

## 4 WASTE MANAGEMENT

The Contractor is responsible for the management of materials and wastes arising during the construction of the proposed works. This includes; control of wastes on site, removal of the waste materials from the site and the implementation of any mitigation measures to minimise waste or redress any problems that arise from waste associated with the works. In addition to C&D waste and domestic wastes, this material may include sewage, waste water or effluent contaminated with sand, cement, silt or any other suspended or dissolved material that flows from the site onto any adjoining land, sewer, or water course. This also includes any waste matter or refuse deposited anywhere within the site or onto any adjoining land.

The Contractor should develop procedures for the management of wastes in the form of a waste management plan (WMP). The proposed widening works will result in a net deficit of fill, and it will be necessary to import fill material for the construction of embankments etc. In this regard, the Contractor shall take all reasonable measures to ensure that materials are reused on site, as far as is practicable and shall introduce a programme for on-site training of staff to promote the issues of site cleanliness and good waste management.

The WMP should be prepared and submitted for approval by the Engineer's Representative and EPD prior any construction activities. During the construction period the WMP should be used as a working document to detail the on-going management procedures and to record waste arisings and import of fill throughout the Contract. The WMP shall be subject to audit under the requirements of the Environmental Monitoring and Audit Procedures.

### 4.1 Waste Management Hierarchy

The WMP shall be developed and implemented according to a best-practice philosophy of waste management. There are various waste management options, which can be categorised in terms of preference from an environmental viewpoint. The options considered to be more preferable have the least impacts and are more sustainable in a long-term context. Hence, the hierarchy is as follows:

- avoidance and minimisation, i.e. avoiding or not generating waste, through changing or improving practices and design;
- reuse of materials, thus avoiding disposal (generally with only limited reprocessing);
- recovery and recycling, thus avoiding disposal (although reprocessing may be required); and
- treatment and disposal, according to relevant laws, guidelines and good practice.

This hierarchy should be used to evaluate waste management options, thus allowing maximum waste reduction and often reducing costs. For example, by reducing or eliminating over-ordering of construction materials, waste is avoided and costs are reduced both in terms of purchasing of raw materials and in disposing of wastes.

There is anticipated shortfall in fill requirements (estimated at 156,000 m<sup>3</sup>) as such:

- Inert excavated material and construction and demolition material deemed suitable for fill should be re-used on site;
- Inert material deemed unsuitable for reuse on site, reclamation or land formation; and non-inert construction waste material should be disposed of at a landfill;

The suitability (or otherwise) of material for reuse on site shall be detailed in the WMP. If, for any reason, the recommendations cannot be implemented, full justification should be given in the WMP for approval by EPD.

## 4.2 Training

To facilitate adoption of the best-practice philosophy, training shall be provided to all personnel working on site. The training shall promote the concept of general site cleanliness and clearly explain the appropriate waste management procedures defined in the WMP. Overall, the training should encourage all workers to reduce, reuse and recycle wastes.

## 4.3 Records of Waste Arisings and Management

During construction, the WMP should be kept up to date on a monthly basis with records of the actual quantities of wastes generated, recycled and disposed of off-site, as well as fill imported to site. Quantities shall be determined by weighing each load or other methods agreed to by the Engineer's Representative. Waste shall only be disposed of at licensed sites and the WMP should include procedures to ensure that illegal disposal of wastes does not occur. Only reputable waste hauliers authorised to collect the specific category of waste concerned should be employed and a trip ticket system shall be implemented for offsite disposal of C&D and solid waste at public filling facilities and landfills (in accordance with WBTC 5/99). Appropriate measures should be employed to minimise windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers.

## 4.4 Site Planning

The Work site(s) shall be arranged and managed to facilitate the proper management of wastes and materials. The WMP shall include plans indicating specific areas designated the storage of particular types of waste, reusable and recyclable materials as well as areas and management proposals for any stockpiling areas. Waste storage areas should be well maintained and cleaned regularly. Specific provisions for different types of material are

outlined below. In general, these areas should be designed to avoid cross contamination of materials as well as pollution of the surrounding environment.

#### **4.5 Excavated Materials (Public Fill)**

Excavated material should be segregated, such that topsoil is stored separately from fill and treated accordingly to avoid degradation.

Inert excavated material and construction and demolition material deemed suitable for fill should be re-used on site. The suitability (or otherwise) of material for reuse on site shall be detailed on the WMP. If, for any reason, the inert material cannot be reused on site, full justification should be given in the WMP.

Any stockpiles should be sited away from existing watercourses and suitably covered to prevent wind erosion.

#### **4.6 Construction and Demolition Waste**

Careful design, planning and good site management can minimise over ordering and generation of surplus materials such as concrete, mortars and cement grouts. The design of formwork should maximise the use of standard wooden panels so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing should be considered to increase the potential for reuse.

C&D materials should be segregated on site into different waste and material types. This will increase the feasibility of certain components of the waste stream being recycled by specialised contractors. The Contractor should clearly demonstrate in the WMP how he intends to maximise the reuse of C&D material on-site. Where reuse of materials on site is not feasible, the Contractor should explore opportunities for recycling materials off-site. Inert C&D materials shall be reused on site or recycled with the remaining non-inert materials which cannot be reused or recycled being disposed of to landfill.

Potential opportunities for recycling and reuse of C&D materials from the Widening works includes:

- milling wastes arising from regrading of the existing pavement could be recycled on site and reused as either road-base in the new carriageways or fill for new embankments;
- existing marginal roadside barriers comprise pre-cast units, it may be possible to re-use these following widening works; and
- existing bridge parapets comprise aluminum post and railings, these have a recyclable value and could be sold on for reconditioning or reused for scrap metal.

## 4.7 Chemical Waste

For those processes which generate chemical waste, it may be possible to find alternatives which generate reduced quantities or less dangerous types of chemical waste.

Chemical waste should be handled in accordance with the Code of Practice on the packaging, Handling and Storage of Chemical Wastes as follows. Containers used for the storage of chemical wastes should:

- 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 450L unless the specifications have been approved by EPD; and
- display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.

The storage area for chemical wastes should:

- 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 as chemical waste if necessary); and
- be arranged so that incompatible materials are adequately separated.

The Contractor shall register with EPD as a Chemical Waste producer. Waste oils and other chemical wastes as defined in the Waste Disposal (Chemical Waste) (General) Regulation will require disposal by an appropriate means and could require pre-notification to EPD prior to disposal. An appropriate disposal facility could be the Chemical Waste Treatment Centre (CWTC) at Tsing Yi. If chemical wastes are to be generated, the contractor will need to register with EPD as a chemical waste producer and observe the requirements for chemical waste storage, labelling, transportation and disposal. Disposal of chemical waste should:

- be via a licensed waste collector; and
- be 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; or
- be to a reuser of the waste, under approval from EPD.

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The Centre for Environmental Technology operates a Waste Exchange Scheme, which can assist in finding receivers or buyers.

#### **4.8 Municipal Wastes**

General refuse generated on-site should be stored in enclosed bins or compaction units separate from other wastes. A reputable waste collector should 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.

General refuse is generated largely by food service activities on site, so reusable rather than disposable dishware should be used if feasible. Aluminum 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 should be provided. Office waste can be reduced through recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered if one is available.