped at sea subject to permit controls under the Dumping at Sea Ordinance (DASO). Anyone who intends to dump dredged sediment must first obtain a permit from the Director of Environmental Protection. Marine dumping sites have been designed for the disposal of dredged sediment. All marine dumping activities must be carried out at these specified areas in accordance with the marine dumping permit.

1.3.2.8 Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap 413)

The Merchant Shipping (Prevention and Control of Pollution) Ordinance and its subsidiary regulations prohibit the discharge of wastewater and garbage from vessels.

Hong Kong has implemented the International Convention for the Prevention of Pollution from Ships 1973 as amended by the 1978 Protocol (universally known as MARPOL) and the MARPOL related requirements are mainly implemented under the Merchant Shipping (Prevention and Control of Pollution) Ordinance. Under the requirements, liquid oil waste or any other mixtures which contain oil and noxious liquid substances or any such residues shall not be discharged into the sea. In Hong Kong, the Chemical Waste Treatment Centre (CWTC) is the reception facility for oily waste discharged from vessels.

1.3.2.9 Summary Offences Ordinance (Cap 228)

It contains provisions related to littering offences including marine littering.

1.3.3 Other Relevant Guidelines

The following guidelines related to waste management and disposal would be adhered to during construction of the Project:

- Waste Disposal Plan for Hong Kong (December 1989), Planning, Environment and Lands Branch Government Secretariat, HKSAR Government;
- Code of Practice on the Packaging, Labelling and storage of Chemical Wastes EPD (1992);
- Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste, EPD;
- Works Branch Technical Circular No. 12/2000, Fill Management, Works Bureau, HKSAR Government;
- Works Branch Technical Circular No. 19/2001, Metallic Site Hoardings and Signboards, Works Bureau, HKSAR Government;
- Works Branch Technical Circular No. 12/2002, Specifications Facilitating the Use of Recycled Aggregates, Works Bureau, HKSAR Government;
- Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002, Management of Dredged / Excavated Sediment, Environment, Transport and Works Bureau, HKSAR Government;
- Works Branch Technical Circular, 32/92, the Use of Tropical Hard Wood on Construction Site, Works Branch, Hong Kong Government;
- Works Branch Technical Circular No. 2/93, Public Dumps, Works Branch, Hong Kong Government;
- WBTC No. 2/93B - Public Filling Facilities, Works Branch, HKSAR Government;
- Works Branch Technical Circular No. 16/96, Wet Soil in Public Dumps, Works Branch, Hong Kong Government;
- Works Bureau Technical Circular NO. 4/98 and No.4/98A, Use of Public Fill in Reclamation and Earth Filling Projects, Works Bureau, HKSAR Government;
- Waste Reduction Framework Plan, 1998 to 2007, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- Works Bureau Technical Circular No. 25/99, 25/99A and 25/99C, Incorporation of Information on Construction and Demolition Material Management in Public Works Sub-committee Papers, Works Bureau, HKSAR Government;
- Environment, Transport and Works Bureau Technical Circular (Works) No. 19/2005, Environmental Management on Construction Sites, Environment, Transport and Works Bureau, HKSAR Government;

- Development Bureau (Works) Technical Circular No. 6/2010, Trip Ticket System for Disposal of Construction and Demolition Materials
- Development Bureau (Works) Technical Circular No. 8/2010, Enhanced Specification for Site Cleanliness and Tidiness;
- Development Bureau (Works) Technical Circular No.2/2011, Encouraging the Use of Recycled and other Green Materials in Public Works Projects
- Development Bureau (Works) Technical Circular No. 9/2011, Enhanced Control Measures for Management of Public Fill;
- Hong Kong Planning Standards and Guidelines Planning (2014), Planning Department, HKSAR Government;
- Project Administration Handbook for Civil Engineering Works, Section 3.3(i) of Chapter 2 and Section 4.13 of Chapter 4 - Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers, Hong Kong SAR Government;
- Project Administration Handbook for Civil Engineering Works, Section 4.1.3 of Chapter 4 - Management of Construction and Demolition Material Including Rock, HKSAR Government;
- Project Administration Handbook for Civil Engineering Works, Section 21.25 of Chapter 7 and Section 9.12 of Chapter 5 - Control of Site Crushers, HKSAR Government;
- PNAP ADV-19 Construction and Demolition Waste; and
- PNAP ADV-21 Management Framework for Disposal of Dredged/ Excavated Sediment.
- A Guide to the Registration of Chemical Waste Producers; and
- A Guide to the Chemical Waste Control Scheme.

1.3.4 Permits and Licenses

The Contractors will apply, register and maintain any appropriate permits and license required under the legislation for handling and disposal waste arising from the project, including but not limited to:

- Open a billing account to make arrangement for disposal of construction waste under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354);
- Register as Chemical Waste Producer under the Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C); and
- Obtain a Marine Dumping Permit under Dumping at Sea Ordinance.

1.4 Structure of the Waste Management Plan

The remainder of this WMP is set out as follows:

- **Section 2** presents the organization structure and the roles and responsibilities of different parties;
- **Section 3** describe the arrangements for avoidance, reuse, recovery and recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities and the recommended mitigation measures on waste management;
- **Section 4** describe the disposal arrangements and locations of the dredged marine sediments and construction and demolition materials arising from the construction of the Project; as well as the marine dumping permit system and trip ticket system;
- **Annex A** contains the implementation schedule summarising all waste management mitigation measures proposed in the approved EIA Report;

- **Annex B** contains the proforma for waste management; and
- **Annex C** contains the flow charts of the Trip Ticket System.

2. ORGANIZATION STRUCTURE

2.1 Overall Organizational Structure

HK Electric, together with the Environmental Team (ET) and the Independent Environmental Checker (IEC) of the Project will be responsible for overseeing and ensuring the WMP is effectively implemented by the Contractor(s) during their relevant construction works.

2.1.1 HK Electric

HK Electric is the project proponent for the Project and has overall responsibility to oversee and manage the Contractors' implementation of the WMP.

2.1.2 Environmental Team (ET)

The ET will be employed by HK Electric and shall not be in any way an associated body of the Contractor or the IEC for the Project. The ET is responsible to:

- undertake the duties defined in the Updated EM&A Manual and the FEP, review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- prepare the WMP with assistance from the Contractor(s);
- review the Contractors' equipment and work methodologies with respect to waste management and associated mitigation measures;
- liaise with the IEC on the waste management matters;
- review and report the implementation status of waste management mitigation measures from site inspections;
- provide advice to the Contractor(s) on waste management improvement, awareness and enhancement matters on-site; and
- adhere to the procedures for carrying out complaint investigation on waste management matters.

2.1.3 Independent Environmental Checker (IEC)

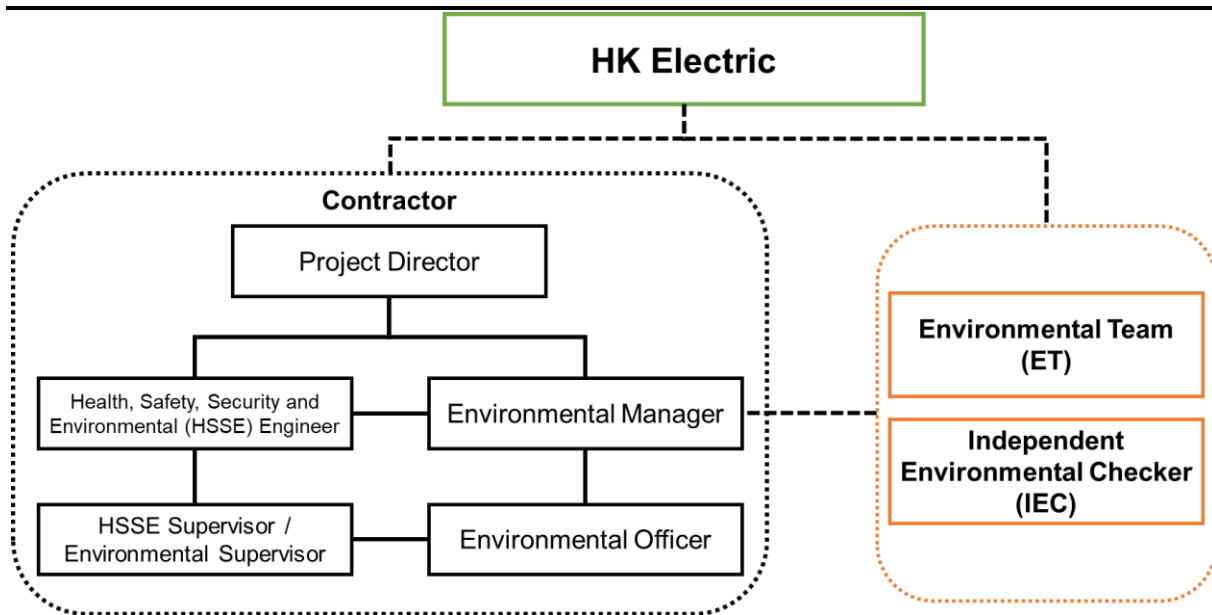
The IEC will be employed by HK Electric and shall not be in any way an associated body of the Contractor or the ET for the Project. The IEC is responsible to:

- undertake the duties defined in the Updated EM&A Manual and the FEP, review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- verify the WMP;
- review the effectiveness of waste management and environmental mitigation measures and project environmental performance including the proposed corrective measures;
- liaise with the ET on the waste management matters; and
- adhere to the procedures for carrying out complaint investigation on waste management matters.

2.2 Organizational Structure of the Contractor

The organization structure of the Contractor for waste management is outlined in **Figure 2.1**. This chart outlines the overall site management in relation to waste management and environmental issues. Details on the roles and responsibilities of staff responsible for implementation of the WMP are outlined below.

Figure 2.1 The Organisational Structure for Waste Management



Remark: Please refer to the Management Organization of the Project submitted under Condition 2.4 of the FEP (FEP-02/558/2018) for details of the names and contact details of the responsible persons.

2.3 Roles and Responsibilities of the Contractor

The Contractor has appointed the Environmental Manager as the senior staff member fully responsible for implementing the WMP, including the oversight of the Trip Ticket System operation. The General Foremen and Foremen are appointed to man each exit from the construction site for the purpose of ensuring that every truck / barge carrying C&D materials leaving the construction site bears a duly completed, signed and stamped CHIT ticket / Vessel CHIT respectively.

2.3.1 Project Director (Head Office)

The Project Director (Head Office) of the Contractor will:

- ensure that an effective Environmental Management System is established, implemented and maintained;
- report the overall environmental performance to the Managing Director or the management board;
- be the chairman of the Contractor's Environmental Management Committee;
- take the lead to promote environmental protection generally whenever opportunities arise both internally and externally; and
- ensure adequate resources are available for implementation, control and improvement of the Environmental Management System.

2.3.2 Environmental Manager

The Environmental Manager of the Contractor will:

- develop the site waste management system, site facilities and mitigation measures;
- advise to the senior management timely on waste management matters;
- supervise the waste management works of the environmental officer and his team;

- review and report the implementation status of waste management mitigation measures from site inspections;
- liaise with the ET, IEC and HK Electric on the waste management matters; and
- review the waste management mitigation measures included in method statements.

2.3.3 Environmental Officer

The Contractor shall assign a person with sufficient qualification as an Environmental Officer (EO). The duties of the EO shall, for the purpose of waste management of the Project, include but without limitation to the following:

- carry out inspections of the waste management works for which he is responsible, and to ensure that follow-up actions have been taken promptly against defects and deficiencies identified;
- advise on the upkeeping of waste management and standards of the construction site;
- attend the weekly environmental walk to review and report the implementation status of waste management mitigation measures;
- ensure the marine dumping vessels dispose the marine sediment in proper locations and keep record;
- conduct toolbox talks regarding site waste management; and
- attend Site Safety and Environmental Management Committee Meeting and the Site Safety and Environmental Committee Meeting.

2.3.4 Health, Safety, Security and Environmental (HSSE) Engineers

The HSSE Engineers have the following duties in relation to environmental control:

- monitor and control the waste management implementation status including those of sub-contractors to ensure compliance of both contractual and statutory requirements;
- report to the Project Manager and Construction Manager(s) regarding non-compliance of any waste management issues;
- ensure the remedial actions or mitigation measures are carried out as planned; and
- attend Site Safety and Environmental Committee Meeting.

2.3.5 Health, Safety, Security and Environmental (HSSE Supervisor) / Environmental Supervisor

The duties of the HSSE Supervisor / Environmental Supervisor shall, for the purpose of waste management under the Contract, include but without limitation to the followings:

- assist the EO carrying out his/her duties regarding to waste management;
- enable him / her to discharge his / her duties in the proper implementation of the WMP on the construction site;
- carry out inspections of the waste management implementation status for which he is responsible, and to ensure that follow-up actions have been taken promptly against defects and deficiencies identified;
- advise the EO on the upkeeping of waste management and standards of the construction site;
- attend the weekly environmental walk to review and report the implementation status of waste management mitigation measures;
- supervise and promote the execution of waste management on the construction site;

- conduct toolbox talk as assigned by the Environmental Manager / EO regarding site waste management;
- assist the EO to ensure marine sediment on the marine dumping vessels would be disposed at proper locations and keep record;
- assist to keep the records regarding the disposal of all C&D materials to the public filling areas and landfills, i.e. trip tickets and chits; and
- attend Site Safety and Environmental Management Committee Meeting and the Site Safety and Environmental Committee Meeting.

The HSSE Supervisor / Environmental Supervisor will also act as a ticket issuer who is responsible for issuing both “Disposal Delivery Form (DDF)” under trip ticket system and “CHIT” / “Vessel CHIT” under the Disposal Charging Scheme. He is responsible for checking the following items before issuing the tickets:

- The size of the inert C&D material is less than 250 mm;
- The proper sorting of the construction waste that no public fill is mixed with Construction and Demolition waste before disposal;
- No overloading of the dump truck; and
- Ensure the coverage of the cover of dump truck.

He has the authority not to issue the tickets if any one of the above list requirements is not complied and directly reported to Environmental Manager / EO.

2.3.6 Subcontractors

Subcontractors are responsible for the following duties in relation to environmental control:

- Implementing environmental control measures according to the WMP and instructions given by its staff;
- Submitting relevant environmental information to the main contractor where required, such as reports, method statements and environmental related records such as CHIT record, etc.
- To ensure their activities are carried out in an environmental control manner and complied with both contractual and legal requirements;
- Supervising their workers to observe environmental rules and regulations,
- To arrange and release workers to attend environmental training where appropriate; and
- Reporting environmental related accidents, incidents, emergency situations to main contractor’s staff promptly.

2.3.7 Other staff / Workers

- Co-operating with his / her proprietor and environmental personnel and supervisor, to enable them to comply with or to perform duties and responsibilities for environmental protection at work; and
- Observe environmental rules and regulations.

3. CATEGORY OF WASTE MATERIALS AND MEASURES ON WASTE MANAGEMENT

3.1 Expected Sources of Waste Generation

During the construction phase of the Project, the main activities include subsea pipeline construction, including marine dredging and jetting, and onshore pipework fabrication. These activities will potentially result in the generation of wastes. The typical waste types associated with these activities include:

- Dredged marine sediment from the construction of the LPS Pipeline;
- C&D materials from the construction of the GRS at the LPS, and onshore pipeline trenching and pipework fabrication;
- Chemical waste, such as used cleansing chemicals, lubricants, fuel waste, spent reagent etc, from maintenance of construction plant and equipment for both land and marine-based works; and
- General refuse from land and marine-based construction workforce, such as food scraps, aluminium cans, PET bottles and waste paper, and floating refuse.

Mitigation measures, where appropriate, have been recommended as part of the EIA to avoid or reduce potential adverse environmental impacts associated with handling, collection, transport and disposal of waste arising from the construction of the proposed Project. The details are summarised in **Annex A**.

3.2 Waste Management Hierarchy

The various waste management options are categorised in terms of preference from an environmental viewpoint. The options considered to be most preferable have the least environmental impacts and are more sustainable in the long term. The hierarchy is as follows:

- Avoidance and reduction - avoid and minimize waste through careful planning and design works;
- Re-use of materials - reuse construction waste such as excavated material, used wooden plants and ferric materials;
- Recovery and recycling - undertake on-site or off-site waste recycling; and
- Storage, collection, treatment and disposal - properly store, collect, treat and dispose of waste in accordance with legislative requirements, guidelines and good practices.

In the context of waste reduction, environmentally responsible purchasing would involve the introduction of practices that discourage unnecessary purchases and encourage the purchase of products with reduced packaging, increased durability and materials with high recycled content, such as, recycled paper, steel and other raw construction materials.

Waste minimisation is best achieved through careful planning, design and supervision. Good management practices would reduce and prevent large amount of waste generated. Raw materials would be managed from the first instance before they are ordered and delivered to the site. Good estimation and planning would minimize the amount of raw materials wasted. The generation of waste would be controlled at source.

3.3 Waste Management Options

Waste management options will be exercised by the Contractor according to the hierarchy described below:

- Pre-identification between reusable and recyclable materials by producing a list of works activities that will generate C&D materials;

- Avoidance and reduction - to minimise waste generation through careful planning and design works; good site management to minimise over ordering and avoid wastage;
- Contamination with collected reusable materials;
- Reuse of materials - to reuse inert C&D material, timber material and metal on-site;
- Recovery and recycling - to undertake on-site or off-site waste recycling by encourage collection of aluminium cans, PET bottles and paper generated by the workforce of the Contract; separate labelled bins will be provided and located on site wherever possible; and
- Treatment and disposal - to properly treat or dispose of waste materials in accordance with legislative requirements, guidelines and good practices.

3.4 Measures of Good Site Management

Recommendations for good site practices to facilitate the waste management hierarchy as described in the section above during the construction phase and all other office related works include, but not limited to:

- Nomination of an approved person, such as a superintendent, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;
- Training of site personnel in proper waste management and chemical handling procedures;
- Regular collection of on-site waste will be implemented, with provision of sufficient waste disposal points and containers to avoid overflow of waste materials;
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. Excess materials will be cleaned from the decks and exposed fittings of the marine vessels;
- Optimising the use of metal materials required in the work process and maximising the reuse of inert C&D materials within the construction site.
- Ensure any chemicals utilised on the marine vessels are not deposited into surrounding water;
- All water and other liquid waste products arising on site will 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 not cause either pollution or nuisance;
- Provide adequate precautions to ensure that no materials of any kind is allowed to be pushed, washed down, fall or deposited onto nearby marine waters; and
- Prohibit any burning of debris and other construction waste within construction areas.

Specific measures will be implemented to reduce the generation of waste materials, and thus minimise the amount of waste disposal to landfills. The measures will include:

- Sorting on site to recover the inert portion of C&D materials;
- Sorting of plastic waste and deliver to recycling company;
- Recover all metallic waste for recycling;
- Recover all cardboard and paper packaging, and properly stockpile them in dry and covered condition to prevent cross contamination;
- Use of the materials (such as formworks and hoardings) in the construction would be calculated before purchasing in order to minimize waste generation; and
- Use of metal formworks and hoardings, and they would be recycled after demolition on site as far as it can before disposal.

3.5 Waste Reduction Measures

To prevent over-generation of construction waste, the Contractor will implement the following waste reduction measures step by step according to their specific waste type:

3.5.1 C&D Materials

- Regular review with HK Electric during the construction phase to assess the amount of waste that is likely to be generated;
- Each delivery of construction materials will be identified and kept separately to avoid over ordering;
- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; and
- Proper storage and site practices to minimise the potential damage or contamination of construction materials and equipment.

3.5.2 Chemical Waste

- Order and deliver appropriate quantity of chemicals to avoid unnecessary storage of excess chemicals;
- Avoiding unplanned wastage of chemicals by cautiously utilising the chemicals in accordance with the manufacturer's instructions;
- Determine the chemicals' expiry date to maximise its usage; and
- Any unused chemicals, and those with remaining functional capacity, shall be recycled as far as possible.

3.5.3 General Refuse

- Reduce generation of printing paper through electronic documentation;
- Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the work force; and
- Burning of refuse within site boundary is prohibited by law and will not be undertaken.

3.5.4 Dredged Marine Sediment

- Review the need for dredging of marine sediments for the pipeline construction works;
- Adopt alternative non-dredged methods, such as jetting, where practicable; and
- Consider off-site treatment and beneficial reuse of marine sediment where practicable.

3.6 Reuse and Recycling

All C&D materials arising from or in connection with the construction of the Project will be sorted on the site to recover reusable and/or recyclable materials. The Contractor will implement appropriate action to these materials according to their categories.

3.6.1 Inert C&D materials

Reuse and recycling could divert any C&D material from waste stream back to the construction cycle. The Waste Flow Table as shown in **Annex B** will be maintained and updated regularly to keep track of the recycling progress.

3.6.2 Non-Inert C&D material

Ensure consumable accessories and equipment in the office, namely toner cartridge, fluorescent tube and batteries, will be stored and recycled after their contents were exhausted. Office paper will also be reused as much as possible before considering recycling. Aluminium cans and PET bottles will be collected and recycled using separate labelled bins.

3.7 Material Control and Maintenance

Mis-ordering construction materials, together with poor storage and maintenance of raw materials could result in their deterioration and damages. To avoid accumulation, the right amount of raw materials will be ordered at the right time with proper control and documentation on material flow. Any surplus materials will be returned to stock in centralised area with suitable protective measures.

3.8 Waste Target Summary

The targets set for the Contractor during construction phase will cover, but not limited to, the followings:

- Producing a list of work processes or activities that will generate C&D materials for general waste management;
- All surplus wastes are to be sorted to recover any inert portion of C&D materials;
- All metallic waste to be recovered for collection by recycling contractors;
- Glass and plastic bottles will be recovered for collection where practicable;
- All cardboard and paper packaging will be recovered on site, properly stockpiled in dry condition and covered to prevent cross-contamination by other C&D materials and will be collected by recycling contractors;
- All chemical wastes to be collected and properly disposed of by specialist contractors; and
- All inert materials will be sorted to recover for reuse on site or disposal to designated outlets.

3.9 Waste Management Records

The Contractor is responsible for keeping waste management records on site. These records include, but not limited to, the following:

- Relevant licences and permits, including dumping licences and registration as chemical waste producer;
- Records of quantities of waste generated, recycled and disposed of (including the selected disposal sites);
- Records for dredged marine sediments;
- Records for trip tickets and documentation for collection and tipping of waste and waste removal;
- Disposal recording system of vehicular trip of transporting C&D materials and its mechanism for collection of returned form together with recipe from public filling areas or landfill site;
- Method for estimation of load for inert C&D materials, metals, papers / cardboard or other C&D wastes;
- The receipt for recycling of inert C&D material, paper / cardboard and metal; and
- Keeping the attendance record of each waste management training session.

The Construction and Demolition Material Disposal Delivery Form (DDF) will be used for each and every vehicular trip transporting C&D materials off site. Prior to the vehicle leaving the site, HK Electric's Representative will insert the date, time of departure, vehicle licence plate number,

designated public filling facility / landfill, and other information as required, and stamp the form. HK Electric's Representative will then retain the first strip of the form and pass the rest to Contractor's Representative. The form will be carried on board the vehicle at all times throughout the vehicular trip.

A comprehensive register of the DDF issued will be maintained and available for inspection by HK Electric's Representative upon request. The following records will be kept for monitoring of the DDF issued. Daily Record Summary (DRS) and the Waste Flow Table (WFT) (see **Annex B** for the proforma) should be completed and submitted to HK Electric's Representative for record.

3.9.1 Waste Flow Table (WFT)

Record of the quantities of C&D materials generated each month will be maintained using the monthly summary WFT. The Contractor will complete and submit the monthly summary of WFT to HK Electric by not later than the 7th day of each month following the reporting month, or if it is a General Holiday, the day following the General Holiday, or a later date as agreed by HK Electric. The WFT shall also be made available to ET and IEC.

Specific trip ticket and records for internal transfer of C&D materials and imported fill materials will also be kept for monitoring whatever necessary.

For recyclable materials, Contractor's Representative will record the quantities of all the recyclable materials before removal off the construction site by the recycling contractors, and include the details in the WFT for submission to HK Electric's Representative.

For disposal of marine sediment, Monthly Dumping Report as attached in the Dumping Permit shall be filled in to record the quantity of marine sediment disposal.

In order to ensure proper disposal of C&D materials, enhancement measures to further improve the Trip Ticket System recording system, a video recording system shall be installed and disposal shall be checked against survey record. Such video recording system used to monitor the vehicular exit / entrance of the site and pier area of the site.

3.10 Training for Waste Management

The Contractor will provide training on waste management in the site-specific environmental training and its refresher training for all Contractor staff and the sub-contractors. The training will cover the waste management procedures and targets as described in this WMP.

Toolbox talks for the topic on on-site sorting of C&D materials will be organized by the Contractor to promote awareness on handling, sorting, reuse and recycling of C&D to all levels of staff along with subcontractors.

3.11 Waste Monitoring and Audit

The Contractor will be responsible for all waste management activities during the construction phase of the Project. The Contractor must ensure that all wastes produced during the construction phase are handled, stored and disposed of in accordance with EPD's regulations and requirements and in line with good waste management practices.

The Contractor should perform regular site inspection (at least once per week) to determine if wastes are being managed in accordance with approved procedures. Waste materials generated during the construction works, such as inert C&D material, general refuse and chemical wastes, are recommended to be monitored on a weekly basis to ensure that proper storage, transportation, reuse, recycling and disposal practices are being implemented. This monitoring of waste management practices will ensure that these solid and liquid wastes are not disposed into the nearby waters. The Contractor should be responsible for the implementation of all mitigation measures to minimise waste or address problems arising from the waste materials.

In addition, the ET will carry out weekly site inspections in accordance with the Updated EM&A Manual of the Project with reference to the checklist detailed in **Table 3.1** below. The ET will identify any non-compliance with the Updated EM&A Manual and the WMP, and will report them accordingly. The results of the waste management audits would be reported in the monthly EM&A reports.

Table 3.1 Waste Management Checklist

Activities	Timing	Checking Frequency	If non-compliance noted, Action Required
Necessary waste disposal permits or licences have been obtained.	Before the commencement of works	Once	The ET will inform the Contractor(s), IEC and Project Proponent. The Contractor(s) will apply for the necessary permits/ licences prior to disposal of the waste. The ET will verify that corrective action has been taken.
Dredged sediments are managed and disposed in accordance with PNAP ADV-21: Management Framework for Disposal of Dredged/ Excavated Sediment and Dumping at Sea Ordinance (DASO).	Throughout the dredging works	Each Month	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to manage and dispose the dredged materials properly. The Contractor(s) will immediately suspend dredging until the dredging materials are properly managed and disposed.
Waste are collected by licensed waste hauliers and disposed of at licensed sites.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to comply. The Contractor(s) will temporarily suspend waste collection of that particular waste until a licensed waste haulier is used. Corrective action will be undertaken within 48 hours.
Records of quantities of wastes generated, recycled and disposed of and the disposal sites are properly kept.	Throughout the works	Each Month	The ET will inform the Contractor(s), IEC and Project Proponent. The Contractor(s) will estimate the missing data based on previous records and the activities carried out. The ET will review the results and forward to Project Proponent for approval.
Sufficient waste disposal points are provided. Wastes are collected and removed from site in a timely manner. General refuse is collected on a regular basis.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance. Appropriate measures to reduce windblown litter and dust nuisance of waste will be adopted, e.g. by either covering trucks or by transporting wastes in enclosed containers.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to clean the storage area and/or cover the waste.

Activities	Timing	Checking Frequency	If non-compliance noted, Action Required
Different types of waste are segregated in different containers or skip to enhance reuse and recycling of material and proper disposal of waste.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to provide separate skips/ containers. The Contractor(s) will verify that the workers place the waste in the appropriate containers.
Chemical wastes are stored, handled and disposed of in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> , published by the EPD. Chemical wastes are separated for special handling and appropriate treatment at the Chemical Waste Treatment Centre at Tsing Yi.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and Project Proponent. Project Proponent will instruct the Contractor(s) to rectify the issues immediately. Warning will be given to the Contractor(s) if corrective actions are not taken within 24 hrs.

Note: ET – Environmental Team, IEC – Independent Environmental Checker

4. DISPOSAL ARRANGEMENT, LOCATION AND PROCEDURES

4.1 Estimated Quantities of C&D Materials & Other Wastes

The following types of waste would be generated from the construction works and they are summarised in **Table 4.1**:

- Inert and non-inert C&D materials;
- Marine sediments;
- Chemical waste; and
- General refuse, including recyclable wastes (paper, plastic and metal).

Table 4.1 Summary of Estimated Waste Arising and Recommended Waste Management Arrangements

Types of Waste	Approximate Quantity	Disposal Locations
C&D materials	<ul style="list-style-type: none"> ▪ Total: 15,000m³ ▪ Inert: 13,500m³ ▪ Non-inert: 1,500m³ 	<ul style="list-style-type: none"> ▪ Inert C&D materials: Public fill reception facilities directly or Outlying Island Transfer Facilities ▪ Non-inert C&D materials: WENT or NENT Landfill directly or via Outlying Island Transfer Facilities
Chemical waste	<ul style="list-style-type: none"> ▪ Few hundred litres per month 	<ul style="list-style-type: none"> ▪ CWTC or other licensed chemical waste treatment facilities
General refuse, including floating refuse	<ul style="list-style-type: none"> ▪ ~130kg per day 	<ul style="list-style-type: none"> ▪ Recyclable materials: on-site sorting and off-site recycling ▪ Non-recyclable refuse: WENT or NENT Landfill directly or via Outlying Island Transfer Facilities
Marine sediments (Note 1)	<ul style="list-style-type: none"> ▪ Category L sediment: 5,700m³ 	<ul style="list-style-type: none"> ▪ Category L sediment - to be disposed of at open sea disposal site managed by the CEDD ▪ HK Electric will implement the project in accordance with the DASO and the requirements as stipulated in PNAP ADV-21, prior to the application and allocation of space for dredging and disposal of sediment arising from the Project

Note 1: After further review during detailed design, marine dredging will not be required for alternative shore approach of the LPS Pipeline. In view of cost-effectiveness and relatively small amounts of Category L sediments to be generated from the Project, off-site treatment and beneficial reuse for the Project are considered not practicable.

The quantities of disposed C&D materials will be recorded under the barcode trip ticket system by using the "C&D Material Disposal Delivery Form". In addition, the filled "CHIT" / Vessel "CHIT" will also be presented to the landfill / public fill site as part of the system for the disposal charging scheme which had already been officially effective in January 2006. Waste transaction records could be obtained either in the waste disposal facilities right after the transaction or retrieved from the EPD bill statement each month.

4.2 Acceptance Criteria for the Government Disposal Facilities

Inert C&D materials shall dispose to Fill Banks (e.g. Tuen Mun Area 38, TKO Area 137 etc). Mixing of non-inert C&D materials with inert C&D materials will result in rejection for disposal of C&D materials at Fill Banks.

For non-inert C&D materials, the designated disposal facility is depended on the waste depth / weight ratio of the vehicle to transport the non-inert C&D materials off site. The summary of waste acceptance criteria for landfill and sorting facilities for non-inert C&D materials is provided in **Table 4.2** below.

Table 4.2 Waste Acceptance Criteria for Landfill and Sorting Facilities for Non-inert C&D Materials

Vehicle Type	Waste Depth	Weight Ratio (Note 1)	Designated Facility
Non-demountable Vehicle	Over 1.5m	No restriction	Landfill
	1.5m or below	0.20 or below	
		Over 0.20	Sorting Facility
Demountable Vehicle	Over 1m	No restriction	Landfill
		0.25 or below	
		1m or below	Over 0.25

Note 1: Weight ratio = The net weight of C&D materials / Permitted Gross Vehicle Weight

The Contractor will comply with the acceptance criteria laid down by the operators of the corresponding fill bank(s) and landfill(s), as outlined below:

4.2.1 Acceptance Criteria for Fill Banks (Tuen Mun Area 38 Fill Bank or Tseung Kwan O Area 137 Fill Bank)

- The truck driver should bear a duly completed, signed and stamped DDF and a duly signed CHIT;
- The dump truck should also have a valid Dumping License issued by CEDD, dump trucks without Dumping Licenses will be rejected;
- The inert C&D materials to be delivered to the fill bank(s) should be in accordance with the conditions stipulated in the Dumping License;
- Any over-sized inert C&D materials should be broken down to less than 250mm in size so as to facilitate its reuse by other reclamation or earth-filling projects;
- The C&D materials to be disposed should consist entirely of inert construction waste (i.e. 100% inert construction waste); and
- The bituminous material is required to be separated from other inert construction and demolition (C&D) materials for disposal prior to delivery to the Public Fill Reception Facility (PFRF).

4.2.2 Acceptance Criteria for WENT Landfill (West New Territories Landfill) and NENT Landfill (North East New Territories)

- The truck driver should bear a duly completed, signed and stamped DDF and a duly signed CHIT;

- The dump truck should also have a valid Dumping License issued by CEDD, dump trucks without Dumping Licenses will be rejected;
- The non-inert C&D waste to be delivered to the landfills should be in accordance with the conditions stipulated in the Dumping License;
- Construction waste containing not more than 50% by weight of inert C&D waste (Gazette Notice G.N. 4272 published on 27 June 2008);
- For a load of C&D waste not consisting entirely of bamboo, plywood or timber delivered by a vehicle, the weight of the waste divided by the permitted gross vehicle weight of the vehicle must not greater than 0.25 for goods vehicle with demountable skip and 0.2 for other types of vehicle (Gazette Notice G.N. 4272 published on 27 June 2008);
- Mixed C&D materials should be sorted at source to reduce the inert content as far as practicable to meet the above criteria before they are delivered to landfills;
- C&D waste delivered for landfill disposal should contain no free water and the liquid content will not exceed 70% by weight; and
- At least one week's notice, including contractors name and contact details etc, will be submitted to the EPD before starting to deliver the C&D waste to the landfills. EPD will be informed of any subsequent change to the disposal programme.

4.3 Procedures of the Trip Ticket System

A reputable waste collector will be identified first and employed to remove and transport the stored waste from the site area. Before the commencement of the construction phase, the Contractor will open a billing account for the Hong Kong Offshore LNG Terminal Project with EPD in accordance with the Waste Disposal (Charges for Disposal of Construction Waste) Regulation for the payment of disposal charges to facilitate C&D waste transaction recording and billing to prevent any illegal waste dumping. Disposal destinations will first be approved by HK Electric before proceeding. The flow charts of the Trip Ticket System for disposal of C&D materials by barges and dump trucks are provided in **Annex C**. The general steps of the C&D waste transportation are provided below:

- For each load of C&D materials leaving the construction site, the Contractor's transportation personnel must bear a duly completed and signed CHIT form. Their respective usage are described as follows.
 - The CHIT should be used for off-site delivery of C&D material to prescribed facility as defined under Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N), such as the West New Territories Landfill (WENT).
- The Contractor will also sign Part 1 of the Daily Record Summary (DRS) before departure of the trucks / barges.
- C&D waste will be transferred from the construction barge to landside by derrick lighter, transporting vessels or waste collection barges. Then, dump truck or grab trucks will be used to transfer the C&D waste to landfill or other waste disposal facilities.
- The truck driver or barge operator will proceed to the disposal facilities as specified in the CHIT or DDF. The CHIT / DDF will be presented by the truck driver / barge operator at the facility entrance gate before proceeded with the disposal operation.
- Disposal of the C&D materials will be permitted if the materials accords the criteria in Cap. 354N. The disposal facility operator will provide the truck driver / barge operator a transaction record slip and a stamped CHIT / DDF for record.
- For disposal at a prescribed facility, the Contractor will check the information recorded in the DRS and check the site record against data from EPD's website [<http://www.epd.gov.hk/epd/misc/cdm/scheme.htm#>].

- The Contractor will submit the completed Part 1 and Part 2 of the DRS form to HK Electric within 1 working day for prescribed facility and within 3 working days for other disposal ground after the records have been finalized.

The Contractor will maintain a daily record of C&D materials disposal from the site including CHIT / DDF numbers, vehicle registration marks, driver's particulars, approximate volume, C&D materials type, designated disposal ground, departure time from the site, actual disposal ground and arrival time at disposal ground.

In the case that an irregularity is observed from the disposal records provided by the Contractor, supporting evidence such as the duly stamped CHIT / DDF will be submitted to HK Electric to confirm the procedure of the delivery trips in question.

All the waste transportations truck will be checked by the Contractor for valid Dumping Licences and were fitted with a mechanical cover before leaving the site area.

4.4 Measures to be Implemented during Transportation of Wastes

The following measures will be implemented during transportation of wastes to avoid leakage on public areas:

- All of the dump trucks used would be equipped with mechanical covers in which maintained in a good condition.
- In order to minimize the leaking of material from the dump trucks, no material should be stored higher than the trail board.
- Deposited silt and wastes on all dump trucks' wheels and bodies should be properly washed off by wheel washing facilities before leaving the constructions sites.
- The Contractor will provide wheel washing facilities on site at the site entrance.

4.5 Disposal of C&D Materials to Alternative Disposal Ground(s)

Where the Contractor has identified a project that can be an alternative disposal ground, the Contractor shall strictly comply with the procedures as stipulated in the Development Bureau Technical Circular (Works) No. 6/2010 "Trip Ticket System for Disposal of Construction and Demolition Materials" (DEVB TC(W) No.6/2010). According to the DEVB TC(W) No.6/2010, the Contractor will provide a detailed description of the alternative disposal ground, including location, lot number (where appropriate), location plan(s) and photographs of the proposed disposal ground for HK Electric to request for written approval.

Where the alternative disposal ground is a private construction site, the Contractor will submit a letter from the Authorized Person of the development (as defined under the Building Ordinance) to confirm that:

- The C&D materials for use in the development is acceptable;
- The use of land so formed by the C&D materials is in conformity with the statutory town plan / lease conditions;
- HK Electric's Representative are allowed to enter the alternative ground to conduct inspection where necessary; and
- The estimated quantity and type of C&D materials to be used in the construction works and the approximate delivery programme, together with the name, post and specimen signature of the competent person to sign the DDF / internal trip ticket stipulated in G.S. Clause 25.25(6)(a)(ii).

Where the alternative disposal ground is a private recycling facility but not a construction site, the Contractor will submit a letter from the relevant authorities, such as the Lands Department and the

Planning Department, to confirm that the suitability of the alternative disposal ground in receiving the proposed amount of C&D materials for use, and a written consent from the landowner.

Where the alternative disposal ground is a government project, the Contractor will submit written consent from the project office of the alternative disposal ground to use the C&D materials generated from the construction site, and to confirm the estimated quantity and type of C&D materials required and the approximate delivery programme.

A system for transmitting disposal records from the alternative disposal ground will be submitted to HK Electric's Representative for approval before disposal to the alternative ground starts.

4.6 Chemical Waste / Hazardous Waste Handling and Disposal

4.6.1 Chemical Waste Handling and Disposal

Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, will be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes as follows:

4.6.1.1 Packaging

Chemical waste will be packed and held in containers of suitable design and construction so as to prevent leakage, spillage or escape of the contents under normal conditions of handling, storage and transport.

Containers used for the storage of chemical wastes will:

- Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;
- Have a capacity of less than 450 litres unless the specifications have been approved by the EPD; and
- Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.

4.6.1.2 Labelling

Every container of chemical waste will bear an appropriate label which will contain the particulars details. The waste producer will ensure that the information contained on the label is accurate and sufficient so as to enable proper and safe handling, storage and transport of the chemical waste.

4.6.1.3 Storage

The storage area, with height less than 2m, will be specially constructed and bunded, and located close to the source of waste generation.

The storage area for chemical wastes will:

- Be clearly labelled and used solely for the storage of chemical waste;
- Be enclosed on at least 3 sides;
- Have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste stored in that area, whichever is the greatest;
- Have adequate ventilation;
- Be covered to prevent rainfall entering (water collected with the bund must be tested and disposed of as chemical waste); and

- Be arranged so that incompatible materials are adequately separated.

Before reaching 80% capacity of the storage container, licensed waste collectors will be employed to remove the chemical waste.

4.6.1.4 Transportation and Disposal

After the chemical wastes have been packed, labelled, and stored, the chemical wastes will be transported by licensed waste collectors and disposed of at Chemical Waste Treatment Facility in Tsing Yi.

4.7 General Refuse

4.7.1 Handling the General Refuse

Measures to be implemented to encourage waste avoidance / minimization include:

- Reducing the number of photocopies to a minimum and by copying on both sides of paper for internal documents and external documents where appropriate;
- Preventing over-ordering of office equipment and consumables;
- Procuring green office equipment and consumables in terms of energy efficiency, recycled content and durability, etc.;
- Deploying sufficient recycling bins in site offices, working vessels and barges to facilitate collection of recyclables including wasted aluminium cans, plastics bottles and papers;
- Deploying sufficient collection bins with cover at convenient locations at site to facilitate collection of non-recyclable for disposal at landfills; and
- General refuse generated from working vessels and barges can dispose the waste to the Outlying Island Transfer Facilities by barge/marine vessel on a regular basis.

Other general refuse that cannot be reused on-site will be transported to the shore and disposed of at WENT or NENT landfill or other alternative landfill sites as agreed with HK Electric. Floating refuse, together with any contained general refuse, will be collected by reputable licensed waste collector for disposal at WENT land fill by dump trucks.

4.7.2 Handling of Recyclables

Before starting the transportation of recyclable materials off site to recycling facilities, the Contractor will meet with recycling contractors to establish a suitable system for collecting recyclable materials with care. The collection frequency will depend on the actual generation rate of recyclable materials.

4.8 Dredged Marine Sediments

Off-site treatment and beneficial reuse for the Project have been considered not practicable as discussed in *Table 4.1*. With reference to the Sediment Quality Report of the Project which has been prepared under PNAP ADV-21 and DASO, about 5,700 m³ Cat L marine sediments generated from the LPS Pipeline would need to be disposed off-site to Type 1 Open Sea Disposal Site Managed by CEDD. A marine dumping permit under DASO from the Director of Environmental Protection (DEP) is required for the disposal of marine sediments. The Contractor(s) will obtain marine dumping permit under DASO prior to dredging works of the Project. During disposal, the marine sediments should be loaded onto barges, transported to and disposed of at the designated disposal sites to be allocated by the Marine Fill Committee (MFC) depending on the level of contamination or at other disposal sites after consultation with the MFC and EPD.

4.8.1 Disposal of Sediment

The marine sediments should be dredged, loaded onto barges and transported with great care, and the following mitigation measures as recommended in the EIA should be strictly followed to minimize impact on water quality during transportation of the sediments requiring Type 1 disposal:

- Bottom opening of barges should be fitted with tight fitting seals to prevent leakage of material;
- Silt curtains surrounding the closed grab dredger should be deployed as a precautionary measure;
- When the dredged material has been unloaded at the disposal areas, any material that has accumulated on the deck or other exposed parts of the vessel will be removed and placed in the hold or a hopper. Under no circumstances will decks be washed clean in a way that permits material to be released overboard.
- Dredgers will maintain adequate clearance between vessels and the seabed at all states of the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.
- Hopper barge shall be equipped with Front End Mobile Unit to monitor the real time loading and location;
- Hopper barge should not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation;
- Excess materials should be cleaned from the decks and exposed fittings of hopper barges and dredgers before the vessels are moved; and
- Fill in the Monthly Dumping Report as attached in the Dumping Permit to record the quantity of marine sediment disposal.

ANNEX A

MITIGATION MEASURES FOR WASTE MANAGEMENT

TABLE A.1 RECOMMENDED MITIGATION MEASURES FOR WASTE MANAGEMENT

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
Waste Management								
S8.5	S6.2	The contractor(s) will nominate approved personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	S6.2	Good waste management practices should be implemented: <ul style="list-style-type: none"> • Training of site personnel in proper waste management and chemical handling procedures; • Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Centre; • Encourage collection of aluminium cans and waste paper by individual collectors during construction with separate labelled bins provided to segregate these wastes from other general refuse by the workforce; • Any unused chemicals, and those with remaining functional capacity, be recycled as far as possible; • Prior to disposal of C&D materials, wood, 	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-

⁽¹⁾ D = Design Phase, C = Construction Phase, O = Operational Phase

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
		<p>steel and other metals will be separated, to the extent practical for re-use and/or recycling to reduce the quantity of waste to be disposed in a landfill;</p> <ul style="list-style-type: none"> • Proper storage and site practices to reduce the potential for damage or contamination of construction materials; and • Plan and stock construction materials carefully to reduce amount of waste generated and avoid unnecessary generation of waste. 						
S8.5	Table 6.1	The contractor(s) must provide sufficient waste disposal points. Wastes will be collected and removed from site in a timely manner.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	Table 6.1	The contractor(s) will have appropriate measures to reduce windblown/ floating litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	Table 6.1	The contractor(s) will take and keep records of quantities of wastes generated, recycled and disposed of and the disposal sites.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	Table 6.1	The contractor(s) must segregate and store different types of waste in different containers, skips or stockpiles to enhance reuse and recycling of material and proper disposal of waste.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	S6.2	The contractor(s) will use reusable non-timber formwork to reduce the amount of C&D materials.	All areas/ During construction	Contractor(s)		✓		-
S8.5	Table 6.1	The contractor(s) must ensure that all the necessary waste disposal and marine dumping permits or licences are obtained prior to the commencement of the construction works.	During construction	Contractor(s)		✓		-
S8.5	S6.2	The contractor will open a billing account with EPD in accordance with the <i>Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i> for the payment of disposal charges.	During construction	Contractor(s)		✓		<i>Cap 354N Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i>
S8.5	S6.2	A trip-ticket system will be established in accordance with <i>DEVB TC(W) No. 6/2010</i> to monitor the reuse of surplus excavated materials off-site and disposal of construction waste and general refuse at transfer facilities/ landfills, and to control fly-tipping.	During construction	Contractor(s)		✓		<i>DEVB TC(W) No. 6/2010, Trip Ticket System for Disposal of Construction & Demolition Materials</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	S6.2	A WMP as stated in the <i>PNAP ADV-19</i> for the amount of waste generated, recycled and disposed of (including the disposal sites) will be established and implemented during the construction phase as part of the Environmental Management Plan (EMP). The Contractor will be required to prepare the EMP and submits it to the Architect/ Engineer under the Contract for approval prior to implementation.	All areas/ During construction	Contractor(s)		✓		<i>PNAP ADV-19</i>
S8.5	Table 6.1	The management of dredged marine sediment requirement from <i>PNAP ADV-21</i> will be incorporated in the Contract for the construction and maintenance dredging during the operation of the Project.	Marine works/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>PNAP ADV-21 and Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	Disposal vessels will be fitted with tight bottom seals in order to prevent leakage of material during transport.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓		<i>Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	Barges will be filled to a level, which ensures that of marine sediment and marine sediment laden water does not spill over during loading or transport to the disposal site and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓		<i>Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	After dredging, any excess materials will be cleaned from decks and exposed fittings before the vessel is moved from the dredging area.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓		<i>Dumping at Sea Ordinance (DASO)</i>

HONG KONG OFFSHORE LNG TERMINAL - WORKS ASSOCIATED WITH
THE SUBSEA GAS PIPELINE FOR LAMMA POWER STATION (LPS) AND
THE ASSOCIATED GAS RECEIVING STATION (GRS) IN LPS

Waste Management Plan

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5/ S7.9	S6.2 / S5	When the dredged material has been unloaded at the disposal areas, any material that has accumulated on the deck or other exposed parts of the vessel will be removed and placed in the hold or a hopper. Under no circumstances will decks be washed clean in a way that permits material to be released overboard.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓		
S8.5	S6.2	Dredgers will maintain adequate clearance between vessels and the seabed at all states of the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓		
S8.5	Table 6.1	C&D materials will be segregated on-site into public fill and non-inert C&D materials and stored in different containers or skips to facilitate reuse of the public fill and proper disposal of the construction waste. Specific areas of the land and marine-based construction sites will be designated for such segregation and storage if immediate use is not practicable. Prefabrication will be adopted as far as practicable to reduce the construction waste arising.	During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	Table 6.1	The contractor(s) will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> .	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>
S8.5	Table 6.1	Containers used for storage of chemical wastes will: <ul style="list-style-type: none"> • Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; • Have a capacity of less than 450 L unless the specifications have been approved by the EPD; and • Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations. 	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	Table 6.1	<p>The storage area for chemical wastes will:</p> <ul style="list-style-type: none"> Be clearly labelled and used solely for the storage of chemical waste; Be enclosed on at least 3 sides; Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; Have adequate ventilation; Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and Be arranged so that incompatible materials are appropriately separated. 	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>
S8.5	Table 6.1	<p>Chemical waste will be disposed of:</p> <ul style="list-style-type: none"> Via a licensed waste collector; and To a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers. 	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	Table 6.1	General refuse (including the floating refuse collected) will be stored in enclosed bins separately from C&D materials and chemical wastes. Floating refuse will be collected on an 'as needed' basis for disposal as general refuse. Workers will be prohibited from throwing rubbish into the sea and adequate bins will be provided on both land and marine-based sites and marine vessels. General refuse will be delivered separately from C&D materials and chemical wastes for offsite disposal on a regular basis to reduce odour, pest and litter impacts. General refuse from the marine vessels will be collected and disposed on shore.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	Table 6.1	Recycling bins will be provided at strategic locations within the land and marine-based construction site and marine vessels to facilitate recovery of recyclable materials (including aluminium can, waste paper, glass bottles and plastic bottles) from the Project Site. Materials recovered will be sold for recycling.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	S6.2	To avoid any odour and litter impact, appropriate number of portable toilets will be provided for workers on-site.	All areas/ During construction	Contractor(s)		✓		-

HONG KONG OFFSHORE LNG TERMINAL - WORKS ASSOCIATED WITH
THE SUBSEA GAS PIPELINE FOR LAMMA POWER STATION (LPS) AND
THE ASSOCIATED GAS RECEIVING STATION (GRS) IN LPS

Waste Management Plan

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ¹			Relevant Legislation & Guidelines
					D	C	O	
S8.5	S6.2	At the commencement of the construction works and operations, training will be provided to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling. In particular, the training will emphasize no dumping of waste into the sea is allowed, particularly at marine-based work sites and on marine vessels.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	S6.2	Industrial waste arising from maintenance activities will be segregated. Scrap metals and recyclables will be sent for recycling to reduce the overall quantity of waste disposed from these activities.	All areas / During operation	Project Proponent			✓	-
S8.7	S6.1	It is recommended that monthly audits of the waste management practices be carried out during the construction phase land-based work sites (at the GRSs at the BPPS and the LPS), and at marine-based work sites (on marine vessels and Jetty) to determine if wastes are being managed in accordance with the recommended good site practices and WMP. The audits will include all aspects of waste management including waste generation, storage, handling, recycling, transportation and disposal, to prevent any dumping of waste into the sea or malpractice of waste disposal.	All areas/ During construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-

ANNEX B

PROFORMA FOR WASTE MANAGEMENT

Disposal Records of Construction Waste

建築廢物棄置記錄

Facility 設施	Date of transaction 交易日期	Vehicle No. 車牌號碼	Account No. 帳戶編號	Chit No. 入帳票編號	Time-in 進入時間	Time-out 離開時間	depth (meter) 廢物深度 (米)	Weight-in (tonne) 入閘重量 (公噸)	Weight-out (tonne) 出閘重量 (公噸)	Net weight (tonne) 淨重量 (公噸)
----------------	--------------------------------	---------------------	---------------------	-------------------	-----------------	------------------	---------------------------------	--------------------------------------	---------------------------------------	--------------------------------------

Project: _____

Contract No.: _____

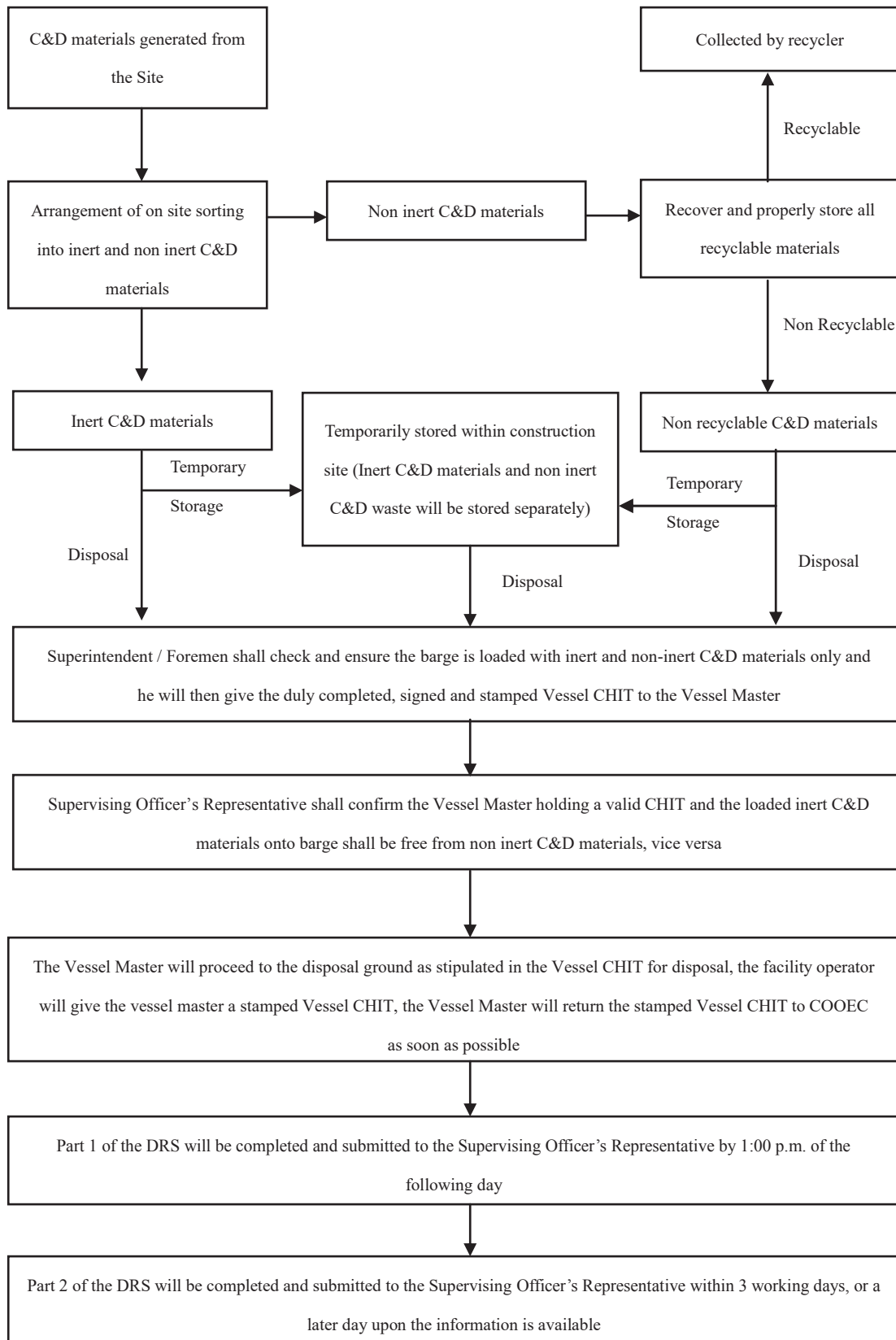
Month	Actual Monthly Quantities of Inert C&D Materials Generated						Actual Monthly Quantities of Marine Sediment Generated					Actual Monthly Quantities of C&D Wastes Generated				
	Total Quantity Generated	Hard Rock and Large Broken Concrete ¹	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Total Quantity of Type L Generated	Total Quantity of Type M Generated	Reused in the Contract	Reused in other Projects	Open Sea Disposed	Metals	Paper / Cardboard Packaging	Plastics ²	Chemical Waste	Others (e.g. general refuse) ³
	(in '000m ³)						(in '000m ³)					(in '000kg ³)			(in '000kg ³)	(in '000L)
Jan																
Feb																
Mar																
Apr																
May																
Jun																
Total																
Jul																
Aug																
Sep																
Oct																
Nov																
Dec																
Total																

Notes:

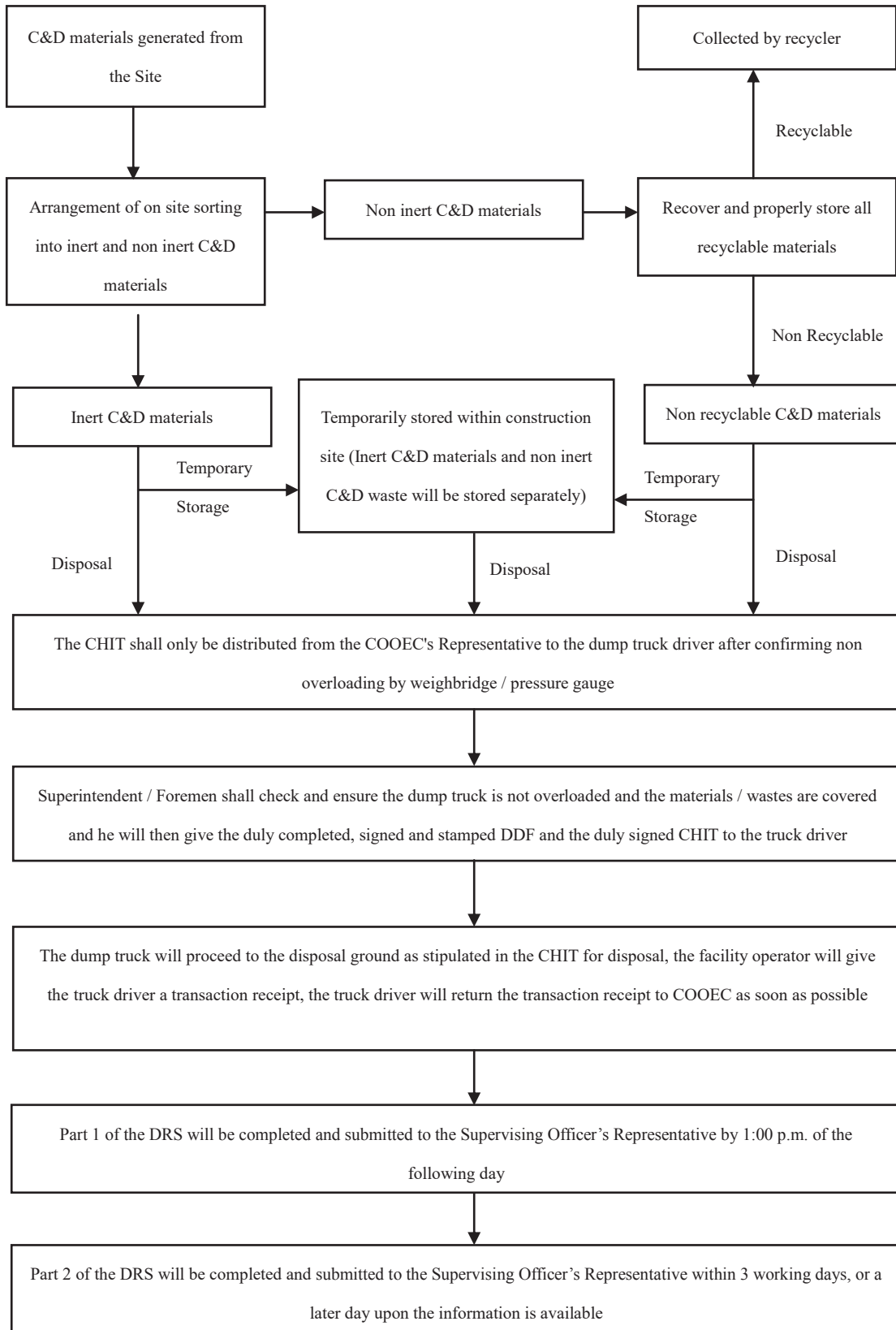
- (1) Broken concrete for recycling into aggregates.
- (2) Plastics refer to plastic bottles / containers, plastic sheets / foam from packaging materials
- (3) 1 full loaded dumping truck is assumed to be equivalent to 6.5m³ by volume

ANNEX C

FLOW CHARTS OF THE TRIP TICKET SYSTEM



Procedure for dumping C&D materials by barge



Procedure for dumping C&D materials by dump truck