

APPENDIX 6.2

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**Waste Management  
Plan**

## **Appendix 6.2 – Waste Management Plan**

# **1 INTRODUCTION**

## **1.1 General**

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The WENT Landfill Extension form an integral part in the Strategic Plan in maintaining the continuity of landfill capacity in the West New Territories. The project is to develop the WENT Landfill Extension (about 188 hectares with capacity of 81Mm<sup>3</sup>) lying between the existing WENT Landfill and the CLP Black Point Power Station at Nim Wan.

The eastern part of the site is located in Tsang Kok Valley which is a hilly terrain site sparsely vegetated with grass and limited patched of shrubs. The easterly ridge forms a boundary with the existing landfill. The northern part is the CLP Tsang Tsui Ash Lagoons and the former BBC Relay Station. The southern area is bounded by the natural topography, with ridgelines rising southwards from the coastline to meet the major east-west trending ridgeline at about +290mPD. The southern part of the site will also encroach onto the Tsing Shan Firing Range.

## **1.2 Legislation and Requirements**

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The relevant legislation and associated guidance notes applicable to the study for the assessment of waste management implications include:

- Waste Disposal Ordinance (Cap.354) and subsidiary Regulations;
- Environmental Impact Assessment Ordinance (Cap 499) and subsidiary Regulations;
- Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Public Health and Municipal Services Ordinance (Cap 132);
- Hong Kong Planning Standards and Guidelines (HKPSG), Chapter 9 – Environment;
- A Policy Framework for the Management of Municipal Solid Waste (2005-2014);
- Waste Reduction Framework Plan, 1998 – 2007, Planning Environment and Lands Branch, Government Secretariat;
- Code of Practice on the Packaging, Labeling and Storage of Chemical Wastes, EPD (1992);
- Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TC(W)) No. 33/2002 Management of Construction and Demolition Material Including Rock;
- ETWB TC(W) No.31/2004 Trip Ticket System for Disposal of Construction and Demolition Materials;
- ETWB TC(W) No. 19/2005 Environmental Management on Construction Sites;
- WBTC No. 12/2002, Specifications Facilitating the Use of Recycled Aggregates;
- WBTC Nos. 25/99, 25/99A and 25/99C. Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers.

# **2 Construction and Demolition Materials**

## **2.1 Identification of Waste Sources**

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The major activities that generate C&D materials are summarized as follows:

- (i) Site clearance and slope works for landfill bowl (Phases 1 to 6);
- (ii) Road construction for Lim Wan Road realignment;
- (iii) Demolition of the existing WENT Landfill Facilities;
- (iv) Scrap metals from off-cuts, rebar, steel pipes etc;
- (v) Plastic and paper from pre-formed products and packaging;

- (vi) Unusable/surplus concrete/grout; and
- (vii) Refuse from construction workforce and DBO Contractor.

## 2.2 C&D Materials Generation and Minimisation of C&D Waste

Given the remote location of the site, the site formation works will be based on a material balance approach and no significant import or export of soil materials is expected. To construct the landfill bowl and the realigned Nim Wan Road, ~16.6Mm<sup>3</sup> of construction materials will be excavated whilst ~16.8Mm<sup>3</sup> will be required as fill materials for site formation, daily cover and final capping materials. A total of about 0.2Mm<sup>3</sup> of fill materials are thus required to be imported. On the other hand, a total of about 0.2Mm<sup>3</sup> of non-inert C&D waste (top soil + vegetation) is required to be disposed of at existing WENT Landfill and WENT Landfill Extension. The breakdown of total excavated materials and fill materials is shown on the below table:

Activities		Volume (Mm <sup>3</sup> )
Excavation (Inert Materials)	Construction of Landfill Bowl	13.1 <sup>(a)</sup>
	Construction of Realigned Nim Wan Road	3.5
	Fly ash (to be reused on site)	Small quantity (less than 0.1Mm <sup>3</sup> )
Total		16.6
Excavation (Non-inert Materials)	Construction of Landfill Bowl (Top soil & vegetation)	0.2 <sup>(a)</sup>
Filling <sup>(b)</sup>	Operation of Landfill	13.8
	Restoration of Landfill	3.0
Total		16.8

Note :

- (a) The breakdown of 13.1Mm<sup>3</sup> and 0.2Mm<sup>3</sup> for different phases for the bowl construction is given below. In view of the large site area (over 140 ha for Phases 1, 2, 3 and 4), there should be adequate area to store the surplus material from Phases 1, 2, 3 & 4 on site and used as for daily cover and the fill material for Phases 1, 2, 3, 4, 5 & 6. C&D materials generated from the demolition of existing facilities are also included.

Phase	Quantity, m <sup>3</sup>			
	Inert C&D Materials to be reused on site			Non-inert C&D Materials to be disposed of at Landfill
	Fill	Cut	Balance	Top Soil and Vegetation
1	1,328,000	3,630,000	2,302,000	40,000
2	291,000	4,961,000	4,670,000	4000
3	426,000	4,439,000	4,013,000	150
4	552,000	4,767,000	4,215,000	100,000
5	1,482,000	418,000	-1,064,000	400
6	1,165,000	116,000	-1,049,000	60,000
<b>Total</b>	<b>5,244,000</b>	<b>18,331,000</b>	<b>13,087,000</b> <b>(say 13,100,000)</b>	<b>204,550</b> <b>(say 200,000)</b>

- (b) With reference to the existing WENT Landfill; during operation stage, volume of daily cover + haul roads + channels is about 13.8Mm<sup>3</sup>. During restoration stage, total thickness of final cover = intermediate cover + vegetative layer, thus fill volume (restoration) = 3Mm<sup>3</sup>. Thus, total fill required ≈ 16.8Mm<sup>3</sup>.

The DBO Contractor will be responsible for sorting construction materials into inert and non-inert portions. Inert portion of construction materials should be reused on-site as far as practicable, whilst any non-inert portion should be reused whenever possible and be disposed of as a last resort. The contract documents should specify that no excavated materials are to be removed from the site.

According to the latest construction methodology, the area near to Tsang Kok Stream Outfall would be first installed with temporary sheet piling to enclose the area. After de-watering, the box culvert would then be installed after the associated engineering works. Upon backfilling the box culvert, site office and LFG treatment facilities of the existing WENT Landfill will be constructed accordingly. The existing seawall along the ash lagoon and the berth would also not be modified. Hence, there are no dredging activities in this project.

### **2.3 Site Management on Minimizing of C&D Materials/Waste**

The DBO Contractor will adopt a waste management hierarchy for this Contract. The waste management options will be categorized in terms of preference from an environmental viewpoint. The options considered to be preferable have the least impacts and are more sustainable in long term. The hierarchy is as follows:

- Avoidance and minimization, i.e. not generating waste through changing or improving practices and design;
- Reuse of materials, thus avoiding disposal generally with limited reprocessing;
- Recovery and recycling, in which substantial reprocessing may be required; and
- Treatment and disposal, according to relevant laws, regulations, guidelines and good practice as the last option.

The hierarchy is used to evaluate and select waste management options. The aim is to reduce and minimize the amount of waste to be generated and hence reduce the waste handling and disposal costs. For example, by reducing or eliminating over-ordering of construction materials, waste is avoided, and costs are reduced both in terms of purchasing and in disposal of wastes.

The generation of C&D materials should be minimized as much as practicable.

#### **General**

- (a) Management of construction materials such that over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures should be avoided. Any ordering of materials should be approved by Site Agent or Project Manager;
- (b) In order to avoid over-order of materials (eg concrete, liners etc), accurate calculation should be made prior to construction works. Close supervision should be arranged;
- (c) Surplus concrete should be, as far as practicable, used for paving of temporary road or cast of concrete blocks etc.;
- (d) Useful materials such as timber, rubble and steel/metal should be segregated for reuse. For example, formwork and timber should be cleaned for reuse, off-cuts of reinforcement should be sorted into usable lengths and short off cuts stacked for scrap metal. Where it is no longer reusable, steel and metal items will be sold as scrap for recycling;

- (e) Packaging waste including foam board and cardboard should be, as far as practicable, returned to material suppliers for reuse;
- (f) Environmental Induction Training and Toolbox Talk will be arranged to disseminate the requirements on waste management and avoidance of mishandling of materials;
- (g) The resident environment team (to be established by the DBO Contractor) will carry out Daily Inspection, Weekly Tidying Inspection, Weekly Environmental Inspection and Audit to monitor the performance

### **General Refuse**

General refuse refers to the domestic waste generated from daily human activities. General refuse may include food wastes and packaging, waste paper, plastic bottles, aluminium cans and other debris.

- (a) Reducing the number of photo copies to a minimum and by copying on both sides of paper for internal documents and external documents where appropriate;
- (b) Preventing over-ordering of office equipment and consumables;
- (c) Procuring green office equipment and consumables in terms of energy efficiency, recycled content and durability etc.;
- (d) Providing drinking facility and encouraging employees to bring their own cups;
- (e) Discouraging take-away food;
- (f) Deploying sufficient recycle bins in site offices to facilitate collection of recyclables including waste aluminium cans, plastic bottles and papers;
- (g) Deploying sufficient refuse collection bins with cover at convenient locations to facilitate collection of non-recyclables for disposal at landfills;
- (h) Participating in local collection scheme (e.g. scheme launched by District Board) if available.

## **2.4 Control the Use of Timber**

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The DBO Contractor should avoid, reduce or minimize the use of timber as far as possible, such as follows:

- Restriction on use of hardwood such that softwood, metal props and/or proprietary steel system should be considered for falsework and shoring of trenches and pits;
- The formwork should be designed to maximize the use of standard wooden panels so that high reuse levels can be achieved. More durable alternatives such as steel formwork or plastic facing should be considered for repetitive areas to increase the potential for reuse.

Where DBO Contractor has to use timber, a method statement should be prepared and submitted to the Engineer for agreement prior to commencement.

The method statement should include the justification for and the measures taken to minimize the use of timber. In addition, a summary table will be prepared containing the description, justification and the estimated quantity for every work process/activity requiring the use of timber.

In addition, the updated summary table on the use of timber should be submitted to the Engineer together with the monthly summary Waste Flow Table (WFT) for monitoring and review.

## **2.5 Pre-identification of Reusable/ Recyclable Materials**

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### ***Analysis of Waste Generation***

Throughout the Contract duration, there will be different categories of reusable and recyclable wastes generated from every construction process in connection with either temporary or permanent works. The major material generation will include:

- Inert C&D materials - broken concrete from road features;
- Metals - site hoarding and reinforcement offcuts;
- Paper/cardboard - packaging, printed papers and cartons;
- Plastics - foam/plastic material packaging and plastic bottles/containers;
- Chemical waste - engine oils, hydraulic fluids, cleaning fluids, used oil filters and car batteries etc, and
- General refuse - generated from on site work force.

### ***General Approach***

The strategy for management and disposal of all C&D materials arising from the Contract will be based on the principle of avoidance, minimizing, segregation, salvage for reuse or recycle on or off-site wherever practicable followed by the last resort of disposal to landfill as appropriate.

The DBO Contractor will carefully design and properly plan the temporary and permanent works to be carried out in such a way to avoid, reduce or minimize the generation of C&D materials in particular metallic waste, timber, paper/ cardboard packaging and chemical waste. The DBO Contractor will employ measures to ensure proper planning of works, good site management such as minimizing over-ordering, avoiding cross contamination of reusable and/or recyclable materials collected, optimizing the use of metal formwork or other process to reduce or minimize the use off-site in temporary works construction and maximizing the reuse of excavated inert C&D materials within the sites (e.g. backfilling).

On-site sorting of C&D materials will be adopted so that inert materials can be reused or recycled on or off-site as far as practicable. Such sorting would ensure the quality of the inert C&D materials for backfilling

### ***Management of Inert C&D Materials***

The DBO Contractor will practice necessary design, proper planning and good site management to minimize wastage of materials such as concrete debris) mortars, cement grouts and reinforcing bars as follows:

<b>Bituminous material</b>	It is mainly from road reconstruction or improvement. They will be broken down and sorted at source, and delivered to recycling contractors for recycling if available in Hong Kong or used for temporary paving or access on site. Surplus material will be mixed with soil as backfill material.
<b>Broken concrete</b>	It is from road reconstruction or improvement. It is suitable for recycling into aggregates and will be sorted at source and reused.
<b>Reinforcement bars</b>	It is from reconstruction works and will be sorted on site and recovered for collection by recycling contractors.
<b>Formworks</b>	The design of formwork should maximize the use of standard metal / wooden panels so that high reuse levels can be achieved. Metal panels will be given the first priority except for small quantity of timber which is to be used for some activities.

The DBO Contractor will as far as possible detail the rebar in such a way as to minimize and standardize off cuts which in turn to maximize the planned reuse thereof. Bar benders will be required to label both the bundles of bent bars and the bundles of reinforcement offcuts which will be logged for use in other parts of the works in accordance with the bar bending schedules.

The DBO Contractor will arrange to reuse or recycle as much as possible the general construction waste with recyclable values such as steel mesh, reinforcement bars as described above, railings, banisters, wooden planks, tires, etc. Where practicable, these wastes would be segregated on site. Different areas should be designated for such segregation and storage. These wastes would either be reused on site or collected by outside licensed waste recycling agents. If feasible, an inert and a non-inert construction waste storage skips would be set up on site as below:

- inert (e.g. sand, rubble) - for reuse and recycle;
- non-inert (e.g. wood, plastics) - for disposal at WENT Landfill and its extension.

The storage, collection and transport of construction waste should follow the key measures below as far as practicable:

- a trip ticket system should be adopted for the off-site disposal of construction and demolition wastes, if required;
- only permitted waste hauliers should be used to collect and transport wastes to licensed disposal points. A list of licensed waste collectors will be obtained from the EPD;
- wastes should be stored and handled properly in designated storage points;
- wastes should be removed off-site in a timely manner.

### ***Management of Chemical Waste***

Repair and maintenance of plant and vehicles on site are not encouraged but minimized as far as practicable to reduce generation of chemical waste on site. Plant in poor condition will not be deployed on site.

Chemical wastes expected from the Contract include engine oils, hydraulic fluids, waste fuel, spent solvent, spent cleaning fluids, spent lubricating oil, contaminated sawdust/sandbags, paint residual; and used oil filters. The DBO Contractor shall register with EPD as a Chemical Waste Producer.

All chemical waste generated by the construction works should be properly labelled, packaged, and temporarily stored at designated chemical waste storage areas within the construction site in accordance with the Code 01 Practice on the Packaging, Labelling and Storage of Chemical Wastes issued by EPD.

### ***Management of General Refuse***

Enclosed bins for general refuse other than construction and chemical wastes should be provided at convenient locations within the site for the collection of general refuse from the work force. The bins and their storage areas should be cleaned regularly. Refuse should be removed from site by a reputable waste haulier regularly. Burning of refuse on site is strictly prohibited.

Three-colored recycling bins will be provided to collect and segregate aluminium cans, plastic bottles and paper waste on site for subsequent collection by outside waste recycling companies if volumes are large enough to warrant such collection.

### ***Management of Packaging Materials***

Construction materials will be ordered as far as practicable in bulk quantity or in container that requires the least packaging or wrapping. For materials delivered to site, reusable and recyclable cardboard, packaging materials and pallets will be re-used, recycled or returned to the supplier. Suppliers who accept the return of pallets and reusable and recyclable cardboard and packaging materials should be identified and given priority for business.

Sufficient space will be provided for proper stockpile of such recovered materials in dry condition and with cover to prevent cross contamination by other C&D materials. The recovered materials will be arranged to be collected by or delivered to recycling contractors on a regular basis.

### ***Management of Temporary Works to Minimize Timber Usage***

To avoid/minimize the use of timber for temporary works construction, the following measures will be adopted:

- Design structural or concrete members (such as bridge segments, reinforced earth wall panels, crash barriers, channels, kerbs etc.) to be constructed by pre-cast method as far as practicable that optimizes the repeated use of metal formwork;
- Use metal system or panel formwork for cast-in-situ members as far as practicable;
- Corrugated sheets and structural steel members or steel angle sections should be used to construct site hoardings;
- Steel tubular scaffolds, props or I-beams should be used as falsework with steel I-beams or channels as horizontal runner beams to support formwork; and
- Steel planking or sheet-piles with horizontal steel beams and struts will be proposed as support to excavation when necessary.

## **3 WASTE REDUCTION TARGET**

The targets set for the entire construction period should cover the followings:

- All excavated materials are to be sorted to recover the inert portion of C&D materials, e.g. hard rock, soil and broken concrete, for reuse on the site. The target is that there is no surplus C&D materials to be disposed off-site;
- All scrap metals are to be recovered for collection by recycling contractors;
- All cardboard and paper packaging (for plant, equipment and materials) is to be recovered, properly stockpiled in dry and covered condition to prevent cross contamination.;
- All chemical wastes are to be collected and properly disposed of by specialist contractors;
- All demolition debris is to be sorted to recover broken concrete, reinforcement bars, mechanical and electrical fittings, hardware as well as other fittings/materials for recycling at established recycling outlets; and
- The use of new timbers is to be reduced and the Temporary Works controlled.

The DBO Contractor shall propose and agree with Engineer on the specific waste reduction target to be achieved.



## **4 ON-SITE SORTING OF C&D MATERIALS**

### **4.1 General**

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- All C&D materials arising from or in connection with the construction and demolition works should be, as much as possible and practicable, sorted on-site and be separated into different categories for recycling, re-use or disposal at landfill as appropriate. The sorting area should be at the immediate working area to avoid loss or leakage during handling and should be revised from time to time in order to suit the construction activities. Foreman should deploy sufficient storage bins to collect reusable and recyclable materials.
- Segregated materials should be temporarily stored at source for delivery off-site as the last resort.

### **4.2 On-site Sorting**

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All C&D materials will be properly sorted into inert C&D materials, metals, timber and other non-inert C&D materials in the workplace to prevent cross-contamination. Sorting will be carried out at source to avoid double handling. In any case to minimize transport distance, the stockpiling area of C&D materials will be set up in close proximity of the sorting ground.

All non-inert demolition C&D materials such as unwanted timber will be temporarily stored in designated storage areas on site and to be disposed of at WENT Landfill and its extension. To prevent illegal dumping, a trip-ticket system will be adopted to ensure C&D waste is disposed of at landfill properly.

Useful materials such as steel pipes, reinforcement; will be collected for recycling as scrap metals. Sorted steel reinforcing bars will be collected and sold to scrap steel mills for recycling. Concrete and rubble will be segregated and reused on site.

The tentative sorting and storage area for C&D materials will be identified. Complete records of quantities of material reuse, recovery and recycled at the site or transported off-site for further reuse should be maintained and should be readily available on site.

### **4.3 Collection of Recyclable Materials by Recycling Contractors**

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The DBO Contractor will make arrangements with potential recycling contractors to facilitate that recyclable materials sorted from the site are collected with reasonable care. The quantities of all the recyclable materials will be recorded before removal off-site by the recycling contractors and the details will be included in the WFT for submission to the ER.

### **4.4 Reinforcement Bars**

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The DBO Contractor will as far as possible detail the rebar in such a way as to minimize and standardize off cuts which in turn to maximize the planned reuse thereof. Bar benders will be required to label both the bundles of bent bars and the bundles of reinforcement offcuts which will be logged for use in other parts of the works in accordance with the bar bending schedules. Sorting area will be located at source to minimize transport distance. Sorted steel reinforcing bars will be collected and sold to scrap steel mills for recycling.

### **4.5 General Construction Waste**

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The DBO Contractor will arrange to reuse or recycle as much as possible the general construction waste with recyclable values such as steel mesh, reinforcement bars as described above, railings, banisters, wooden planks, tires, etc. Where practicable, these wastes would be segregated on site. Different areas should be designated for such segregation and storage. These wastes, which are described below, would either be reused on site or collected by outside licensed waste recycling agents.

- inert (e.g. rock, concrete, sand, rubble) - for reuse or recycle;

- non-inert (e.g. wood, plastics) - for disposal at WENT Landfill and its extension.

Concrete and rubble will be segregated at source. Those inert C&D materials will be reused on site.

Complete records of quantities of waste reuse, recovery and recycled at the site or transported off-site for further reuse should be maintained and should be readily available on site.

#### **4.6 General Refuse**

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General refuse from the site should be stored in waste skips and garbage bins with proper covers at designated locations around the areas of site offices, workshops and works areas and separated from construction and chemical wastes for regular removal. Refuse burning on site should not be practiced.

Site staff should be encouraged to use reusable rather than disposable dishware by displaying notice/poster on site. Office waste will be reduced through recycling of paper if volumes are large enough to warrant waste paper collection. This will be achieved by reducing the number of photocopies to a minimum and by allowing double side photocopying for internal documents and external document, where appropriate.

Aluminium cans and plastic bottles should be segregated for collection by waste recycling firms if the volumes are large enough to warrant such collection.

#### **4.7 Chemical Waste**

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The chemical wastes generated from the general site operation will primarily arise from the maintenance of plant and equipment. These may typically include oils, lubricants, paints and solvents. For chemical waste produced from a process, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, registration should be made with EPD as a Chemical Waste Producer.

Preventive measures should be implemented for leakage and spillage of fuel and lubricating oil to avoid contamination of the construction site. All workshops should be located on impermeable areas with provision of drainage channels and interceptors to allow separation of oils from water and release of treated water.

Good housekeeping practices should be adopted to deal with chemical waste and the practices include:

- (i) Generating less chemical waste through:
  - Delivering appropriate quantity of chemicals to the construction site;
  - Avoiding unnecessary wastage of chemicals by using the chemicals more sensibly and in accordance with the manufacturer's instructions;
  - Finishing one bottle/container of chemicals before opening the next one for use;
  - Collecting the remaining chemicals in suitable containers;
  - Removing the unused chemicals out of the construction site after completion of the Contract.
- (ii) Preventing illegal discharge of chemicals or chemical wastes;
- (iii) Minimizing the volume of unused chemicals through:
  - Using the chemicals before the expiry date;
  - Ordering appropriate quantity of chemicals and avoiding unnecessary storage of excess chemicals.

Chemical waste should be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Waste*. The details are described as follows:

- (i) Containers used for the storage of chemical waste 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 450 litres unless the specification have been approved by EPD; and
  - display a label in English and Chinese in accordance with instruction prescribed in Schedule 2 of the Regulations.
- (ii) The storage area for chemical waste should:
- be clearly labelled and used solely for the storage of chemical waste; be enclosed on at least three sides;
  - have an impermeable floor and bund, 110% capacity of the largest container or 20% of the storage capacity, 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 chemical waste storage area will be identified. The area will be changed in accordance with site condition.

- (iii) Chemical waste should be disposed of:
- via a licensed waste collector;
  - to a facility licensed to receive chemical waste, i.e. Chemical Waste Treatment Facility in Tsing Yi; or
  - to an end-user of the waste, under the approval from the EPD.

Trip tickets issued for every chemical waste collection made by the licensed waste collector should be copied to the Engineer and the original tickets should be maintained by the EnvO for future reference. Chemical waste may be disposed of at landfill site. However, EPD should be informed by the EnvO on the final disposal location of the chemical waste.

## 5 OTHER WASTE MATERIALS

### 5.1 Sludge – Operation Phase

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The sludge from the future WENT Landfill Extension will be sent to the Sludge Treatment Facilities (STF) which adopt incineration technology at the Ash Lagoon area at Tsang Tsui near Nim Wan, Tuen Mun for disposal.

The existing treatment plant is designed to treat 1,800 m<sup>3</sup>/day. The typical quantity of sludge arising from the existing leachate treatment plant during the construction and operation phases of the existing WENT Landfill is about 35 m<sup>3</sup> in 2007.

Assuming the planned treatment capacity of the future treating plant as a worst-case scenario (i.e. 2,600 m<sup>3</sup>/day) throughout the 13-year of construction and operation phases of the future WENT Landfill Extension, the total quantity of sludge generated would be about 657 m<sup>3</sup>.

## **5.2 Restoration and Aftercare Phases**

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During the restoration and aftercare phases between 2029 and 2058, chemical waste, sludge from leachate treatment plant, and general refuse will be the major waste stream anticipated. The DBO Contractor should also consider the reuse and recycling of wastes as far as practicable, thereby reducing the level of generation.

### **Chemical Waste**

Similar to the construction and operation phases, it is difficult to quantify the amount of chemical waste that will arise during the restoration and aftercare phases but the amount should not be significant.

### **General Refuse**

Based on the above estimated quantity of general waste 0.65 kg per worker per day and assuming an average ~125 workers would also be present on site for 6 days a week during the 34-year restoration and aftercare phases, the total general refuse arising would be ~0.86Mkg.

### **Sludge**

The quantity of leachate generated from the WENT Landfill Extension during restoration and aftercare phases is estimated to be about 940m<sup>3</sup>/day. On pro-rata from the estimated quantity of sludge, the total sludge arising from the 34 years of restoration and aftercare phases would be about 621 m<sup>3</sup>.

## **6 WASTE FLOW**

### **6.1 Trip Ticket System**

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If off-site disposal is required, a trip-ticket system will be adopted to ensure that the C&D materials are disposed of properly. For each and every vehicular trip transporting C&D materials off-site to the designated public filling area or landfill, a Construction and Demolition Material Disposal Delivery Form should be produced and completed in duplicate and should be prepared on site for checking by Engineer.

All dump trucks must be installed with mechanical covers for transportation of materials off-site. When the trip-ticket is returned to site after the disposal trip, one eligible trip will be counted for the driver to apply for the subsidies.

### **6.2 Waste Flow Table**

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Besides the aforesaid Trip Ticket System, the receipts for the collection of all scrap metals, cardboard and paper by nominated recycling contractors should be kept on site for recording. The quantities of C&D materials reused, recycled and/or removed from the site will be included in the monthly summary 'Waste Flow Table' (WFT). The completed monthly summary WFT should be submitted to the Engineer.