9. WASTE MANAGEMENT

9.1 Potential Sources of Impacts

9.1.1 Construction Phase

9.1.1.1 General

Construction activities to be carried out for the EPIW's will result in the generation of a variety of wastes which include:

- Site clearance waste;
- Excess excavated material/spoil;
- General construction waste;
- Demolition waste;
- Chemical waste; and
- General refuse.

9.1.1.1.1 Site Clearance Waste

As the EPIW's are mostly within existing highway corridors, minimal clearance works will be required other than existing verge materials. The site clearance works in the vicinity of Yuen Long will mainly involve the clearance of vegetation in the work areas to the north of the station including the West Rail alignment.

9.1.1.1.2 Excess Excavated Material

The majority of the EPIW's will be at-grade through existing corridors and so limited excavation will be required. Excavation will be carried out only for the construction of piles and pile cap foundations for the footbridges, noise barriers and the reprovisioning of services. This will generate minimal quantities of spoil which will be reused as fill as necessary on-site.

9.1.1.1.3 General Construction Waste

General construction waste generated from these construction works will consist of wood waste from formwork and falsework, material and equipment wrappings and surplus or rejected construction material (mainly concrete). These are, however, expected to be minimal given the limited extent of elevated works.

If general construction wastes are not removed from site regularly, they may hinder construction and present a safety hazard, in addition to causing potential water quality impacts from runoff. The storage and disposal of construction wastes also have the potential to create visual and dust nuisances.

9.1.1.1.4 Demolition Waste

No significant demolition works will be carried out for the EPIW's. Detailed cut and fill rates for new alignment works to the north of Yuen Long station are not presently known but will be balanced as is practicable to avoid unnecessary disposal.

9.1.1.1.5 Chemical Waste

Substances likely to be generated by construction activities for the EPIW's will, for the most part, arise from the maintenance of equipment. These may include, but may not be limited to, the following:

- Scrap batteries or spent acid/alkali from their maintenance;
- Used engine oils, hydraulic fluids and waste fuel;
- Spent mineral oils and cleaning fluids from mechanical machinery; and
- Spent solvents/solutions, some of which may be halogenated, from equipment cleaning activities.

Chemical waste may pose serious environmental, health and safety hazards if it is not properly managed. These hazards include:

- Toxic effects to workers;
- Adverse effects on water quality from spills;
- Fire hazards; and
- Disruption of sewage treatment works if chemical waste enters the sewerage system.

9.1.1.1.6 General Refuse

General refuse will be generated from the works sites for the EPIW's. The storage of general refuse has the potential to give rise to adverse environmental impacts. These include odour if waste is not collected frequently, windblown litter, water quality impacts if waste enters water bodies, and visual impact. The site may also attract pests and vermin if the waste storage area is not well maintained and cleaned regularly. In addition, disposal of wastes at sites other than approved waste transfer or disposal facilities, can also lead to similar adverse impacts at those sites.

9.1.2 Operational Phase

Waste other than from pedestrian use of footways and occasional littering by passing vehicles is unlikely to arise directly from the operation of the EPIW's. Other than standard street-cleaning, litter bins should be provided for pedestrian use.

9.2 Evaluation of Impacts

9.2.1 Construction Phase

9.2.1.1 Site Clearance Waste

As little site clearance works will be required for the construction of the EPIW's, it is anticipated that there will be negligible environmental impacts due to the storage, handling, transport and disposal of site clearance waste.

9.2.1.2 Excess Excavated Material

Excavated material generated from the EPIW works is expected to be limited.

With respect to the small quantity of excess excavated soil requiring off-site disposal, it is not anticipated to have a significant impact on the demand for public filling capacity. The disposal of inert excavated material at public filling areas or land formation sites will not have any long term environmental impacts.

9.2.1.3 General Construction Waste

Although the storage, handling, transport and disposal of general construction wastes has the potential to create visual, water, dust and associated traffic impacts, due to the limited quantity of general construction wastes that are expected to be produced, it is not predicted that any impacts will occur.

9.2.1.4 Demolition Waste

As little demolition waste will be generated from the construction of the EPIW's, it is anticipated that the environmental impacts will be negligible.

9.2.1.5 Chemical Waste

It is difficult to quantify the amount of chemical waste which will arise from the construction activities as it will be highly dependent on the Contractor's on-site maintenance activities and the numbers of plant and vehicles utilised. However, it is anticipated that the quantity of chemical waste, such as lubricating oils and solvent, produced from plant maintenance will be small.

Storage, handling, transport and disposal should be undertaken in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Provided that this occurs, and chemical wastes are disposed of at a licensed facility, the contractor should be in compliance with all relevant regulations and there will be little environmental impact.

9.2.1.6 General Refuse

The number of construction personnel who will work on site has not yet been determined by the engineering Design Consultants. However, provided that the recommended mitigation measures are adopted, the environmental impacts caused by the storage, handling, transport and disposal of general refuse is expected to be minimal.

9.2.2 Operational Phase

No impacts are expected during the operational phase.

9.2.3 Mitigation Measures

Construction Phase

The following mitigation measures are recommended in order to minimise the waste related impact of the EPIWs.

General

The Contractor should develop a site specific Waste Management Plan, for submission to the EPD, that clearly defines 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

Various waste management options 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. The Contractor should ensure that, as far as practicable, the most preferred options are implemented. The hierarchy is as follows:

- Avoidance and minimisation (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 regulations, guidelines and good practice.

The contractor should consult the Waste Disposal Authority on the final disposal of wastes.

Storage, Collection and Transport of Waste

Permitted waste hauliers should be used to collect and transport wastes to the appropriate disposal points. The use of permitted waste carriers, and the implementation of a ticketing system, should also ensure the avoidance of fly-tipping.

The following should be instigated:

- Handle and store wastes in a manner which ensures that they are held securely without loss or leakage, thereby minimising the potential for pollution;
- Segregation and sort the waste into 3 categories (The sorting process shall be carefully monitored to avoid mixing of the 3 categories. Different types of materials/wastes shall be stockpiled and stored in different containers or skips to enhance re-use or recycling of the materials and proper disposal):
  - public fill (e.g. concrete and rubble) for re-use on-site or at public filling areas;
  - recyclable waste (e.g. steel and papers);
  - waste which cannot be re-used and/or recycled for landfill disposal.
- Remove wastes in a timely manner;
- Maintain and clean waste storage areas regularly;
- Minimise windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers;
- Obtain the necessary waste disposal permits 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), the Crown Land Ordinance (Cap 28), Dumping At Sea Ordinance (Cap 466) and Works Branch Technical Circular No. 22/92, Marine Disposal of Dredged Mud;*
- Dispose of waste at licensed sites;
- Develop procedures such as a ticketing system to facilitate tracking of loads, particularly for chemical waste, and to ensure that illegal disposal of wastes does not occur; and
- Maintain records of the quantities of wastes generated, recycled and disposed.

Excess Excavated Material

If practicable, the EPIW contractors should liaise with other contractors of West Rail who require fill material, in order to minimise the amount of inert excavated material to be delivered to public filling areas.

General Construction Waste

General construction waste should be removed from site as soon as practicable in order to avoid adverse environmental impacts due to on-site storage of the material.

To conserve the capacities at landfill sites, general construction waste with more than 20% (by volume) inert material should not be disposed of at landfills. The contractor should recycle as much as possible of the construction waste, and subject to the availability of sufficient space on-site, the Contractor should segregate wastes before disposing of inert materials (concrete, soil, cement/bentonite, etc.) at public filling areas and the degradable wastes (wood, paper, plastic,

etc.) at landfills. The production of general construction wastes should be minimised by the careful control of ordering procedures which can result in surplus materials. The avoidance of over-ordering and the segregation of materials will minimise waste arisings requiring landfill disposal.

Chemical Wastes

Storage, handling, transport and disposal of chemical wastes should be undertaken in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.*

General Refuse

General refuse generated on-site should be stored in enclosed bins or compaction units separate from construction and chemical 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 basis to minimise odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.

General refuse will be generated largely by food service activities on site, so reusable rather than disposable dishware should 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 should be provided wherever feasible.

Office wastes 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.

9.3 Residual Impacts

With the implementation of the recommended mitigation measures, potential residual waste management related impacts will be avoided or reduced to acceptable levels such that they have no adverse health, or environmental resource related impacts.

9.4 Conclusion

The potential impacts of waste arising from the construction and operational phases of the EPIWs have been assessed. Key issues include the need for effective waste management planning during the construction phase, effective management of chemical/industrial and other potentially hazardous wastes, and the strong preference for reuse of clean surplus material rather than disposing of it at public filling areas. Waste management methods and practices and other mitigation measures have been recommended to ensure that potential impacts are avoided or controlled to acceptable levels.

A summary of the recommended mitigation measures is outlined in *Table 9.4a* below.

Table 9.4a - Summary of Recommended Mitigation Measures During Construction and Operation of the Project

Phase	Recommended Mitigation Measures
Construction Phase	• The Contractor should develop a site specific Waste Management Plan to define the Permitted waste hauliers should be used to collect and transport wastes to the appropriate disposal points. The use of permitted waste carriers, and the implementation of a ticketing system, should also ensure the avoidance of fly-tipping. • Permitted waste hauliers should be used to collect and transport wastes to the appropriate disposal points. The use of permitted waste carriers, and the implementation of a ticketing system, should also ensure the avoidance of fly-tipping. • If practicable, the EPIW contractors should liaise with other contractors of West Rail who require fill material, in order to minimise the amount of inert excavated material to be delivered to public filling areas. • General construction waste should be removed from site as soon as practicable in order to avoid adverse environmental impacts due to on-site storage of the material. • Storage, handling, transport and disposal of chemical wastes should be undertaken in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. • General refuse generated on-site should be stored in enclosed bins or compaction units separate from construction and chemical 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 basis to minimise odour, pest and litter impacts.
Operation Phase	None required.