

Section 5

WASTE MANAGEMENT

5 WASTE MANAGEMENT

5.1 Introduction

5.1.1 The Contractor is responsible for the control of waste within the construction site, the removal of any solid or liquid waste material produced at the site and the implementation of any mitigation measures to minimise waste or redress problems arising from site waste.

5.1.2 It is recommended that auditing of each waste stream shall be carried out periodically by the ET Leader during site environmental audit inspections to determine if wastes are being managed in accordance with approved procedures and the site waste management plan. The audits should look at all aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal of wastes. An audit shall be undertaken at the commencement of the construction works, after submission and approval of the Contractor's waste management plan and then on a monthly basis thereafter.

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

5.1.4 During the site inspections and the document review procedures as mentioned in *Sections 9* of this Manual, the ET Leader shall pay special attention to the issues relating to waste management and verify that the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong.

5.2 Waste Management Mitigation Measures

5.2.1 The Contractor is responsible for incorporating the following mitigation measures and for the development of a comprehensive on-site waste management plan as recommended in the EIA Study. Such a management plan shall incorporate site specific factors, such as the designation of areas for the segregation and temporary storage of reusable and recyclable materials. All waste mitigation measures are to be audited by the IC(E) to ensure their implementation by the Contractor.

Waste Management Hierarchy

1. The various waste management options that the Contractor shall use in terms of preference from an environmental viewpoint are as follows.
 - (a) Avoidance and minimisation, ie not generating waste through changing or improving practices and design;
 - (b) Reuse of materials, thus avoiding disposal (generally with only limited reprocessing);
 - (c) Recovery and recycling, thus avoiding disposal (although reprocessing may be required); and
 - (d) Treatment and disposal, according to relevant laws, guidelines and good practice.
2. The Waste Disposal Authority shall be consulted by the Contractor on the final disposal of wastes.

Dredged Material

3. The volume of material dredged shall be minimised by limiting dredging during reclamation to seawall formation. Other no dredge options shall also be

investigated, subject to engineering feasibility.

4. Potential impacts associated with the exposure to and disposal of contaminated sediments shall be mitigated by adopting the following measures:
 - (a) Minimising exposure to any contaminated material by the wearing of protective gear such as gloves, providing adequate hygiene and washing facilities and preventing eating during dredging;
 - (b) Any contaminated sediment dredged shall not be allowed to be stockpiled on site and shall be immediately removed from site once dredged;
 - (c) All vessels for marine transportation of dredged sediment shall be fitted with tight fitting seals to their bottom openings to prevent leakage of materials; and
 - (d) Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water, and barges or hoppers shall under no circumstances to be filled to a level which will cause the overflowing of materials or polluted water during loading or transportation.

Excavated Materials

5. Excavated materials are not considered likely to cause adverse impacts with respect to their disposal, since they will be reused on-site as far as possible. If any surplus uncontaminated inert materials do arise then they may be delivered to public filling areas. However, excavated materials should be segregated from other wastes to avoid possible contamination, thereby allowing disposal at public filling areas.

Construction and Demolition Waste

6. Careful design, planning and good site management shall be undertaken to minimise over ordering and generation of waste materials such as concrete, mortars and cement grouts. If feasible, the noise enclosures used at each site shall be designed so that they are reusable, after they have been dismantled and removed, thereby not generating construction waste. The design of formwork shall maximise the use of standard wooden panels so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing shall be considered to increase the potential for reuse.
7. The Contractor shall recycle as much as possible of the C&D material on-site. Proper segregation of wastes on site will increase the feasibility that certain components of the waste stream can be recycled specialised contractors. Concrete and masonry, for example can be crushed and used as fill and steel reinforcing bar can be used by scrap steel mills. Different areas of the work sites shall be designated for such segregation and storage depending on site specific conditions.
8. The requirements for surface run-off and the handling and disposal of bentonite slurries shall follow the *Practice Note For Professional Persons, Construction Site Drainage, Professional Persons Consultative Committee, 1994* (ProPECC PN 1/94). All discharges shall be conducted in accordance with the WPCO and valid water pollution control licences shall be maintained for any discharges.
9. C&D materials shall be segregated on site into different waste and material types. Wherever possible, materials are to be reused or recycled with the remaining inert materials before being disposed of at public filling areas. Waste containing putrescible materials shall be disposed of at landfill. In order to minimise the impacts of the demolition works, these wastes must be cleared as quickly as possible after demolition. The demolition and clearance works shall therefore be undertaken simultaneously.

Chemical Waste

10. For those processes which generate chemical waste, the Contractor shall look into the possibilities of finding alternatives which generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste.
11. Chemical waste that is produced, as defined by *Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation*, shall be handled to accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*. Any persons who produce chemical waste are required to register as a chemical waste producer with EPD. Containers used for the storage of chemical wastes shall:
 - (a) Be suitable for the substance they are holding, resistant to corrosion, maintained to a good condition, and securely closed;
 - (b) Have a capacity of less than 450 L unless the specifications have been approved by the EPD; and
 - (c) Display a label to English and Chinese to accordance with instructions prescribed in *Schedule 2 of the Regulations*.
12. The storage area for chemical wastes shall:
 - (a) Be clearly labelled and used solely for the storage of chemical waste;
 - (b) Be enclosed on at least 3 sides;
 - (c) 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 to that area, whichever is the greatest;
 - (d) Have adequate ventilation;
 - (e) Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
 - (f) Be arranged so that incompatible materials are adequately separated.
13. Disposal of chemical waste shall be:
 - (a) Undertaken by a licensed waste collector; and
 - (b) Disposed of at 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; or
 - (c) Provided to a reuser of the waste, under approval from the EPD.

General Refuse

14. General refuse generated on-site shall be stored to enclosed bins or compaction units separate from construction and chemical wastes. A reputable waste collector shall be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.
15. General refuse is generated largely by food service activities on site, so reusable rather than disposable dishware shall be used if feasible. Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated or easily accessible, so separate, labelled bins for their deposit shall be provided if feasible.

Biogas

16. As a good working practice, prior to entry into any confined space (ie drainage manhole) within the reclamation site (such as underground manholes, culvers and utility casings), the gas atmosphere within the confined space shall be monitored for oxygen, methane, carbon dioxide and hydrogen sulphide. The working practices should follow the EPD Landfill Gas Hazard Assessment Guidance Note,

Waste Facilities Development Group, EPD, 1997 guidelines as follows: Any chamber, manhole or culvert which is large enough to permit access to personnel should be subject to entry safety procedures. Such work in confined spaces is controlled by the Factories and Industrial Undertakings (Confined Spaces) Regulations of the Factories and Industrial Undertakings Ordinance. Following the Safety Guide to Working in Confined Spaces ensures compliance with the above regulations.

17. The key issues with regards to confined spaces which are at risk of landfill gas build-up are set out below:
 - (a) The entry or access point should be clearly marked with a warning notice (in English and Chinese) which states that there is the possibility of flammable and asphyxiating gases accumulated within.
 - (b) The warning notice should also give the telephone number of an appropriate competent person who can advise on the safety precautions to be followed before entry and during occupation of the manhole.
 - (c) Personnel should be made aware of the dangers of entering confined spaces potentially containing hazardous gases and, where appropriate, should be trained in the use of gas detection equipment.
 - (d) Prior to entry, the atmosphere within the chamber should be checked for oxygen, methane and carbon dioxide concentrations. The chamber may then only be entered if oxygen is greater than 18% by volume, methane is less than 10% of the Lower Explosive Limit (LEL), which is equivalent to 0.5% by volume (approximately), and carbon dioxide is less than 0.5% by volume.
 - (e) If either carbon dioxide or methane are higher, or oxygen lower, than the values given above, then entry to the chamber should be prohibited and expert advice sought.
 - (f) Even if conditions are safe for entry, no worker should be permitted to enter the chamber without having another worker present at the surface. The worker who enters the chamber should wear an appropriate safety/recovery harness and, preferably, should carry a portable methane, carbon dioxide and oxygen meter.
18. In general, when work is being undertaken in confined spaces sufficient approved resuscitation equipment, breathing apparatus and safety torches should be available. Persons involved in or supervising such work should be trained and practised in the use of such equipment. A permit-to-work system for entry into confined spaces should be developed by an appropriately qualified person and consistently employed.

Other Waste Management Requirements

19. Waste reduction is best achieved at the planning and design stage, as well as by ensuring that processes are run in the most efficient way. Good management and control can prevent the generation of significant amounts of waste. For unavoidable wastes, reuse, recycling and optimal disposal are most practical when segregation occurs on the construction site, as follows:
 - dredged material for disposal at marine disposal sites;
 - excavated material (inert) suitable for reclamation or fill;
 - Inert C&D material (public fill) for reuse at public filling areas;
 - C&D waste for landfill;
 - chemical waste; and
 - general refuse.
20. The criteria for sorting solid waste is described in *New Disposal Arrangements for Construction Waste*. Waste containing in excess of 20% by volume of inert should be segregated from waste with a larger proportion of putrescible material.

21. Proper storage and site practices will minimise the damage or contamination of construction materials. On site measures may be implemented which promote the proper disposal of wastes once off-site. For example having separate skips for inert (rubble, sand, stone, etc) and non-inert (wood, organics, etc) wastes would help to ensure that the former are taken to public filling areas, while the latter are properly disposed of at controlled landfills. Since waste brought to public filling areas will not attract a charge, while that taken to landfill may attract some future charge, separating waste may also help to reduce waste disposal costs, should landfill charging be introduced.
22. Specifically, it is recommended that:
 - (a) A sediment testing programme should be carried out during the detailed design stage to determine the quantity and quality of sediments to be removed for allocation to a disposal site.
 - (b) wastes should be handled and stored in a manner which ensures that they are held securely without loss or leakage thereby minimising the potential for pollution;
 - (c) only reputable waste collectors authorised to collect the specific category of waste concerned should be employed;
 - (d) removal of demolition wastes should be arranged to coincide with the demolition work;
 - (e) appropriate measures should be employed to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
 - (f) the necessary waste disposal permits should be obtained from the appropriate authorities, if they are required, in accordance with the *Waste Disposal Ordinance (Cap 354)*, *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)* and the *Crown Land Ordinance (Cap 28)*;
 - (g) collection of general refuse should be carried out frequently, preferably daily;
 - (h) waste should only be disposed of at licensed sites and site staff and the civil engineering Contractor should develop procedures to ensure that illegal disposal of wastes does not occur;
 - (i) waste storage areas should be well maintained and cleaned regularly;
 - (j) records should be maintained of the quantities of wastes generated, recycled and disposed (determined by weighing each load or by another method); and
 - (k) during demolition, the Contractor should adopt selective demolition measures so that reusable material, like wood and metal, can be disposed of at landfills, and inert demolition materials can be reused on site or delivered to public filling areas, public filling points or land formation sites.
23. Training and instruction of construction staff should be given at the site to increase awareness and draw attention to waste management issues and the need to minimise waste generation. The training requirements should be included in the site waste management plan.