INITIAL ASSESSMENT REPORT

OF

ISLAND EAST TRANSFER STATION

CES CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

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May 1993

PREFACE

Island East Transfer Station is the second refuse transfer station to be built in Hong Kong and forms a key component of the Territory- wide integrated waste management plan. It is the first of two transfer stations to be built on Hong Kong Island and waste transfer from the site will be achieved via sea vessel. Normally the first report within the Environmental Impact Assessment, the Initial Assessment (IA) has in this case been preceded by a Technical Note on Demolition and on the Temporary Arrangements in operation in the interim period between the original facility shutdown and the commissioning of IETS. The Demolition Technical Note contains information relevant to that period of construction which will commence in mid June 1991. Therefore, fast-tracking the assessment of demolition was determined to be a priority within the overall EIA. Similarly, the Temporary Arrangements were considered before production of the IA because they were in operation from the beginning of June, 1991. The IA provides an overall description of the facility including details of its operation. It also provides an initial assessment of the environmental impacts likely to arise during the construction and operation.

An important function of this report is to identify the significant environmental impacts created by this facility. These will require monitoring and control procedures and will receive more detailed assessment in future key issue reports.

An Environmental Review (ER) of the facility was undertaken for the Government in early 1990. Duplication of that report is not intended. However, this IA does expand upon issues and potential environmental impacts highlighted in the ER and draws upon process design and operation information presented in the Tender and obtained subsequently.

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INTRODUCTION

1. INTRODUCTION

1.1 Background

As a result of studies to develop an integrated waste management plan for the Territory, the Government has identified an optimum strategy for the collection and disposal of municipal wastes. This involves the transportation of waste by Refuse Collection Vehicle (RCV) to centralised transfer stations, followed by compaction, containerisation and onward transportation to strategic Territorial landfill sites. The first transfer station at Kowloon Bay has been constructed and is now operational and the Government has determined that the second transfer station should be located at Chai Wan. This will replace both the existing inadequate facility at Chai Wan and the Kennedy Town incinerator.

1.2 Objectives of the Initial Assessment Report

In accordance with the Brief for the EIA study, the objectives of the IA are:

(i) to describe the proposed installation and related facilities and the requirements for their development;

(ii) to identify and describe the elements of the community and environment likely to be affected by the proposed installation;

(iii) to provide an initial assessment and evaluation of the environmental impacts arising from the development sufficient to identify those issues of key concern to the project which are likely to influence decisions on the project and which require separate attention as key issues reports.

(iv) to recommend any monitoring studies which are necessary to provide a baseline profile of existing environmental quality and to review the monitoring programme specified in the Tender documentation which ascertains impact and compliance during implementation, commissioning and operation of the transfer station;

(v) to propose a detailed programme of investigation and reporting able to meet all other objectives of the assessment.

1.3 Initial Assessment of Environmental Impacts

Specific activities during both construction and operation of the transfer station will impact upon the environment. Reference has been made in this assessment to the Environmental Review (ER) which was made available to tenderers in which the factors affecting environmental quality were identified. In addition, account has been taken of the effectiveness of control and mitigation measures which have been incorporated into the overall design of the facility. These include, in particular, measures for odour and dust control, bird, rodent and insect control, noise abatement and the treatment of wastewaters to an acceptable standard.

The potential impacts arising during the construction phase were also identified in the ER and will be addressed in greater detail in the IA to include an examination of mitigation measures and control procedures proposed.

Positive environmental impacts identified in the ER do not require further quantitative assessment because they are self explanatory. These include:

- more efficient and Territory wide management of refuse;
- elimination of the use of open barges which contribute to marine litter; and
- the provision of alternative waste disposal, thus expediting the decommissioning of Kennedy Town Incinerator.

The assessment has also included consideration of the measures employed to mitigate the environmental impacts of the Kowloon Bay Refuse Transfer Facility.

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THE FACILITY

2. DESCRIPTION OF THE FACILITY AND ITS OPERATION

The proposed refuse transfer station facility is located in Chai Wan on Sun Yip Street as shown in Figure 1. It is situated in an industrial area on a 0.9 ha site between the Chai Wan Sewage Treatment Works and a sea water pumping station in surroundings which are predominantly industrial.

Figure 2 shows a general layout of the facility. The transfer operation will take place at ground and first floor levels. Refuse Collection Vehicles (RCVs) will enter the facility from Sun Yip Street and will pass through a traffic-light controlled weighbridge system, along a ramp and into the Tipping Hall on the first floor. The route from the site's entrance to the tipping hall will be approximately 200 metres long which will if necessary in adverse circumstances accommodate between 25 and 30 RCVs awaiting access to the Tipping Hall. The layout of the facility has been designed such that it will not be possible to see into the Tipping Hall from the site's entrance on Sun Yip Street and that waiting RCVs will not queue on the public highway.

In the Tipping Hall the RCVs will deposit their loads into push-pits and will then exit the facility via another weighbridge and through a vehicle wash system, onto Sun Yip Street.

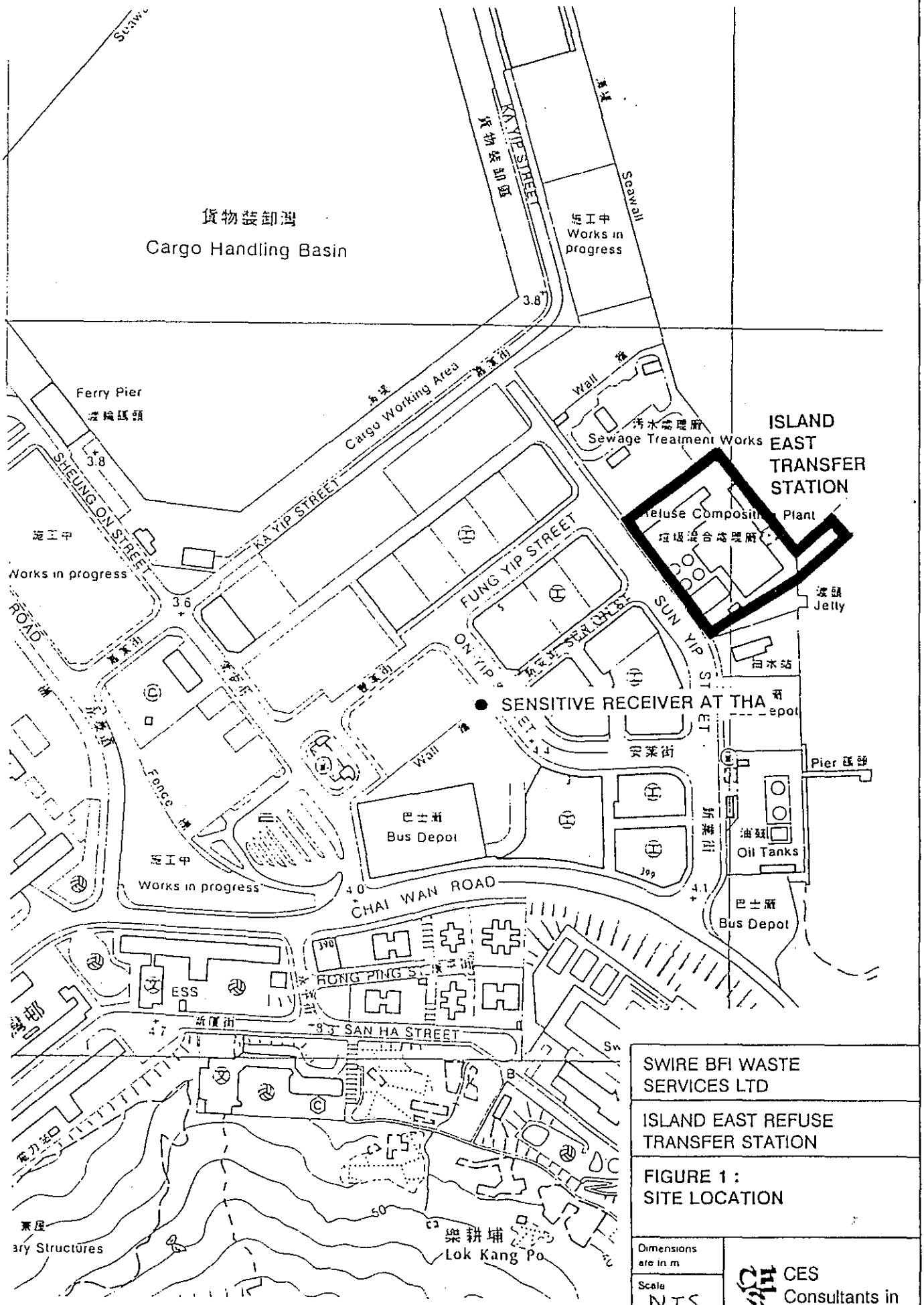
From the push pits the refuse will be compacted into containers (with approximately 14.5 tonne refuse capacity) located on the ground floor of the facility. When full, the containers will be loaded by the sea vessel's gantry crane onto the sea vessel for transfer to landfill. However, there will be rare occasions, such as during a typhoon, no. 8 and above, when the full containers will be loaded onto lorries for overland transport to landfill. When this occurs, the container lorries, or Refuse Transfer Vehicles (RTVs) will also exit the facility via the weighbridge and vehicle wash system.

The container facility, with the exception of the sea vessel or container lorry loading area, will be contained within one building. The barge or container lorry loading will take place on the harbour side of the facility and will therefore not be visible from Sun Yip Street.

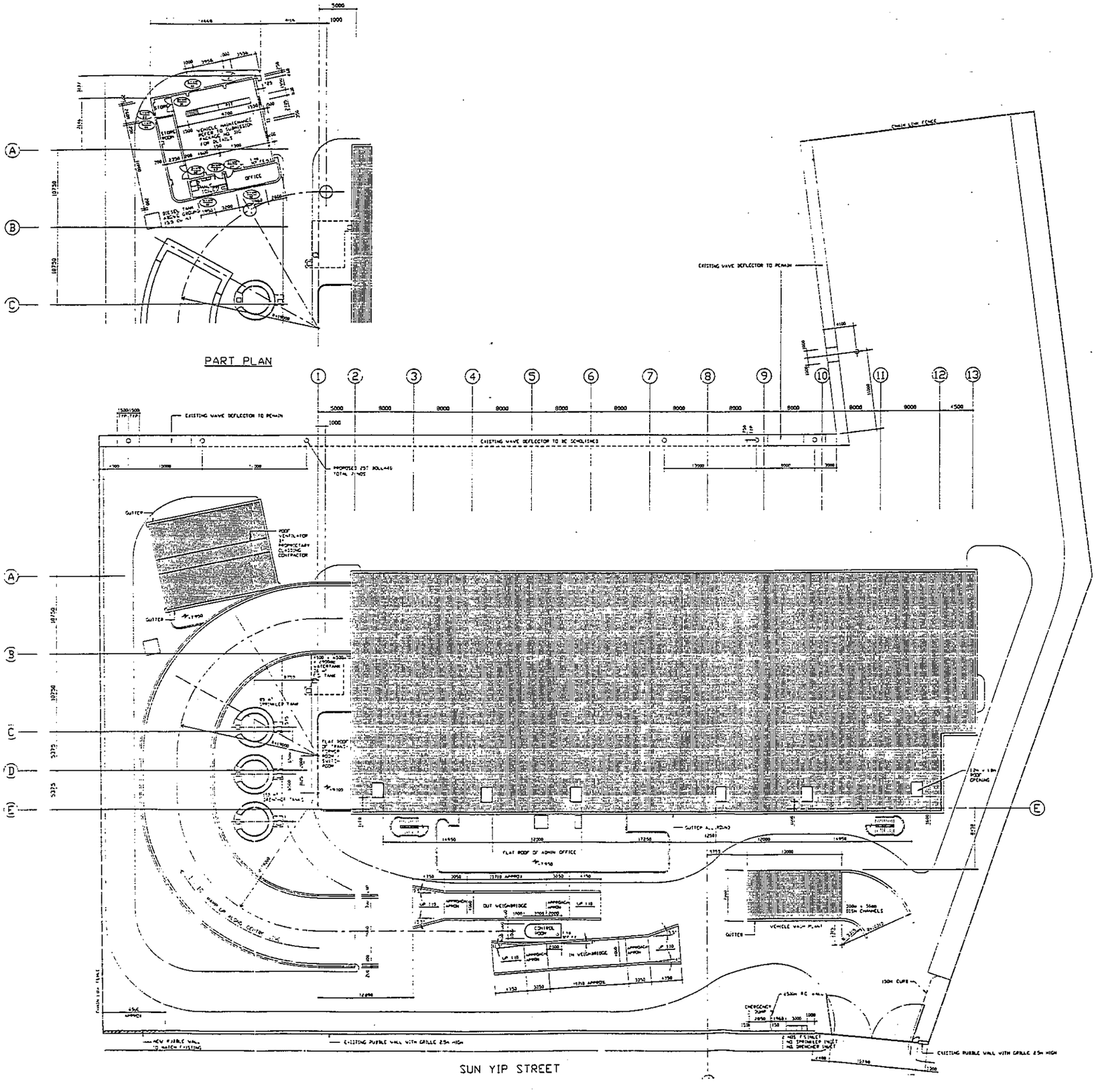
The facility is designed for a normal refuse handling capacity of 1200 tonnes per day. This corresponds to between 240 and 300 RCVs per day. The maximum RCV peak hour arrival rate will be 44 vehicles per hour. The daily refuse acceptance period will be 0730 to 2330, as specified by USD. Typical daily operation will constitute the transfer of 85 containers to landfill on one sea vessel.

Under exceptional conditions, for example immediately before and after Chinese New Year and following typhoons when waste arisings are high, the daily throughput of the facility may increase to 1440 tonnes per day. This would only be for short periods and corresponds to approximately 100 containers. The last 15 containers would be stored overnight and transferred onto the next sea vessel the following day. The plant has sufficient capacity to handle these peak loads.

Maintenance work would normally be carried out during operational hours. Maintenance during the period 2300 to 0700 would only be required in exceptional circumstances.



SWIRE BFI WASTE SERVICES LTD	
ISLAND EAST REFUSE TRANSFER STATION	
FIGURE 1 : SITE LOCATION	
Dimensions are in m	CES Consultants in Environmental Sciences (Asia) Ltd
Scale NTS	
Date JAN 92	



SWIRE BFI WASTE SERVICES LTD	
ISLAND EAST REFUSE TRANSFER STATION	
FIGURE 2 : SITE LAYOUT PLAN	
Dimensions are in m	CES Consultants in Environmental Sciences (Asia) Ltd
Scale NTS	
Date JAN '92	

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CONSTRUCTION IMPACTS

4. INITIAL ASSESSMENT OF ENVIRONMENTAL IMPACTS DURING CONSTRUCTION

4.1 Construction Noise

4.1.1 Statutory Criteria and Guidelines

Noise generated by general construction activities and by percussive piling is controlled under the Noise Control Ordinance (NCO). Under the NCO, the acceptable noise levels (ANL) for general construction work are determined by the methodology specified in the Technical Memorandum on Noise from Construction Work other than Percussive Piling, gazetted in November, 1988. The ANL are presented in Table 4.1. The nearest sensitive receiver, the THA, has been given an Area Sensitivity Rating of C, due to its proximity to industrial areas. There is no statutory limit for daytime construction operations, but a recommended limit has been adopted in keeping with the spirit of the White Paper on Pollution and in accordance with criteria approved for construction work elsewhere. This limit is also presented in Table 4.1.

Table 4.1 Acceptable Construction Noise Levels at THA

Time Period		L_{eq} (5 minutes), dB(A)
Daytime	0700 - 1900	75
Evening	1900 - 2300	70
Holidays and Sunday daytime and evening	0700 - 2300	70
Night-time	2300 - 0700	55

Noise generated by Percussive Piling is similarly subject to control under the NCO as outlined in the Technical Memorandum on Noise from Percussive Piling. The Percussive Piling memorandum differs from the construction memorandum in that the Construction Noise Permit required for piling includes restrictions on the hours during which piling can take place as outlined in Table 4.2. The acceptable noise level (ANL) for the THA is 85 dB(A). The permitted hours of operation are presented in Table 4.3. These are based on the extent to which the Corrected Noise Level (CNL) at the sensitive receiver exceeds the ANL.

Table 4.2 Permitted Hours of Operation for Percussive Piling

Amount by which Percussive Piling CNL exceeds 85 dB(A) at the THA	Permitted Hours of operation on any day not being a general holiday
More than 10 dB(A)	0800 - 0900, 1230 - 1330 and 1700 - 1800
Between 1 dB(A) and 10 dB(A)	0800 - 0930, 1230 - 1400 and 1630 - 1800
No exceedance	0700 - 1900

Table 4.3 Summary of Construction Activities

ACTIVITY	DURATION	COMMENTS
TRANSFER STATION		
Demolition	5/91-8/91	- Hoarding erection - Equipment removal - Concrete breaking - Temporary arrangements operational
Piling & Pilecapping	7/91-1/92	- Using steel H piles - Percussive piling
U.G. Drainage	10/91-12/91	- Piping installation
G.F. Slab	1/92-2/92	- Concreting
Ramp Construction	12/91-3/92	- Concreting
1st F. Slab	2/92-4/92	
Compactors	3/92-6/92	- Installation
Wastewater Treatment Plant	5/92-8/92	- Reinforced concreting - Installation and commissioning
U.G. Tanks	1/92-3/92	- Excavation - Installation of reinforced concrete tanks
Building Construction	3/92-9/92	- Roofing, cladding, fire services
Electrical Installation	5/92-9/92	
Plumbing	5/92-9/92	
Heating/ventilation air conditioning	3/92-7/92	- Ductwork
Roadworks	4/92-8/92	- Concrete - Vibratory rollers
Weighbridge and Vehicle Washing System	4/92-8/92	- Concreting, cladding, installation, commissioning
Vehicle Maintenance Building	5/92-10/92	- Concreting, cladding, finishing
JUNK BAY		
Temporary Facilities	5/91-7/91	- Concreting and fencing
Interim Facilities	6/92-11/92	

4.1.2 Construction Noise other than Percussive Piling

Analysis of the construction activities presented in Table 4.3 shows that the noisiest types of powered mechanical equipment will be used during the demolition and piling phases. During demolition, concrete breaking is required and although activities where concrete breaking is performed are of short duration, (as the existing building is a steel frame structure), a hydraulic breaker is one of the noisiest pieces of equipment available having a sound power level of 122 dB(A). Noise generated by the 5 months of piling will be considered separately in section 4.1.3.

The noise generated during the demolition phase is the subject of a separate "Environmental Technical Note on Demolition Works". It was found that demolition operations would not cause exceedance of the construction ANL at the nearest sensitive receiver and that a Construction Noise Permit could be applied for during demolition in order to extend working hours to include Sundays and Public Holidays.

Noise from the demolition operations is below the construction ANL because of the mitigation provided by distance attenuation between site and NSR and barrier attenuation achieved by the location of factory buildings between the site and NSR. Additional mitigation of construction noise has been provided for by the erection of 2.4 m high, 18 mm thick plywood hoardings around the site boundary.

Other construction activities that will be noisy include excavation for the underground tanks and use of vibratory rollers and compactors and concrete lorry mixers during concreting operations. The sound power levels of individual pieces of powered mechanical equipment required for concreting range from 105 to 109 dB(A). Concreting will be undertaken throughout the whole construction period, beginning with the formation of pile caps in October 1991 to the building of the vehicle washing and maintenance facilities which are due to be completed in October 1992. Analysis of construction noise will be made in the Key Issues Report on Construction. As for the demolition phase, the use of silenced equipment is specified in the Invitation to Tender.

Many of the activities relating to the construction of the actual building will be performed inside the building structure. Therefore, for the purposes of assessment, construction phases such as electrical installation and plumbing will not require further review.

One activity that will be performed in conjunction with construction of the superstructure will be the installation of the compactors from March to June '92. This will require the use of mobile cranes which each have a Sound Power level of 112 dB(A).

It is anticipated that the superstructure will provide attenuation of the crane noise, even if the building envelope is incomplete at the time of compactor installation.

Assessment of whether a construction noise permit could be obtained to enable construction during the evenings, on Sundays and on Public Holidays, will be undertaken in the Key Issues Report on Construction.

4.1.3 Percussive Piling

The ANL for Piling at the THA of 85 dB(A) equates to a transfer station site boundary level of 148 dB(A). This is determined by back calculation, using 150 m distance attenuation, building screening and facade reflection corrections.

Percussive piling hammers used to drive steel H piles have a sound power level range of 126 to 132 dB(A) depending upon equipment type. The noisiest piling method is to use a diesel hammer

driving a steel pile (132 dB(A)). However, a dozen diesel hammers operating simultaneously at the site boundary would result in a sound power level of 143 dB(A) which is less than the ANL of 148 dB(A) calculated at the site boundary. Therefore, at this stage of the assessment, it appears that no exceedance of the ANL will be recorded. Permitted hours of operation for percussive piling would be 0700 - 1900. Piling will be undertaken from the end of July 1991 until December 1991.

The analysis above will be confirmed in the Construction Key Issues Report when more detailed equipment schedules are available. Whilst silenced equipment may not be necessary in this application, the construction contractor should nevertheless provide the quietest equipment available to him in the interests of reducing overall noise levels in Hong Kong.

4.2 Dust Emissions

4.2.1 Statutory Criteria and Guidelines

The Air Pollution Control Ordinance encompasses a number of Air Quality Objectives (AQOs) including dust emissions from construction sites. The AQOs relevant to this assessment include Total Suspended Particulates (TSP) and Respirable Suspended Particulates (RSP). These are presented in Table 4.4.

Table 4.4 Statutory Air Quality Objectives and Guidelines for TSP/RSP

Parameter	Average Concentration, $\mu g.m^{-3}$		
	1-Hour	24-Hour[i)]	Annual[ii)]
TSP	500[iv)]	260	80
RSP[iii)]		180	55

i) Not to be exceeded more than once per year
ii) Arithmetic means
iii) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or smaller.
iv) Guideline for tolerable dust level at the site boundary

The additional maximum short term average TSP of 500 $\mu g.m^{-3}$ per hour has also been applied generally to construction sites in Hong Kong although it is not a statutory limit. This recognises that dust levels on construction sites can be very high over short time periods. The ER stipulated that dust levels on the site should not exceed 5 $mg.m^{-3}$. The lower of these two figures, i.e. 500 $\mu g.m^{-3}$ per hour has been adopted as the site boundary limit.

4.2.2 Assessment of Dust Emissions

The major sources of dust will arise from excavation for the underground tanks, earthworks and wind erosion of dry material (such as soil) on site. Regular watering, particularly during the early stages of construction - i.e. during excavation and before foundations and roads are laid will minimise dust. Additional control measures will also be employed. These include the installation of a vehicle wheel washing bay and covering of loads on trucks leaving the site.

TSP and RSP levels in the general area are already at a high level (refer to Section 3 above) and therefore every effort should be made to ensure that no further significant increases occur.

Construction dust dispersion modelling will be undertaken in the key issues report on construction. This will determine the likely levels of particulates at the NSRs which can then be compared with the limits discussed above to determine the efficacy of mitigation required.

4.3 Water Pollution

4.3.1 Statutory Criteria and Guidelines

There are no effluent limits applicable to construction runoff.

4.3.2 Assessment of Construction Runoff

The most likely source of water pollution will be from contaminated runoff carrying suspended solids into Victoria Harbour via the stormwater drains. This is most likely to occur during early stages of construction when areas of ground are exposed. The early phases of construction will be undertaken in the wet season. Therefore, runoff is likely to occur. Silt traps on stormwater and foul sewer drains will be required. As discussed in the "Environmental Technical Note on Demolition Works", watering required for dust dampening should be undertaken with caution to minimise runoff. This practice will be reduced in any event because of the season.

To place the level of impact into perspective, given the small site area (approximately 0.9 ha) when compared with the existing solids loadings to the Harbour arising from sewer and surface drain discharges, it is considered that contribution from this site will be of an insignificant level and for a short duration.

During construction, the refuse transfer operation will be maintained. This has been discussed in a separate report, "Environmental Note on Temporary Refuse Transfer Operations". In this report, the method for leachate collection from the temporary ramp into a storage tank and subsequent discharge in the barge hold is described.

4.4 Visual Aspects

Completion of the facility will result in an improved visual appearance for the area. A possible impact arising out of construction work could be from lighting of the site at night. However, since the NSRs are either sufficiently distanced or have an obstructed view of the site, it is not expected that lighting glare will pose a problem.

5

OPERATION IMPACTS

5. INITIAL ASSESSMENT OF ENVIRONMENTAL IMPACTS DURING OPERATION

The anticipated environmental impacts arising from operation of the transfer station were outlined in the ER. These are considered in greater detail in this assessment and where necessary, mitigation measures for reduction of adverse impacts are presented.

5.1 Operational Noise

During operation of the facility noise will arise from a number of sources. These will include:

- RCV arrivals and departures;
- loading of refuse transfer containers onto sea vessels or lorries;
- sea vessel arrivals and departures;
- refuse transfer lorry arrivals and departures (on the rare occasions when sea vessels cannot be used);
- plant within the transfer station building (push-pits, compactors, vehicle washing, ventilation systems);
- general maintenance.

5.1.1 Statutory Criteria and Guidelines

The Noise Control Ordinance (NCO) provides the statutory basis with which noise from specific sources may be controlled. The relevant criteria for operational noise are contained in the 'Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites', gazetted on 7 November 1988.

The noise sensitive receivers in the immediate vicinity of the transfer station have an Area Sensitivity Rating (ASR) of 'C'. The Acceptable Noise Levels (ANL) for the area are, therefore, those given in Table 5.1.

Table 5.1 Acceptable Noise Levels

Time Period		L_{eq} (30 mins), dB(A)
Day	(0700 - 1900 hours)	70
Evening	(1900 - 2300 hours)	70
Night	(2300 - 0700 hours)	60

However, in the HKPSG it is stated that in order to plan for a better environment, the noise source should be located and designed so that the noise level at the NSR is at least 5 dB(A) below the ANL presented in Table 5.1 or no higher than the background noise if the latter is no more than 5 dB(A) below the ANL. It was found that background noise is less than 5 dB(A) below the ANL and therefore would not be used to re-establish the recommended ANL at a level equivalent to the background noise (see results in Table 3.1).

Assessment of additional RCV road traffic compared with the present loading will be compared with the HKPSG road traffic noise limit of L_{10} (peak hour) = 70 dB(A).

5.1.2 Vehicle Arrivals and Departures

The establishment of IETS does not, per se, produce any change in RCV traffic, given that the composting plant has been in use as a refuse transfer facility for several years. It does however, enable refuse throughput to be increased as it will have superior handling facilities to those provided at the composting plant.

RCVs will generate noise both on the roads leading to and from the facility and within the facility. The former will be considered in terms of the HKPSG value given above while the latter will be considered under the Technical Memorandum.

Using Transport Department traffic data for 1990, the projected L_{10} peak hour increase on Sun Yip Street is 4 - 5 dB(A). Calculations of road traffic noise, according to various scenarios are attached to this report (Appendix 1). Exceedance of the guidelines L_{10} limit is not anticipated.

RCVs within the tipping hall will not cause a noise problem at the NSRs because of the attenuation obtained by the tipping hall superstructure. Similarly, a noise problem is not predicted from RCVs queuing on site before entering the tipping hall because of the distance between the site and the NSR. Using the construction noise Technical Memorandum and approximating RCV idling noise with lorry noise, 20 vehicles queuing with their engines on would result in an L_{eq} (5 mins) of 66 dB(A) at the THA. Exceedance of the L_{eq} (30 min) ANL is not therefore anticipated particularly because this scenario is not likely to occur. However, in the unlikely event that 20 RCVs would be queuing on site, it is recommended that they switch their engines off if they are waiting in excess of a few minutes.

Refuse Transfer Vehicles (RTVs) will only be used on the rare occasions that the sea vessels cannot be used i.e. typhoon no. 8 and above. There will be a maximum of 85 RTV movements per day. This will not create a noise problem on the site or on nearby roads, particularly if the RTV activities are dispersed evenly across the day. This is verified by the road traffic calculations in Appendix 1 which show that the additional RTVs on Sun Yip Street result in a 1 dB(A) increase over the projected levels when the site is operational with RCVs only. Similarly, on the site itself, the RTVs would be located behind the transfer station building which would attenuate the noise from RTV loading.

5.1.3 Sea Vessel Arrivals and Departures

When the transfer station is fully operational, there will be 1 sea vessel movement per day. Any noise from this activity will be attenuated by the screening provided by the transfer station building itself in the same manner as noise attenuation from RTV activity and would be expected to provide an insignificant contribution to operational noise levels received at the NSRs. Typically, the vessel would depart at the end of the operation of the compaction process for the day and is therefore unlikely to be considered a nuisance.

5.1.4 Operational Noise within the Transfer Station

All refuse handling operations, namely the tipping of refuse from the RCVs into push-pits, the compactor systems and other noisy plant such as the ventilation fans all occur or are located within the enclosure and cover of the transfer station building itself. The ventilation and compactor plant room will be housed on the ground floor. Since the transfer station building will be insulated to minimise solar heat gain and this insulation gives a noise reduction of approximately 30 dB(A), compactor noise and ventilation noise will be reduced further and will therefore not give rise to adverse effects at the sensitive receivers.

There are 6 ventilation fans within the transfer station building. Their sound power levels (SPL) are 75 dB(A), 89 dB(A), 2 at 93 dB(A) and 2 at 97 dB(A). However, noise from them all is attenuated by the ductwork such that a maximum of 85 dB(A) each is not exceeded. The SPL of the compactors as measured 1 m away from the units are also 85 dB(A) each.

Operational noise that is not contained within the building structure includes noise from exhaust fan outlets and from container handling equipment. The exhaust fan outlets are located on the seaward side of the building at a point about 50 metres from the fans themselves.

The containers once full are loaded by the vessel's gantry crane onto the sea vessel. This is carried out in the open. The cranes, however, unlike the unenclosed motors on typical Hong Kong barge cranes - are gantry cranes on specially designed ships. They are similar to the systems operating on modern container ships in Hong Kong's terminals. In the case of RTVs being used instead of the sea vessel, containers would be loaded onto the trailers by a Container Handling Unit. However, as discussed above, noise from these activities and from the exhaust fans are attenuated by the transfer station building acting as a noise barrier.

Detailed calculations of the noise levels arising and degree of attenuation for individual NSRs provided by intervening structures will be provided in the key issues report. At this stage, however, no exceedance of statutory or planning guideline limits is anticipated.

5.1.5 Wastewater Treatment Plant

The plant is located in the compactor hall. Sound attenuations on the pumps will be provided. Therefore, no significant noise impact is likely to occur.

5.1.6 General Maintenance

It is possible that maintenance activites will be occasionally performed between 2300-0700 hours. As these are noise sensitive hours, wherever possible, equipment maintenance will be performed indoors or in the vehicle maintenance building. The ground floor of the transfer station building will be equipped with roller shutter doors at the access points to the container area. These will be closed anyway between 2300 - 0700 hours and will therefore contain noise generated by any maintenance.

Maintenance work performed outdoors should make use of silenced equipment where available or acoustic screens around the work area. However, as the distance from the NSRs is sufficient to provide over 50 dB(A) noise mitigation, further evaluation of maintenance noise should not be necessary. The recommendations made should be incorporated as good practice measures aimed at reducing noise levels where practicable. They should not be dismissed merely because the ANLs are complied with.

5.2 Airborne Emissions

The factors affecting air quality in and within the vicinity of the transfer station are odour and dust. The main source of particulate emissions is expected to be particulates in the diesel exhaust emissions from RCVs. Dust arising from refuse tipping was identified within the ER as the major dust source. However, experience at Kowloon Bay has shown that refuse is quite moist throughout the year and therefore, the dust levels obtained were lower than anticipated. The humid environment in the tipping hall combined with the exhaust emissions does produce a misty atmosphere within the Kowloon Bay tipping hall but this is not due to dust from refuse.

Principles of the air extraction/scrubbing system required were identified in the ER and are discussed in section 5.2.2.

5.2.1 Statutory Criteria and Guidelines

The AQOs presented in Section 4.2.1 for the construction phase similarly apply to operation of the transfer station. In addition, in the ER, a general dust limit of 1 $mg.m^{-3}$ (24 hour average) was established for within the transfer station.

There is no AQO for odour and the evaluation and measurement of this parameter is both subjective and fraught with technical difficulties. The 2 odour units level (Dilution Factor 2) specified in the ER is not to be exceeded at the site boundary. This limit is clearly designed so that the existing ambient odour level is not incremented, although it is widely accepted that recognition and complaints of odour do not occur until a dilution factor of about 5 is reached.

A site visit revealed that odours from the neighbouring seawater pumping station were more noticeable than those from the Chai Wan Sewage Treatment Works, but no data on background odour levels are available.

The Tender Documents specified additional air quality criteria for the ambient NO_2 and CO concentrations inside the tipping hall. The limits specified were 5.6 and 57 $mg.m^{-3}$, respectively, as 8 hour time weighted averages. These limits are very similar to the equivalent UK Health and Safety Executive Occupational Exposure Limits.

5.2.2 Dust Emission Sources and Control

As indicated in Section 5.2, the sources of suspended particulates have been identified as: vehicle emissions within transfer station and deposition of refuse within the transfer station. In addition, deposition and resuspension of dust on site paved areas and roads are other dust sources.

Experience shows that domestic waste in Hong Kong is of a relatively high moisture content (greater than 30%) and of low dust content. Tipping operations at Kennedy Town, Kowloon Bay Refuse Transfer Station and the existing Chai Wan facility have been observed to produce minimal quantities of dust and it is therefore considered that a major problem will not be presented, particularly since air extraction/scrubbing systems have been incorporated into the ventilation system design of the transfer station.

There will be 2 separate ventilation systems, with dedicated extraction provided over the 5 push pit areas and over the tipping hall area. In the tipping hall, individual ducts will be positioned above each RCV exhaust when positioned for tipping. These will collect exhaust emission fumes and particulates as well as any particulates from the refuse discharge itself. The system provides for 8 volume changes per hour with make up air entering through the RCV entrance. This system will enable superior removal of exhaust emissions to the Kowloon Bay system. The ventilation system in the tipping hall has been designed so that NO_2 concentrations will not exceed 5.6 $mg.m^{-3}$ (8 hr TWA) and CO concentrations will not exceed 57 $mg.m^{-3}$ (8 hr TWA). The push pit air extraction system draws air across the face of each push pit towards the rear of the pits. Although the refuse is moist, a high extraction rate of 20 volume changes per hour over the pushpits has been designed. The push pit areas are also enclosed with heavy duty plastic strip curtains to assist in dust control. Air is also extracted from the refuse compaction area at a rate of 2.5 volume changes per hour, with make up air entering along the open side of the building's north face. Additional features of the ventilation system and building design include:

- the tipping hall will be required to be sealed as far as practicable;

- there will be an air conditioned control room for the traffic controller and each pushpit controller;
- circulation of air through the air cleaning plant will be required to ensure that atmospheric dust emissions are very low.

Particle resuspension may be minimised by a regular tipping hall floor cleaning programme. Resuspension of dust deposited upon external site surfaces will also be minimised by regular, stringent cleansing, as part of the overall site maintenance and cleaning operations. Therefore, it is considered that this potential source of dust emission will be adequately controlled. The Elgin Pelican and Tennant cleaning/sweeping vehicles used at Kowloon Bay RTS have been found to be successful and windborne litter is not a problem.

The air extraction system has been designed to keep the general dust levels (TSP) during operation below the 1 $mg.m^{-3}$ recommended level. Make up air will enter the station through the vehicle entrance and vents in the north wall. In addition the air flow regime is based on the negative pressure system, drawing air in through the entrance/exit points such that fugitive emissions at these points will not occur. All the discharged air will therefore have been scrubbed.

The air extraction system will be subject to a more detailed assessment in the Operations Key Issues Report in which the air extraction system's ability to reduce and control particulate levels will be evaluated quantitatively. The effectiveness of the 20 mm mesh screen on the push pit extraction system and aluminium filters on the tipping hall extraction system will also be evaluated. Separate dust control equipment is not considered necessary for the refuse compaction area.

It is expected that the ventilation system proposed at IETS will be superior to that in operation at Kowloon Bay RTS. Since worst case dust levels recorded inside KBRTS were 0.47 $mg.m^{-3}$ in the tipping hall, the proposed system should more than adequately comply with AQOs and the general dust limit.

RCV particulate exhaust emissions outside the building on site roads will be highest when RCVs are queuing. It is implicit in the design, layout and operation of the transfer station that vehicles will spend the minimum possible time on site and queuing will therefore be kept to a minimum by the "fast-turnaround" nature of the facility. Maintenance of vehicle engines to minimise particulate emissions is the other most effective way of reducing emissions, but the responsibility for RCV vehicle maintenance lies with the USD not the IETS operators.

5.2.3 Odour Emission Sources and Control

The odour control scheme proposed at IETS is the same as that for Kowloon Bay RTS. Therefore, the discussion below is common to the operation of both transfer stations.

Possible odour emissions arise from:
- deposition of refuse and refuse liquors in Transfer Station;
- surfaces contaminated by refuse contact;
- Wastewater Treatment Plant;
- RCV and container vehicles.

Refuse possesses an inherent unpleasant odour, which intensifies with time spent exposed to hot humid atmospheres. The composition of refuse odours is complex and is a function of the constituents of the waste and the biological decomposition process. It is likely that the types of odourous compounds evolved could include indoles, skatoles, methylamines (rotting fish), mercaptans, organic acids, alkyl sulphides and hydrogen sulphide (rotten eggs). Clearly, close and constant control of potential sources will be required in order to prevent the occurrence of odour

nuisance.

An odour removal system has been incorporated into the building ventilation using an activated carbon-based adsorbent impregnated with potassium permanganate, commercially available as "Purafil". Odour removal and oxidation is achieved by chemisorption.

The containers into which refuse is loaded have a fully gasketted door seal which will prevent odour escape during storage. They will also be cleaned on the outside on every trip and inside as frequently as necessary. Although RCVs will proceed through the vehicle wash station on leaving the site, RCVs themselves are probably the most prominent odour sources. Fast turnaround will ensure that RCVs spend a minimum of time outside the transfer station building whilst on site. There will be no queuing outside the transfer station, so the potential odour nuisance from RCVs will be minimised.

Odour arising from the recycling plant of the vehicle wash was of initial concern at KBTS. For IETS as a result, the water mixing (fresh: recycled) plant was moved inside the main building, as was the waste water treatment plant, so that the odour control units in the transfer station building could reduce odour from these sources. Therefore, it is not expected that odour from the vehicle washing plant will be the concern that it might have been at KBTS.

However, if odour is detectable from recycled water, the ratio of recycle to water bled from the wash system should be reviewed.

The wastewater treatment plant is another potential odour source. As it will be located in the compactor hall the ventilation system for this area will also serve the treatment plant. In addition, the use of a sequencing batch reactor for wastewater treatment with flexible aeration control is less prone to septicity than a conventional type of plant for flows subject to daily and seasonal variations.

It is unlikely that spillages from enclosed RCVs will occur on the road near IETS but there will nevertheless be a programme of cleaning of neighbouring roadways. Cleaning of external areas on site will ensure that any spillage therein will be cleared immediately.

The design of the tipping hall floor allows for easy cleaning by being well drained with adequately sized drains and smooth floor surfaces. This will facilitate good housekeeping which will in turn prevent the potential for odour production from either refuse or leachate left on the floor itself or in the drains, whose designed falls will produce flow rates of a self cleaning velocity.

Given the intended operational regime of the transfer station, involving rapid movement of refuse, which has not aged beyond approximately 12 hours, stringent cleaning of the tipping hall floor and immediate cleansing and removal of any spillage, in combination with the design of the building ventilation system, it is envisaged that the concentration of odours will be relatively low and that the Purafil chemisorbent will achieve the necessary degree of odour removal. Exceedance of the 2 odour unit limit is not anticipated, although at the site boundary, it will be very difficult to evaluate odour sources.

5.3 Wastewater Discharges and Treatment

5.3.1 Statutory Criteria and Guidelines

Wastewaters from the site will require pretreatment before discharge into foul sewer in order to comply with the Technical Memorandum on Effluent Standards. The effluent limits are presented in Table 5.2. The wastewaters arising can be divided into those associated with surface runoff, domestic wastewater, foul waters and spillage.

Table 5.2 Standard for Effluents Discharged to Foul Sewer

Flow rate (m^3/day) / Determinand	≤10	>10 and ≤100	>100 and ≤200	>200 and ≤400	>400 and ≤600	>600 and ≤800	>800 and ≤1000	>1000 and ≤1500	>1500 and ≤2000	>2000 and ≤3000	>3000 and ≤4000	>4000 and ≤5000	>5000 and ≤6000
pH (pH units)	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Temperature (°C)	43	43	43	43	43	43	43	43	43	43	43	43	43
Suspended solids	1200	1000	900	800	800	800	800	800	800	800	800	800	800
Settleable solids	100	1000	100	100	100	100	100	100	100	100	100	100	100
BOD	1200	1000	900	800	800	800	800	800	800	800	800	800	800
COD	3000	2500	2200	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Oil & Grease	100	100	50	50	50	40	30	20	20	20	20	20	20
Iron	30	25	25	25	15	12.5	10	7.5	5	3.5	2.5	2	1.5
Boron	8	7	6	5	4	3	2.4	1.6	1.2	0.8	0.6	0.5	0.4
Barium	8	7	6	5	4	3	2.4	1.6	1.2	0.8	0.6	0.5	0.4
Mercury	0.2	0.15	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.2	0.15	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Copper	4	4	4	3	1.5	1.5	1	1	1	1	1	1	1
Nickel	4	3	3	2	1.5	1	1	0.8	0.7	0.7	0.6	0.6	0.6
Chromium	2	2	2	2	1	0.7	0.6	0.4	0.3	0.2	0.1	0.1	0.1
Zinc	5	5	4	3	1.5	1.5	1	0.8	0.7	0.7	0.6	0.6	0.6
Silver	4	3	3	2	1.5	1.5	1	0.8	0.7	0.7	0.6	0.6	0.6
Other toxic metals individually	2.5	2.2	2	1.5	1	0.7	0.6	0.4	0.3	0.2	0.15	0.12	0.1
Total toxic metals	10	10	8	7	3	2	2	1.6	1.4	1.2	1.2	1.2	1
Cyanide	2	2	2	1	0.7	0.5	0.4	0.27	0.2	0.13	0.1	0.08	0.06
Phenols	1	1	1	1	0.7	0.5	0.4	0.27	0.2	0.13	0.1	0.1	0.1
Sulphide	10	10	10	10	5	5	4	2	2	2	1	1	1
Sulphate	1000	1000	1000	1000	1000	1000	1000	900	800	600	600	600	600
Total nitrogen	200	200	200	200	200	200	200	100	100	100	100	100	100
Total phosphorus	50	50	50	50	50	50	50	25	25	25	25	25	25
Surfactants (total)	200	150	50	40	30	25	25	25	25	25	25	25	25

All units in mg/L unless otherwise stated; all figures are upper limits unless otherwise indicated.

Source : EPD Technical Memorandum on Effluent Standards, Table 1.

5.3.2 Assessment of Wastewater Discharges and Treatment

The design of treatment facilities was discussed at the tender stage when it was recommended that a plant with maximum flexibility as far as flows are concerned was required. Experience with wastewater treatment and particularly contaminant concentrations at Kowloon Bay RTS was also drawn upon. The transfer station operates during the daytime which effectively means that there is a zero flow into the wastewater treatment plant at night time (2300 - 0700).

Effluent collection has been divided into 4 groups:

Group 1 Contaminated water including liquor derived from waste compression in the collection vehicles, from the compaction of waste and workshop areas washdown water. However, vehicle washwater may be treated independently and recycled for further vehicle washing.

Group 2 Surface drainage water from potentially contaminated areas.

Group 3 Surface drainage water from areas with little or no risk of contamination.

Group 4 Accommodation discharges.

The treatment facility will provide the following:

- a bar screen;
- an equalisation tank in which oil and grease is removed by a skimmer and wastewater is pH adjusted;
- 2 single stage SBRs operating in parallel containing activated sludge microorganisms;
- a plate and frame press for SBR waste sludge dewatering.

Table 5.3 provides the worst case characteristics of wastewater entering the IETS wastewater treatment system. The maximum flow is estimated to be 20 $m^3.day^{-1}$ and as such corresponding effluent standards for flows between 10 and 200 $m^3.day^{-1}$ are appropriate and indicate the reduction required by the treatment plant.

The treatment system being used consists of two single stage Sequencing Batch Reactors which are a modification on the activated sludge system providing a more flexible system allowing the aeration time, the aeration rate, the settling time and the sludge wastage rate to be altered. This allows the hydraulic loading, of the system, the sludge loading, the sludge age and BOD removal to be independent of fluctuations in flows and loads which are unavoidable at this plant. Primary process control is undertaken within the plant by monitoring the flow of effluent and presetting variables accordingly whilst secondary process control is determined by the monitoring of effluents and assessed for compliance with effluent standards. The effluents which will require treatment before discharge to foul sewer i.e. those anticipated to have concentrations in excess of those specified in Technical Memorandum for effluents discharged to foul sewer include Groups 1 and 2. Group 3 effluents have been identified as being within the limits for discharge to storm sewers. Group 4, domestic sewage, can be discharged direct to public sewerage.

Table 5.3 Wastewater Quality Prior to Disposal to Treatment and Standards Required Prior to Disposal to Foul Sewer

Parameter ($mg.L^{-1}$)	Concentration Prior to Treatment	Treatment Requirements (Flow rate $>10\ m^3.day^{-1}$ and $\leq 200\ m^3.day^{-1}$)
pH (no units)	4.6	6 - 10
Total dissolved solids	8100	(i)
Total suspended solids	110	1000
Total acidity (as $CaCo_3$)	3480	(i)
BOD_5	9200	1000
Chemical oxygen demand	11000	2500
Ammonia nitrogen (as N)	120	(i)
Kjeldahl nitrogen (as N)	400	200
Total phosphorus (as P)	0.06	50
Oil and Grease	1500	100

(i) Not specified in effluent standards

Phosphorus in the form of phosphoric acid may need to be added to the wastewater treatment plant influent to maintain a proper C:N:P ratio. It can be seen from Table 5.4 that the predicted phosphorus concentration is low.

The predicted concentrations of the above parameters after the proposed treatment are not yet available. However these must adhere to the treatment requirements from the Technical Memorandum for Effluent Standards before discharge to public sewer. Comprehensive monitoring will be required to ensure compliance with these. At the present time sewage from Chai Wan area is discharged directly to Victoria Harbour with only preliminary treatment (screening) applied. The present total daily Biochemical Oxygen Demand (BOD) loading from the area is approximately 12.1 tonnes per day [1]. Assuming that the treated discharge from the transfer station will have a BOD concentration of 1000 $mg.L^{-1}$, the maximum acceptable limit within the effluent standards, then this site's discharge will be 0.17% of the total loading from the Chai Wan area and is therefore considered to have an insignificant impact on the receiving water.

5.4 Traffic Impact

During normal operation of the transfer station there is an estimated standard waste throughput of 1,200 tonnes per day. Each refuse vehicle is capable of holding up to 5 tonnes of waste, typically 4-4.5 tonnes, resulting in a total of approximately 240 to 300 vehicles entering and leaving the site per day. The peak hour vehicle movements will be of the order of 45 RCVs. During abnormal conditions such as following Chinese New Year it is anticipated that the daily throughput of refuse may increase to 1440 tonnes per day. It should be noted that the peak hour period for RCV arrival corresponds with end of shift, 1400 - 1500 hours, rather than road traffic peak hour on Chai Wan Road. Therefore, in an assessment of traffic noise, the RCV peak hour period is not the noisiest period of the day and RCV movements do not dominate traffic activity (see Appendix 1).

[1] HK Govt. DSD, Strategic Sewage Disposal Scheme WP PH1 Part 4, 1991

The tipping hall design allows for multiple tipping of rubbish from RCVs into the pushpits. If vehicle queuing is necessary outside the tipping hall, there is more than adequate space on site. The distance from the entrance of the site to the hall is approximately 200 m which will allow for approximately 25-30 vehicles. Given an average RCV turnaround of approximately 10 minutes it is considered highly unlikely that traffic congestion or road safety deterioration will occur on Sun Yip Street. No tailback of RCVs queuing for unloading will occur onto the street.

5.5 Bird and Rodent Control

5.5.1 Bird Control

Attraction of birds to the transfer station is much less of a concern than for Kowloon Bay Transfer Station which is very close to Kai Tak International Airport. However it is still desirable to avoid attracting birds to the site to avoid general nuisance so the measures applied successfully at Kowloon Bay will also be employed at Island East.

The transfer station building has been designed to discourage alighting birds by means of smooth, rounded corners, corrugated roofing and rainwater guttering protected with a 45° inclined plate. All ventilation outlets and inlets are to be covered with 20 mm diameter mesh. Should the building roof attract birds, porcupine wires will be installed.

In addition, the inwards air flow of the building's ventilation system and subsequent scrubbing of discharge air will ensure that odours are reduced thus minimising bird attraction.

The priorities in operation of the transfer station with regard to bird control are as follows:

- prevention of refuse accumulation in accessible areas;
- maintenance of a clean, odour-free site;
- regular cleaning of all vehicles;
- rapid clean-up and washing of any refuse spillage;
- exclusion of rodent populations;
- exclusion of birds from the transfer station building.

5.5.2 Rodent Control

The incorporation of rodent control measures into the design and operation of the facility will also ensure that predatory bird species are not attracted to the refuse transfer station environs. This will include limiting of all nominal openings to less than 20 mm, sealing around pipes and services, choice of rodent proof material and others as recommended by Municipal Services. However, it is expected that rats will enter the site in the RCVs, so poisonous baits or traps may be required. Experience at Kowloon Bay RTS can be used to advantage to minimise this problem.

5.5.3 Insect Control

Given the operational nature of the transfer station, with rapid throughput and no exposure of refuse, other than in the push-pits, insect nuisance is not considered to represent a large problem. In addition, the design of the site and the intended cleansing operations will not give rise to standing pools of water which could attract mosquitos. Regular inspection of the building for insect nests should also be undertaken.

5.6 Marine Litter

This represents a significant environmental improvement compared with the previous operations.

5.7 Visual Aspects

Marine litter is not anticipated because the refuse tipping facilities are enclosed in the transfer station building and the containers used to contain refuse within the transfer operations are sealed.

The Kowloon Bay RTS presents a positive visual impact because it is a clean site with buildings of architecturally pleasing design. It is expected that the visual appearance of IETS will also provide such a positive impact and will improve the appearance of the general area. The colour scheme proposed in the ER is endorsed. From outside the site, views of the transfer station activity will be restricted to vehicle movements, as all refuse handling operations will be conducted under cover, together with vehicle washing and wastewater treatment.

Site lighting, particularly of the container handling area on the seaward site of the site will be considered in the Key Issues Report on Operation.

5.8 Public Perception and Public Relations

In order to stimulate public awareness of the steps being taken to initiate environmental improvement with regard to waste management and disposal operations, it is important that information be made available to the public on the operation and management of the transfer station and the aims and objectives of its establishment. Although information will be provided in terms of the consultation mechanism for this EIA, further information could be made available through the production of literature and the organisation of 'open-days' and organised tours of the facility.

6

SUMMARY OF POTENTIAL IMPACTS

6. SUMMARY OF POTENTIAL IMPACTS

6.1 Construction

The environmental impacts arising from construction operations have been summarised below. More detail will be contained in the Construction Key issues report, where the impacts identified will be quantified and mitigation measures evaluated.

6.1.1 Noise

Detailed assessment of construction noise will be made in the Key Issues report when a construction equipment schedule is available. At this stage, potentially noisy activities have been identified. These include concrete breaking during demolition, excavation for the underground tanks, concreting and installation of the compactors. Piling will be another noisy activity. However, the analysis in section 4.1.3 indicated that permitted hours of operation would probably be all day from 0700 - 1900 as no exceedance of the 85 dB(A) limit would occur even with a dozen diesel hammers operating simultaneously at the site boundary.

6.1.2 Dust Emissions

Potential impacts arise from excavation for the underground tanks, earthworks and erosion of dry material on site. Mitigation measures will assist in construction dust control. The frequency of site watering will be established using the weekly TSP monitoring data. However, since much of the work will be undertaken in the wet season, watering may not be necessary on a regular basis.

6.1.3 Water Pollution

The potential impacts arise from contamination of surface runoff with suspended solids from exposed earth. Since this impact is more significant during the wet season, silt traps on stormwater and foul sewer drains will be required.

6.2 Operation

A more detailed assessment of IETS operation will be the subject of a separate Key Issues report.

6.2.1 Noise

A potential impact may arise from RCV vehicle movements although no exceedance of the HKPSG traffic L_{10} peak hour limit is anticipated. RCV movements on site require further evaluation in the Key Issues report on Operation. Plant within the transfer station building is expected to be adequately attenuated by the superstructure itself.

With respect to noise generated by the transfer of containers to and from the sea vessels, the transfer station building itself acts as a barrier between this operation and the NSRs. This will be examined in more detail in the Operation Key Issues report.

6.2.2 Airborne Emissions

Potential impacts arise from odour and dust emanating from refuse tipping and handling. Odour and dust control measures have been incorporated into the design and operational regime of the transfer station and, with correct operation, no significant impacts are likely to occur. Dust and odour are to be controlled at the transfer station to comply with the Air Quality Objectives.

6.2.3 Wastewater Discharges

Potential impacts arise from refuse compaction liquors, contaminated wash water and contaminated surface water runoff.

An assessment of contaminated wastewater arisings has been conducted at Tender stage and a wastewater treatment plant has been provided for those flows requiring treatment prior to disposal to public sewer. Therefore no significant impacts are likely to occur.

Wastewater discharge standards have recently been revised as the Technical Memorandum for Effluent Standards and will replace those stipulated in the Invitation to Tender.

6.2.4 Traffic Impact

There is adequate provision for RCV queuing on site and therefore no tailback onto Sun Yip Street is envisaged. Traffic congestion within the vicinity of the site is also not expected because of the fast turnaround of RCVs on site. A typical RCV turnaround time is about 10 minutes and the site can accommodate up to 25-30 RCVs without the need for queuing on Sun Yip Street.

7

MONITORING AND AUDIT PROGRAMMES

7. ENVIRONMENTAL MONITORING AND AUDIT PROGRAMMES

7.1 Baseline Monitoring

The monitoring of background conditions prior to demolition of the existing composting plant and construction of the RTS have been addressed in the "Environmental Technical Note on Demolition". A 24 hour noise monitoring programme was undertaken prior to demolition work in order to establish ambient noise levels in order to assess whether the ANLs should be reduced according to HKPSG recommendations.

The Demolition Note also discussed the ambient TSP monitoring undertaken prior to demolition. Whilst the monitoring period was relatively short, 2 weeks, it did help in establishing reference conditions against which construction dust levels could be assessed.

Although it is important to establish ambient conditions, changes may occur in background levels during the course of activities, especially during the operational stage so they should be used as a guideline only and referenced to the period at which they were undertaken.

7.2 Construction Monitoring

Parameters requiring monitoring during construction include TSP, RSP and noise (L_{eq} (5 min)). The relevant compliance limits have been presented in Sections 4.1 and 4.2.

Monitoring should be carried out according to Document 29 of the Invitation to Tender, such that the Resident Engineer has the authority to impose controls and restrictions on activities causing or likely to cause exceedance of guidelines or statutory limits. Since Document 29 (presented as Table 7.1) indicates once weekly TSP/RSP monitoring is sufficient, high volume samplers will be used and the data reviewed for the remaining period of the week. Hong Kong Productivity Council have been engaged to perform such monitoring.

7.3 Operational Monitoring

The environmental monitoring programme required during site operation is detailed in Table 7.1 and includes a dust monitoring programme within the transfer station itself. Compliance limits have been discussed in Section 5. In addition to complying with these standards it is considered important that any programme of compliance monitoring must yield data capable of permitting identification of the link between cause and effect, otherwise it may be difficult to identify measures which can be taken to reduce impacts and restore compliance. The monitoring programme has a dual role, therefore, which is to check the status of the general environment in the vicinity of the transfer station and to check emissions at the source with a view to reducing these if necessary. Measuring dust, odour and noise at the site boundary will not necessarily indicate source of these pollutants. Therefore, if the monitoring programme for noise and dust, which is to be undertaken at site boundary, shows that compliance is not achieved, the monitoring equipment should be moved to areas on site where the Company suspects the problem is occurring. In addition, for construction dust, mitigation measures should be automatically performed to see whether a reduction in TSP levels is achieved, thus verifying the source of pollutant.

One of the difficulties of odour monitoring is the characterisation and perception of odour and the wide variation in individual sensitivity. In cases where odour is likely to arise from a particular process and the chemical responsible can be identified, monitoring for that particular substance can be conducted and the control standard concentration (2 odour units in this case) can be set at twice the odour detection threshold of that particular chemical. In the case of refuse odours, these arise from a combination of chemicals which can have additive, synergistic or suppressant effects and

there exists no precise method for measurement. Instrumental methods for detecting low odour levels often are less sensitive than the human nose.

It is assumed that the aim of the stipulated standard is to ensure that no refuse odours are detectable at the site boundary, superimposed upon the prevailing ambient odour. Therefore it would appear that a sensible form of odour monitoring would involve regular patrol and sensing of the site boundary by an independent individual, (persons exposed to the same odour for a length of time lose sensitivity to it) followed by recording and reporting of the results and an assessment of their likely source. Any necessary remedial action can then be implemented.

Since release of the Invitation to Tender wastewater effluent standards have been revised and as such the wastewater disposed of into the foul sewer system is now required to comply with the Technical Memorandum of Effluent Standards. The effluent standards have been presented in Table 5.3. Failure to comply would be judged by less than 80% compliance with the standards, measured on a minimum of 5 consecutive daily samples.

In order to obtain a representative sample, it is proposed that a composite sample is made up, by accumulation of hourly grab samples, and that two sub-samples are extracted from this, one to be sent for analysis at an independent certified laboratory, one for storage in the event of accident and sample loss. All samples should be stored at $4^{o}C$.

Table 7.1 Environmental Monitoring Programme as per Tender Document 29

Sample Location	Parameter	Frequency
<u>During Operation</u>: Site Boundary	Dust: TSP RSP Odour[i)]	Once per week for first year. Monthly thereafter*.
Transfer Station (at a position where RCVs unload refuse into the pushpits in the Tipping Hall)	Dust	Once per week for first year. Monthly thereafter*.
Final Effluent	Flow pH Temperature Suspended Solids BOD_5 COD Grease and oil Detergents	Continuous monitoring and recording " " Once per week for first year. Monthly thereafter*.
Storm water Discharge	BOD_5 COD Grease and oil	Monthly
Site boundary	Noise	1 hour/week of day and night for first year. 1 hour/month of day and night thereafter*.
Noise Sensitive Receiver	Noise	1 hour/week of day and night for first year. 1 hour/month of day and night thereafter*.
Tipping Hall	NO_2 CO	Once per week for first year. Monthly thereafter*.
<u>During Construction</u>: Site Boundary	TSP RSP Noise	Once per week during construction

* subject to EPD approval and subject to review by EPD.

i) non-compliance failure will be counted if a measured odour level exceeding 2 odour units as sampled on 4 consecutive occasions at non overlapping one hour intervals is recorded.

7.4 Environmental Audit

The auditing proposed in the ER is endorsed i.e. the submission of a monthly report to EPD. This report should include all environmental monitoring results, assess whether compliance was achieved and indicate whether any remedial measures were undertaken. The effectiveness of remedial action should also be assessed.

The structure, management, methodology and reporting involved in the audit process will be addressed in detail in the Key Report on operation.

8

SUMMARY OF KEY ISSUES

8. SUMMARY OF KEY ISSUES

Key Issue Reports will be prepared on both the Construction and Operational stages of IETS. A more comprehensive analysis of all environmental impacts will be undertaken in these reports, with emphasis upon noise, dust and odour control and wastewater treatment.

APPENDIX 1

ROAD TRAFFIC NOISE ASSESSMENT ON SUN YIP STREET

Appendix 1 Road Traffic Noise Assessment on Sun Yip Street

Case (i)

Present Road Traffic Noise

Using 1990 data : There are 322 vehicles on Sun Yip Street in the am peak hour including existing RCVs - 65 vehicles per day or 130 vehicle movements per day.

Assume that of the other 192 vehicle movements other than RCVs 50% are heavy vehicles.

Assume peak hour flow = 10% of total ∴ Flow = 32 vehicles/hr

BNL	=	57.3 dB(A)
Mean traffic speed	=	50 km/hr
% Heavy Vehicles	=	$\frac{96 + 130}{322} \times 100 = 70$
Heavy vehicle correction	=	6.2 dB(A)
Gradient correction	=	0 dB(A)

Taking the nominal receiver position to be 10 m from the edge of nearside carriageway and 1.2 m above ground level,

Distance correction	=	0 dB(A)

No barriers are considered and
180° angle of off view which results in a correction of 0 dB(A).

∴ L_{10} (peak hour)	=	63.5 dB(A)

Case (ii)

Future Road Traffic Noise : All RCVs + RTVs on Road

Additional RCVs round trips per day = 270 - 65	=	205
RCV vehicle movements per day	=	410
(assuming average number of RCVs per day = 270)		
Additional RTVs per day	=	85
RTV vehicle movements per day	=	170
∴ Daily Traffic flow = 322 + 410 + 170	=	902
Assume peak hour flow = 10%	=	90 vehicles.
Basic Noise Level	=	61.7 dB(A)
% Heavy Vehicles	=	$\frac{96 + 130 + 410 + 170}{902}$
	=	89.4

Heavy vehicle correction	=	7.2 dB(A)
Using the same assumptions as in case (i),		
∴ L_{10} (peak hour)	=	68.9 dB(A)

This is an increase of 5.5 dB(A) when all the RCVs and RTVs are travelling by road.

Case (iii)

Future Road Traffic Noise : All RCVs on road but no RTVs i.e. projected normal operation for IETS.

Peak hour flow	=	0.1 (322 + 410)
	=	73 vehicles
BNL	=	60.8 dB(A)
% HV	=	$\frac{96 + 130 + 410}{732}$
	=	87
Heavy vehicle correction	=	7.1 dB(A)

∴ L_{10} (peak hour) = 67.9 dB(A). This is an increase of 4.4 dB(A) compared with case (i).

APPENDIX 2

RESULTS OF AMBIENT NOISE MONITORING

Appendix 2 Results of Ambient Noise Monitoring

The results of the noise monitoring are summarised in Table A2.1

Table A2.1 Results of Noise Monitoring

Period (1 hour intervals)			A-weighted Parameters (dB(A))		
			L_{eq}	L_{90}	L_{10}
11:30 a.m.	-	12:30 p.m. on 13/6/91	69.3	65.3	72.3
12:30 p.m.	-	1:30 p.m.	73.3	68.8	75.8
1:30 p.m.	-	2:30 p.m.	75.9	71.3	77.8
2:30 p.m.	-	3:30 p.m.	76.1	70.8	76.8
3:30 p.m.	-	4:30 p.m.	74.6	72.3	76.3
4:30 p.m.	-	5:30 p.m.	73.9	70.8	74.3
5:30 p.m.	-	6:30 p.m.	68.5	65.3	72.3
6:30 p.m.	-	7:30 p.m.	67.9	64.3	68.8
7:30 p.m.	-	8:30 p.m.	67.0	63.8	66.3
8:30 p.m.	-	9:30 p.m.	65.8	63.3	66.3
9:30 p.m.	-	10:30 p.m.	66.9	62.8	64.8
10:30 p.m.	-	11:30 p.m.	68.2	62.8	65.8
11:30 p.m.	-	0:30 a.m. on 14/6/91	63.9	62.3	63.8
0:30 a.m.	-	1:30 a.m.	62.5	61.8	63.3
1:30 a.m.	-	2:20 a.m.	62.7	62.3	63.3
2:30 a.m.	-	3:30 a.m.	62.6	62.3	63.3
3:30 a.m.	-	4:30 a.m.	62.5	61.8	63.3
4:30 a.m.	-	5:30 a.m.	63.3	61.8	64.3
5:30 a.m.	-	6:30 a.m.	63.7	61.8	65.3
6:30 a.m.	-	7:30 a.m.	65.4	62.3	67.3
7:30 a.m.	-	8:30 a.m.	70.0	64.8	72.3
8:30 a.m.	-	9:30 a.m.	73.7	67.3	75.8
9:30 a.m.	-	10:30 a.m.	72.7	67.3	75.8
10:30 a.m.	-	11:30 a.m.	70.6	65.8	73.3

APPENDIX 3

RESULTS OF TSP AMBIENT MONITORING

Appendix 3 Results of TSP Ambient Monitoring

Table A3.1 Results of the TSP Measurement

Date (time) to Date (time)		24 hr Average TSP ($\mu g/m^3$) at 25°C	Weather Condition
5.6.91 (11:10)	6.6.91 (11:30)	114	Sunny - Sunny
6.6.91 (12:30)	7.6.91 (11:10)	55	Sunny - Sunny
7.6.91 (11:15)	8.6.91 (11:30)	50	Sunny - Rainy
8.6.91 (11:15)	9.6.91 (11:25)	31	Rainy - Rainy
9.6.91 (11:30)	10.6.91 (11:10)	29	Rainy - Rainy
10.6.91 (11:20)	11.6.91 (11:10)	33	Rainy - Sunny
11.6.91 (11:15)	12.6.91 (11:40)	38	Sunny - Cloudy
12.6.91 (11:45)	13.6.91 (11:10)	41	Cloudy - Sunny
13.6.91 (11:25)	14.6.91 (11:25)	39	Rainy - Sunny
14.6.91 (-)	15.6.91 (-)	N.A. *	N.A. due to no power supply

* N.A. Stands for Not Available

Notes : The Hong Kong Air Quality Objectives for 24-hr average TSP is 260 $\mu g/m^3$.

APPENDIX 4

NOTE ON TEMPORARY REFUSE TRANSFER OPERATIONS

Appendix 4 Note on Temporary Refuse Transfer Operations

1. INTRODUCTION

Demolition of the refuse composting plant and construction of the new refuse transfer station at Chai Wan (IETS) are expected to take 1½ years. It is envisaged that IETS will be operational by the end of 1992. During this period, refuse transfer operations are to be maintained at the site via temporary arrangements. This Note considers the temporary facilities proposed and how adverse environmental impacts can be mitigated.

2. POLLUTION CONTROL MEASURES

2.1 Site Improvement and Operation

In the tender documentation, two options were provided to prevent litter entering Victoria Harbour. Island East Transfer Station Co Ltd have chosen the second option which includes modifications at the refuse discharge point i.e. around the RCV vehicle tipping area and modifications to the barge itself and the transfer operation. The pollution control measures to be incorporated are illustrated in Figures 1 to 3 and include:

- an extension on the barge hold: the edge of the gunwale will be raised approximately 1 m to minimise the quantity of marine litter when RCVs are discharging their refuse into the barge;
- a heavy duty nylon curtain vertical to the ramp edge, held down by a plumb weight: this will prevent waste being blown into the sea between the berth and the barge;
- installation of a 3 m high litter control fence along the ramp constructed of net mesh with a 1 m wide fixed gate extending past the ramp over the barge. When the litter control fencing becomes covered with fly blown refuse it will be removed and replaced;
- separation of the temporary arrangements from the demolition area by 18 mm thick, 2.4 m high plywood hoardings;
- ramp drainage discharging into a 10 m^3 contaminated water storage tank, provided to collect leachate from the refuse and vehicle wash water;
- provision for discharge from the contaminated water tank into the barge hold at low tide via a flexible hose. It is anticipated that all of the leachate will be reabsorbed by the refuse. The amount of water collected in the storage tank will be greater than the leachate amount originally discharged from the RCVs due to the addition of the vehicle washing water.

A leachate stop (like a speed hump) is to be installed on the ramp so that contaminated water can drain only into the storage tank provided and not into stormwater gullies on the access road leading up to the ramp. Vehicles will be washed above this leachate stop so that the washing water can similarly be collected. As only 65 RCVs a day deliver waste to this facility, queuing is not anticipated. However, there is ample provision of queuing space on site if for some reason an RCV has to wait whilst another RCV is hosed down.

In addition, clean and safe operating conditions are to be adopted which will also reduce the possibility of refuse entering the harbour. The site will be regularly cleaned during the day; in

particular the ramp and the ramp drainage system will be maintained in order to prevent blockage of grilles etc that would cause build-up of contaminated water on the ramp itself. There will be no provision for on-site storage of waste arisings and during peak waste arisings periods of the year, additional barges will be required in order to remove all the waste.

2.2 Barge Operation

Whilst the temporary arrangements are being used, the barge operator will be required to cover the waste in the hold with tarpaulins. A spare tarpaulin will also have to be carried on board. It is also the barge operator's responsibility to collect any marine litter around the barge, using the clam shell grab on the barge.

3. NOISE

It will not be possible to assess operational noise from the temporary operation due to the noise generated by the demolition and construction works. However, in any event, the noise impact is considered to be insignificant becuase the operation involves only 65 RCVs a day driving onto the site and onto the ramp.

4. RECOMMENDATIONS

Refinement of the pollution control measures may have to be undertaken during the early stages of the temporary refuse transfer operation as operational experience is accumulated if the facilities require improvement. The ramp from which the RCVs unload into the barge is in an exposed position and easterlies will blow across the flat reclaimed land and up the ramp. It will be necessary to review whether the proposed litter control fencing is high enough to prevent litter left on the ramp from blowing into the harbour. It is anticipated that refuse removal from the ramp via sweeping will be a regular practice in order to prevent litter from being blown around.

The ramp drainage system should be reviewed when the temporary arrangements are in operation and if necessary, modifications can be made. Runoff from the washed RCVs will not all be collected by the ramp drainage system (ie above the leachate stop) because the vehicle washwater will continue to drip off the RCVs as they drive off the ramp and off the site. However, the quantity of runoff from the washed RCVs is expected to be small.

When the site is operational and temporary operations have ceased, grease and oil interceptors are required at the discharge point to stormwater drain. These interceptors are not being installed until that time as they will be incorporated into the overall site's drainage system which is yet to be designed.

The heavy duty nylon curtain extending off the ramp will have to be raised before the barge moors and lowered once the barge is in position. This curtain may become damaged in this process or by refuse hitting against it. The curtain will be replaced should it become damaged.

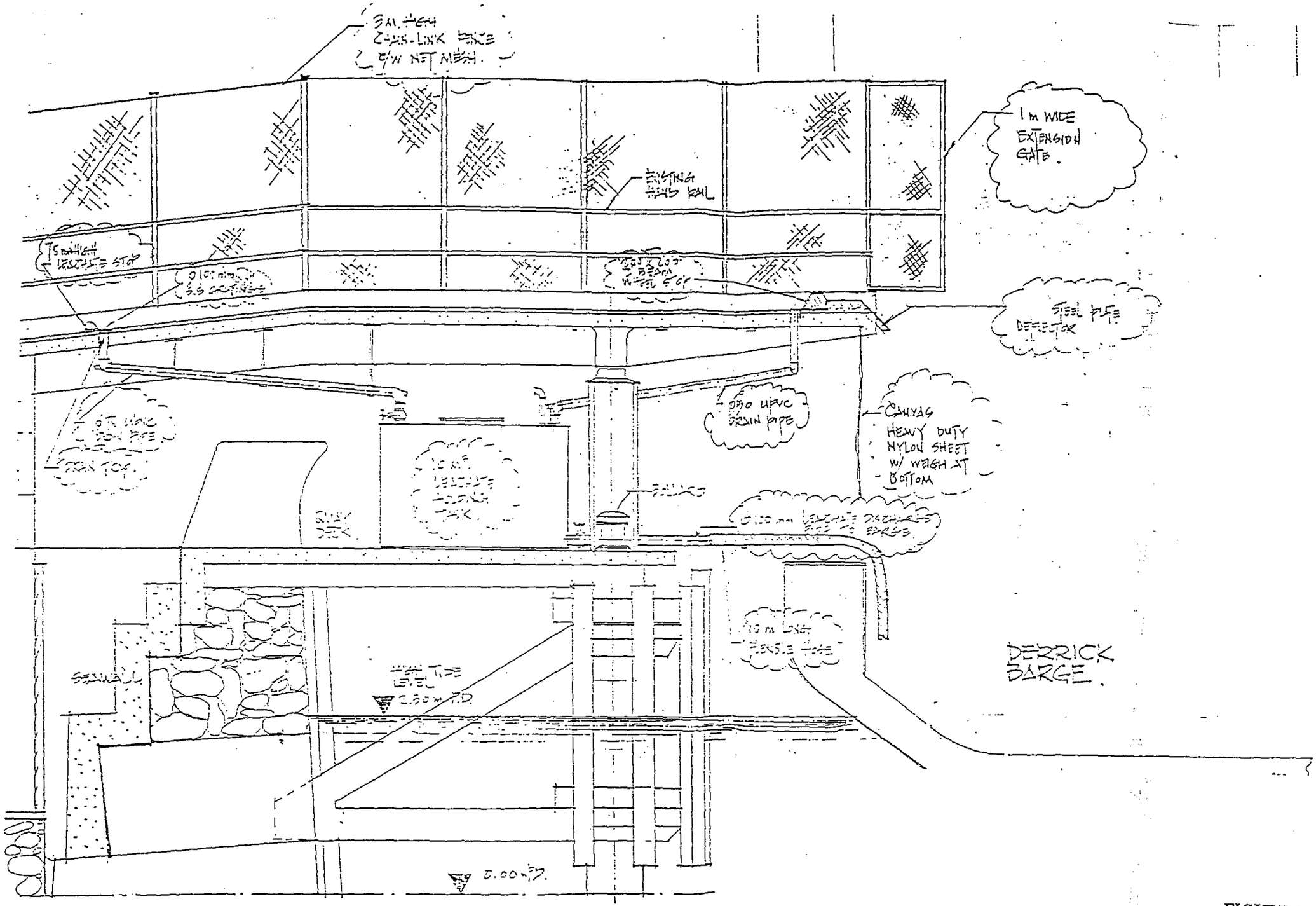

FIGURE 1
IMPROVEMENT WORKS ON RAMP - ELEVATION VIEW

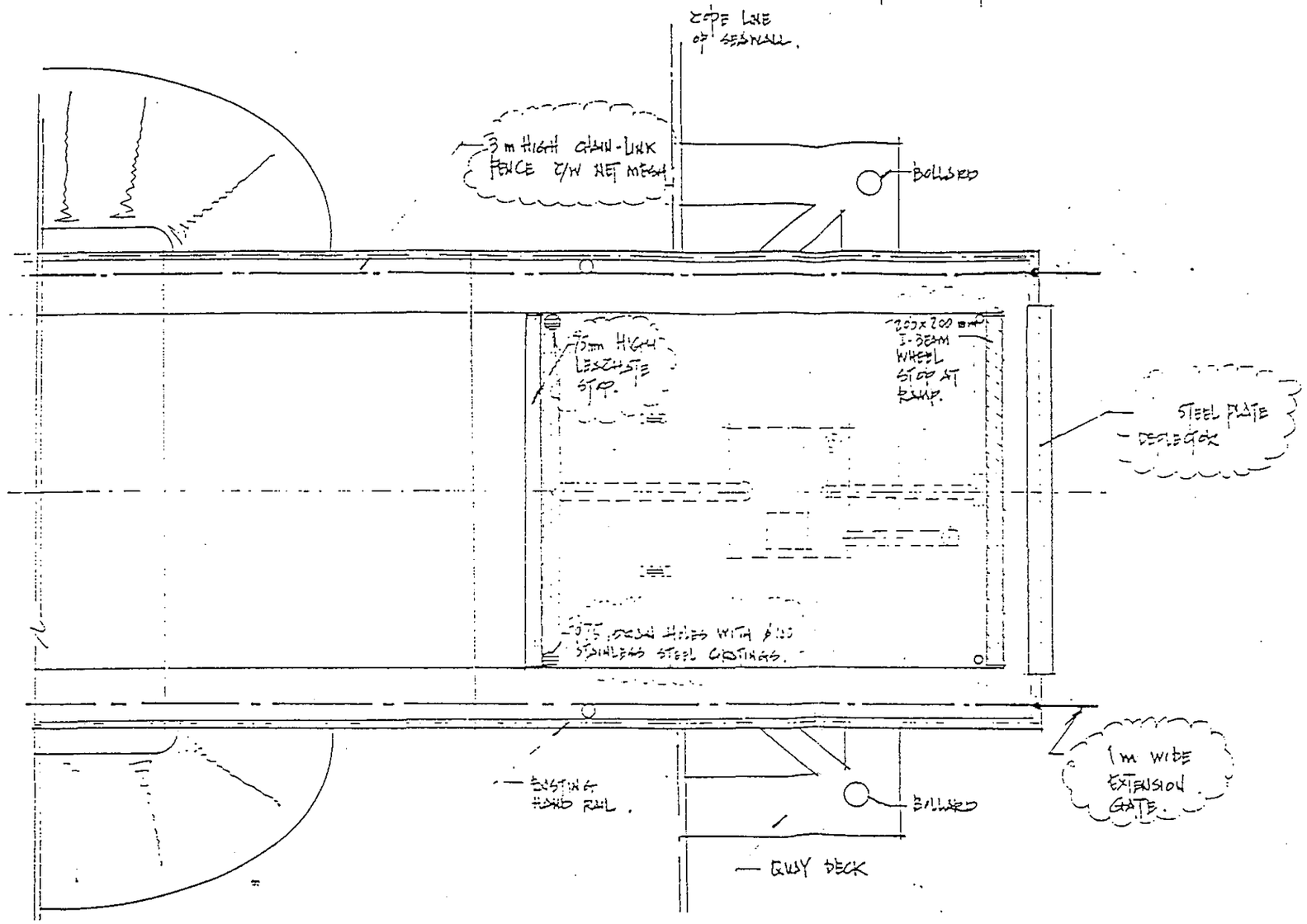

FIGURE 2
IMPROVEMENT WORKS ON RAMP - PLAN VIEW OF LOADING RAMP

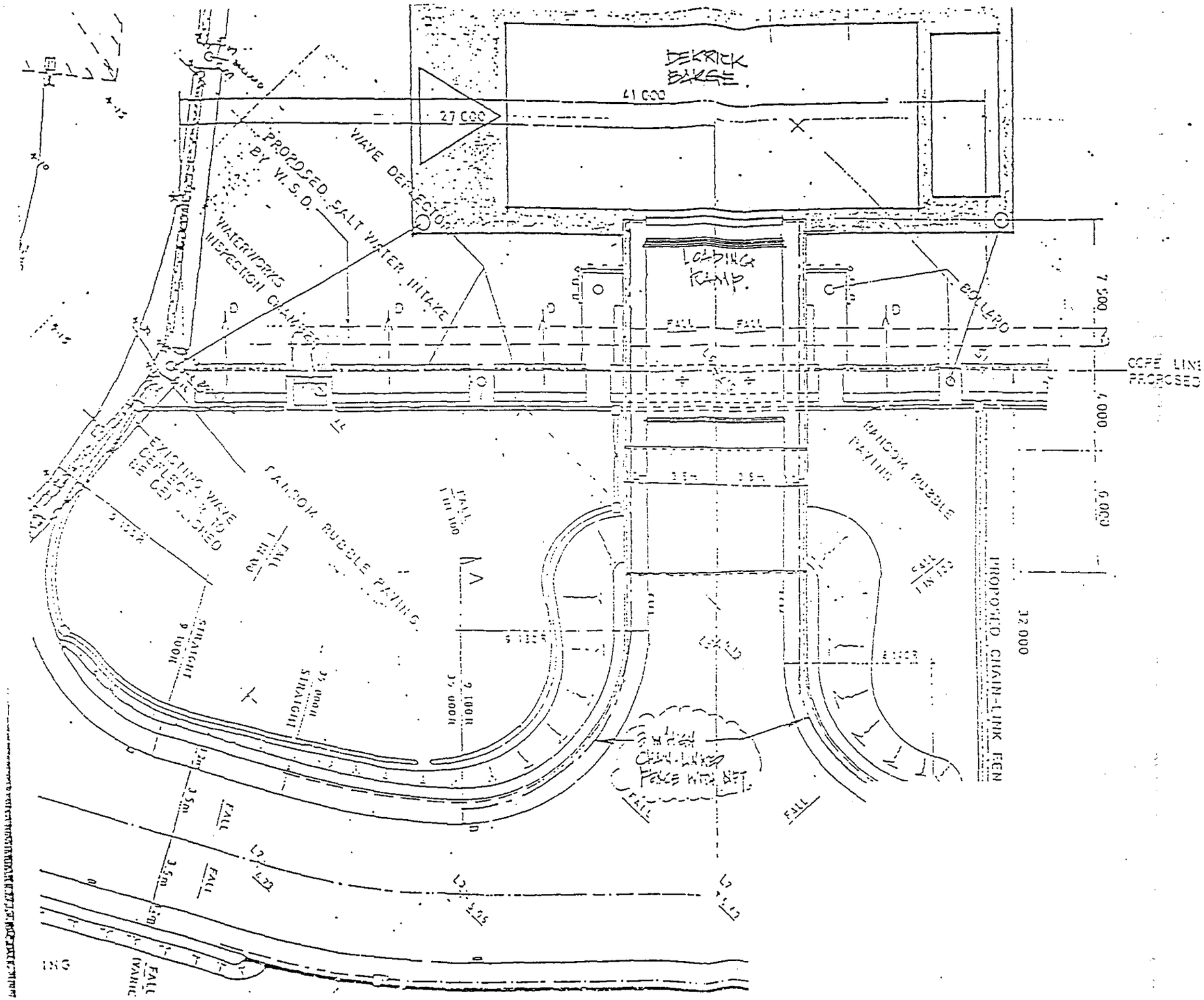

FIGURE 3
IMPROVEMENT WORKS ON RAMP - PLAN VIEW OF ACCESS ROAD AND MOORING ARRANGEMENT

APPENDIX 5

COMMENTS AND RESPONSES

Appendix 5

Responses to Comments
on
Environmental Note on Temporary Refuse Transfer Operations
Island East Transfer Station

i) Air Quality Issue

Comments:

As the temporary refuse transfer operations involve direct discharge of refuse from RCVs to the barge and which only installed with 3 m high litter control fence and plywood hoardings, there would be severe odour nuisance and also dust as a result of such open manner activities. Should the consultants please further investigate this issue and identify mitigation measures (e.g. total enclosure at the loading ramp where RCVs discharge refuse into the barge, control of barge staying time, etc.) to ameliorate the likely odour impact during the temporary operations.

Response:

The transfer of refuse from the Refuse Collection Vehicle (RCV) to the barge is undertaken within two minutes, after which any refuse remaining on the ramp is swept into the barge. The rear of the RCVs are then hosed down whilst on the ramp and the water is collected in a tank below the ramp. No refuse, contaminated leachate or washwater therefore collects in the unloading area and hence there is little potential for odour nuisance. Similarly, dust is not produced by the process because, as has already been ascertained, the refuse is wet. Only one barge is required per day which necessarily means that refuse does sit in the barge's hold for the whole day.

Total enclosure at the loading ramp where RCVs discharge refuse is restricted by the physical constraints of the ramp position in relation to the barge berthing area. If extensions are built out over the water from the end of the ramp, the barge cannot get as close which means that refuse would fall into the harbour. In addition, total enclosure was not required by the Tender Documents. The evidence of operations to date is that there is no dust or odour nuisance.

ii) Sewage Disposal Issue

Comments:

I have no adverse comment on the proposed leachate disposal method provided that it is only a temporary measure during the construction phase of the captioned refuse transfer station. However, consideration to remove left-over leachate at the bottom of the barge should be made as there is possibility that the leachate may not be completed 'absorbed' by the refuse.

Responses:

Noted and agreed. If the leachate is found to collect in the bottom of the barge, provision for removal such as pumping it out at the landfill site should be made.

ENVIRONMENTAL PROTECTION DEPARTMENT

a) General

Comment:

i. There is no assessment of environmental impact for the "Temporary Arrangements" stage, i.e. the temp. barging of refuse from CWCP to TKOL during construction period. Will the barging operation induce any additional impact to the existing environment?

Response:

There is a separate technical note titled "Island East Transfer Station Co Ltd Environmental Note on Temporary Refuse Transfer Operations" which was submitted to EPD on 11 June 1991 on which we have received comments and upon which responses have been submitted. This Note was produced in recognition of the fact that the Temporary Arrangements were required in June 1991 and was not specifically required by the Brief. We will append this Technical Note to the Initial Assessment.

ii. **Comment:**

Para. 5.2.2 - Any analytical data on the moisture content of HK refuse?

Response:

Experience at Kowloon Bay Refuse Transfer Station has shown that domestic waste in Hong Kong has a moisture content of greater than 30% as indicated in the report, section 5.2.2. In addition, Figure 11 from the EPD report "Monitoring of Municipal Solid Waste Arisings 1987" EPD/TP10/1988 has been reproduced here for your information.

Waste Content	Moisture Content (% by Wt.)
Putrescibles	53.8%
Paper	47.5%
Rags	39.0%
Plastics	30.0%
Wood	24.9%
Ferrous Metals	18.0%

Figure 11 Moisture Content by Waste Constituent - Publicly Collected Waste in Chai Wan Composting Plant

iii. **Comment:**

Para. 5.2.2. - The air extraction system, which draws air across the face of each push pit towards the rear of the pits, has an extraction rate of 20 volume changes/hour. Will it affect the effectiveness of the other ventilation system, which sucks vehicle emission fumes vertically upward, which has an extraction rate of only 8 vol. changes/hour.

Response:

It is expected that the design of the push pits and the ventilation plant ducting configuration is such that drawdown from the tipping hall where the RCVs' dedicated exhaust collection ducts are located, would not be significant. This is verified by performance testing at Kowloon Bay Refuse Transfer Station which has shown that the 8 air volume changes per hour are achieved in the Tipping Hall.

iv. **Comment:**

Para. 5.2.3. - Will re-cycled vehicle wash water induce any odour problem?

Response:

It has been decided that the vehicle re-cycling system will be located on the ground floor of the main building. Therefore, if any odour were to arise, this would be captured and treated by the building's odour control system.

v. **Comment:**

Para. 7.3. - Any operational monitoring during the "Temporary Arrangements" stage?

Response:

There will be no operational monitoring undertaken whilst the Temporary Arrangements are being used. This is in accordance with Document 29 from the Tender Documentation.

b) Air Quality Issue

i. General

Comment:

The report is in general just a elaboration of the ER for IETS done by ERL and has said in the report that further work would be done in the key issue report to determine the significance of the construction and operation impacts and hence determine the efficacy of mitigation required (S.4.2.2 last para. and S.5.2.2, 6th para.). The proposed methodology for the detailed assessment should be submitted to EPD for endorsement prior to the assessment.

Response:

Noted.

ii. Section 3.2

Comment:

It's noted from the report that the pre-construction TSP monitoring is protected from street activities by a 2.4 m high boundary wall and the monitoring result are in general quite low in view of the existing environment (industrial area and with concrete batching plant nearby). It might be

due to the fact that the high volume sampler was placed too close to the wall. Thus, the consultant should review whether the low TSP results were due to inappropriate monitoring location and investigate how true the result would represent the background TSP level.

Response:

The sampler was correctly sited taking into account the proximity of the boundary wall, available electricity supply point and the security of the measuring equipment. The low TSP results were more likely due to the weather conditions during the testing period.

iii. Section 4.2.1, 5.2.1 and 5.2.2

Comment:

The report has stipulate a number of air quality requirements within the site of the IETS which I think for the protection of the workers within the site during construction and operation. Those requirements should be the Occupation Health Criteria and the consultants should seek comments from the Labour Department.

Construction (Section 4.2.1 last para.)

i. dust level on the site should not exceed 5 mg/m^3;

Operation (Section 5.2.1 1st para. and S.5.2.2 3rd para.)

i. NO_2 concentration should not exceed 5.6 mg/m^3 (8 hr TWA);
ii. CO concentration should not exceed 57 mg/m^3 (8 hr TWA);
iii. dust level should not exceed 1 mg/m^3.

For area outside the site boundary (the ambient), the AQOs in APCO and the 2 odour units should be the referred standard.

Response:

The construction dust level adopted, 500 $\mu g.m^{-3}$ per hour is more conservative than the level stipulated in the ER and in this comment of 5 $mg.m^{-3}$.

The operational air quality limits cited are already presented in the report in sections 5.2.1 and 5.2.2.

iv. Section 5.2.2

Comment:

As the ventilation exhaust would contain a large amount of NO_2 and CO from the RCV exhaust emission fumes, the consultant should assess whether there would be any significant impact/exceedance of AQOs to the adjacent user and what mitigation measures are required.

Response:

The site has been used by the same RCV's (delivering waste to this former compost plant, transfer system or temporary arrangements) and such exhaust has not been treated, nor has it been a problem to adjacent site users. In the IETS, the ventilation exhaust will be passed through filters before discharged to atmosphere. The effectiveness of the filters is to be addressed in the Operation Key Issues Report.

v. Section 5.2.3

Comment:

The consultant should further elaborate the efficacy of the odour removal system using "Purafil" as the compostion of the refuse odour is very complex. The consultant should also instigate a program for the replacement of the adsorbent so as to ensure effectiveness of the system and a 2 odour unit is maintained at the site boundary. Furthermore, is there any quantitative assessment on the odour impact from the IETS?

The effectiveness of the odour control all depend on the odour removal system that incorporated in the building ventilation. However, it is still not clear whether the building ventilation would cover the whole plant or not (for example the tipping hall and the empty container storage area). Please clarify and a building/layout plan would be helpful.

Response:

A description of the odour control system is provided in the Tender Submission and is thus incorporated in the Contract.

Quantitative assessment of the odour impact is not proposed due to the difficulty in identifying odour sources at site boundary and in quantifying odour levels. Odour control units will be located in the combined tipping hall and pushpit ventilation system. The compactor hall ventilation system also has a combined Puracarb/Purafil unit to remove vehicle exhaust emissions and odours. Thus, the odour control system covers the complete main building.

Purafil contains an oxidising agent - potassium permanganate, the quantity of which can be easily determined with a chemical test. This will allow replacement times to be determined. Until the plant is operational, the requirement for replacement of the chemisorbent is not known.

Layout plans will be included in the report and have been attached to these responses.

vi. Section 7.3

Comment:

As the report has stipulated 2 odour unit as the required standard. Odour patrol itself can only give information on whether or not there was odour but not the extend of the impact. In order to ensure 2 odour units at the site boundary, odour panel test should be the referred control monitoring method. Moreover, odour patrol can be used in addition to the odour panel as a self control method and to identify the odour sources. Nevertheless, details of the proposed odour panel and the odour patrol should be submitted for comment.

Response:

Qualitative evaluation of odour will be examined in the Operation Key Issues Report.

vii. Section 7 and Table 7.1

Comment:

In general, the minimum requirement for TSP and RSP monitoring is once every 6 days instead of once weekly.

For odour monitoring, we suggest that the sampling should be conducted formally once weekly with odour level to be determined by an odour panel and supplemented by daily informal detection by odour patrol. For informal detection, if odourous smell was detected, a odour panel test should be followed to ascertain the existence of an odour nuisance.

Response:

Noted, although the comment on TSP/RSP monitoring is not in agreement with the Tender Documentation.

c) Noise Issue

i. General

Comment:

Please note that the comments stated below are given on the understanding that full analysis of certain construction and operational noise impacts would be covered in the key issues report. Please confirm.

Response:

We confirm that full analysis of construction and operational noise impacts will be undertaken in the Key Issues Reports.

ii. Section 2

Comment:

The period for routine maintenance work as indicated in p.2 differs from that stated in p.11.

Response:

The maintenance hours should be stated 2300 - 0700 on page 2, not 0600 hours. Nevertheless, routine maintenance will be conducted during the day : night-time maintenance activity would be extremely exceptional.

iii. Section 3.2

Comment:

It is not stated whether the baseline monitoring is carried out at the site boundary of the IETS or the THA.

The dominant noise source(s) of the ambient noise environment is not described.

Response:

Please refer to section 3.2 1st sentence in which it states "As part of the pre-construction baseline monitoring programme, a 24 hour ambient noise monitoring programe was undertaken at the site boundary".

There is no dominant noise source readily detectable in the area in which the site is located. The high ambient noise levels are contributed to by the industries within the multi-storeyed flatted factories near the site.

iv. Section 4.1.1

Comment:

It should be noted that for general construction noise assessment in accordance with the relevant TM, a NSR near industrial areas may not always be assigned an ASR of 'C' as such an assignment will depend on affect from the IF at the time of day under consideration. Hence Table 4.1 should be reviewed.

The provision under the Summary Offences Ordinance as cited in the last para. of p.4 was already repealed under the Noise Control Ordinance as consequential amendments.

Response:

The Technical Memorandum does not support this comment. There is no reference to reassigning ASRs according to the time period. In any event, the ambient noise monitoring recorded high noise levels at night - thus indicating that industry within the area must be operational at night. As such Table 4.1 will not be amended.

v. Section 5.1.2

Comment:

It is doubtful whether administrative measures like switching off engines in queuing RCVs are practical.

The noise impact from night-time (2300-0700) vehicular movements, if any, should be assessed.

Response:

Since it is more fuel efficient to turn truck engines off rather than idle over 1 minute, it is anticipated that this would be performed if necessary and if requested.

The site is not operational after 2330. Vehicular movements during night-time hours from 2300 - 2330 will be negligible and are not expected to be a problem.

d) Sewage Disposal Issue

i. **Comment:**

In para. 4.3.2 (p.8), it was indicated that 'silt traps on stormwater and foul sewer drains will be required' and 'contribution (surface runoff and sewage) from this site will be of an insignificant level'. The consultant should clarify further the operation of the silt traps and the application of the foul sewer drains. It should also be noted that sediments in the silt traps should be removed regularly.

Response:

The silt traps used on a construction site on stormwater drains are usually of a "basket" style where a mesh basket in which sediments are collected, can be easily removed for cleaning. Installation of a silt trap on the foul sewer line was recommended just to protect the system.

ii. Para. 5.3.3

Comment:

The treatment of surface drainage water from potentially contaminated areas at the proposed wastewater treatment plant would perhaps entail a big hydraulic design loading for the system, depending on the area of the potentially contaminated areas. Would it be possible to house as much as possible of the potentially contaminated areas within covered areas? The creation and hence discharge of a considerable amount of wastewater originating from rainfall to the foul sewerage is very undersirable.

Response:

The potentially contaminated areas referred to in Group 2 are within the refuse transfer station building such as the tipping hall floor. Large hydraulic loading on the wastewater treatment plant is not anticipated. It is not anticipated to divert site runoff originating from rainfall to foul sewer. Rainfall has been categorised under Group 3 which is to be discharged to storm water drain.

iii. **Comment:**

As regards para. 7.3, it should be noted that compliance of the effluent standards stipulated under WPCO is based on grab samples collected during any time of the day.

Response:

Discussion of the sampling procedures will be included in the Key Issues Report on Operation.

e) Waste Management

i. **Comments:**

Section 4.1.1 - 2nd paragraph
Table 4.3 should read Table 4.2

Response:

Noted.

ii. Section 5.4

Comment:

It was stated that the normal throughput of the facility is 1200 tpd and that it may process double the normal intake of refuse during abnormal conditions such as the Chinese New Year period. This statement seems to disagree with Section 2 (7th paragraph) which states that, under exceptional conditions, the daily throughput of the facility may increase to 1440 tpd.

It is recommended to incorporate some sketches or drawings which show the schematic layout of the facility in the report. This will assist the reader to understand better how the station layout, in practicular the station building, could help attenuating some potential impacts such as noise, site lighting, airborne emissions, traffic impact, etc.

Response:

The statement in Section 5.4 will be amended to state that the refuse intake may increase to 1440 tonnes per day around the Chinese New Year period, as indicated in Section 2.

A schematic layout will be included in the report and has been attached to these responses.

URBAN AREA, TERRITORY DEVELOPMENT DEPARTMENT

a) General

Comment:

Usually an environmental impact assessment report is carried out at the planning stage such that any required remedial measures would be incorporated into the contract before implementation. This report is only an initial assessment and there will be Key Issues Reports on detailed assessment to be undertaken at a later stage. However, I understand that contract for the transfer station had been awarded and demolition work for the existing Chai Wan Composting Plant commenced in June 91. I presume you have had provisions in the contract that would allow future incorporation of the proposals on remedial measures.

Response:

The Contract allows for agreed measures to be incorporated into the Transfer Station and its operation.

b) Para. 4.1

Comment:

You should indicate on a drawing the location of the sensitive receivers. Will you consider the accumulative effect of the construction activities?

Response:

The location of the sensitive receivers will be indicated on Figure 1, a copy of which is attached to these responses. Should construction activities result in cumulative impacts upon the environment, they will be addressed in the Construction Key Issues Report.

c) Paras. 5.1.2, 5.1.3 and 5.4

Comment:

The assessments have indicated that queuing of refuse collection vehicles onto the Sun Yip Street should not be permitted.

Response:

The assessment has indicated the queuing of RCVs on Sun Yip Street will not occur.

DISTRICT PLANNING OFFICER/HONG KONG

a) Para 3.1

Comment:

The concerned site falls mainly on an 'Industrial' zone with minor encroachment onto 'Government/Institution/Community' zone on the approved Chai Wan OZP No. S/H20/4. On 15.12.1989 the Town Planning Board approved a S.16 planning application (No. A/H20/40) for the subject refuse transfer station development;

Response:

Noted.

b) Para 5.7

Comment:

The Report should include detailed proposal for visual impact;

Response:

The proposed transfer station will present an improved positive visual impact by replacing an unattractive plant in a flatted factory industrial area. As in Kowloon Bay, the Refuse Transfer Station Proposed is low rise and contained primarily in one building. Futhermore, site operations cannot be viewed from Sun Yip Street. An artist's impression will be included in the Operations Key Issues Report.

The nearest sensitive receivers do not have a view of the site. The closest receivers who can see the site reside in Siu Sai Wan Estate, 500 m away across a yet to be developed reclaimed land area. We do not believe that further assessment is warranted.

c) Table 4.3

Comment:

Presumably, the Piling and Pilecapping construction duration '(7/91 - 1/91)' is a typing error.

Response:

Yes, it is a typing error. It should read 7/91 - 1/92.

TRANSPORT DEPARTMENT

a) **Comment:**

6th para of Section 2, page 2 - what is the maximum handling capacity of the proposed station ? How soon is it expect that the maximum handling capacity be reached ? Why was the maximum handling capacity not used as design value for assessing the impact of the proposed plant ?

Response:

The normal and maximum capacities of the station are set out in the Tender Documents and summarised in Section 2 of the IAR. The normal daily intake of the station will depend upon the growth in waste arisings generated on Hong Kong island and factors such as the timing of the closure of Kennedy Town Incineration Plant. IETS is designed to be flexible to acccomodate exceptional events and impact assessment has been conducted accordingly.

b) **Comment:**

Section 5.4, page 17 - the peak hour factor quoted here is about 15% to 20%, is this peak hour factor calculated base on normal traffic or specifically for the operating pattern of RCVs ? What is the peak hour factors of RCVs in existing refuse transfer station on Kowloon side ?

Response:

The peak hour factor is based upon the RCVs' operating pattern and has been determined using Kowloon Bay Refuse Transfer station as a model. This will be refined as necessary.

c) **Comment:**

Section 6.2.4, page 21 - What is the queuing capacity within the site and the average turn around time of a RCV in the transfer station ? Without such information it is difficult to prove that no tailback into Sun Yip Street is envisaged.

Response:

In Section 2 paragraph 2 it is stated that 25 - 30 RCVs can be accommodated on site before the entrance to the Tipping Hall. This is repeated in Section 5.4 paragraph 2 where it also states that the average RCV turnaround time is 10 minutes.

d) **Comment:**

Appendix 1 - what is the design year for the assessment of road traffic noise ? Has the assessment taken into account of the growth of other vehicles using the road ? What is the maximum acceptable noise level on the road in the area?

Response:

As stated in case (i) Appendix 1, the traffic data is from 1990 and the assessment did not consider an increase of other vehicles using the road. The maximum acceptable noise level on the road, in accordance with the Hong Kong Planning Standards and Guidelines is L_{10} (1 hour) = 70 dB(A) as received at the nearest sensitive receiver in the THA.

WATER SUPPLIES DEPARTMENT

a) **Comment:**

Existing watermains/waterworks reserve are affected. No development will be allowed which will require resiting of watermains/Waterworks Reserve.

Response:

Noted. No encroachment upon the Waterworks Reserve is required.

b) **Comment:**

Details of site formation work shall be approved by Water Supplies Department prior to commencement of works.

Response:

Noted.

c) **Comment:**

No structures shall be built or material stored within the Waterworks Reserve or 6 metres from the centre line of any watermains. Free access shall be made available at all times for staff of the Water Supplies Department or their contractor to carry out inspection, operation, maintenance and repair works.

Response:

Noted.

d) **Comment:**

A 5.3 m headroom shall be maintained at all time over the existing Waterworks Reserve.

Response:

Noted.

e) **Comment:**

No percussive piling shall be carried out within the Waterworks Reserve or 6 m of the centre line of any water main. In case where piling is necessary outside the above limits and in the vicinity of our existing Waterworks installations, the maximum particule velocity and amplitude of ground movement at the installations as measured by a vibrograph shall be restricted to 25 mm/sec and 0.2 mm respectively.

Response:

Noted. The above comments from the Water Supplies Department will be forwarded to the contractor for his information.

	Comment	Response
	Environmental Protection Department, ref. (64) in EP2/H20/02 (II)	
1)	Section (a) question iii) - There is no exhaust collection system at KBTS, please clarify how verification could possibly be made during testing of the station.	It was intended only to indicate that the design ventilation rate at KBTS is achieved in practice.
2)	Section (a) question iv) - Although the vehicle recycling system will be located at the ground floor of the main building, the vehicle wash building/compound is not. Based on KBTS experience, contaminated recycled washwater will give rise to odour problem. Would there be any preventive measures for the IETS system?	No additional preventive measures are provided. Odour nuisance from this source is not anticipated.
3)	Section (a) question v) - It is noted that certain environmental monitoring (for noise, dust in particular), under Document 29, are applicable to "Temporary Arrangements" stage.	Noted. However, the reference is to "construction" and the inference is that the monitoring is *primarily* intended to measure impacts of the construction activities. The monitoring would, of course, register any contribution from the temporary operations.
4)	Section (b) question ii) - It is stated that the "low TSP results were more likely due to the weather conditions during the testing period", would other weather condition affect the results? Or does it mean these results do not represent the "normal" condition?	Of course other weather conditions would affect the results. Weather is an important factor in determining concentrations of pollutants from multiple sources at a single receiver. It is not possible to comment on the "normality" of the condition, merely to state that data were obtained for nine 24 hour periods, during five of which rain was recorded.
5)	Section (b) question iii) - Would the Consultant please confirm if Labour Department have been consulted regarding the specified air quality requirements.	The construction dust levels *within* the site and the operational levels for NO_2, CO and TSP inside the transfer station are stated requirements included in the Tender Specification. Compliance is required irrespective of the basis or source of these figures. Establishment or review of occupational health criteria is not a requirement of the EIA Study, although it is noted that the NO2 and CO limits are very similar to the UK Health and Safety Executive's Occupational Exposure Limits. The Labour Department has not been consulted on this issue; if it is considered critical, a copy of the Report can be forwarded to that Department for comment.

6)	Section (b) question iv) - Comparison of previous CWCP condition with the proposed IETS station is inappropriate. It should be noted that the design throughput/capacity of 1000 tonnes per day for IETS, is considerably higher than that of the design capacity of CWCP which, with its smaller bunker size, could accommodate only a much smaller number of RCVs. Hence, for IETS, the amount of No and Co generated within the tipping area would be significantly higher. This may induce significant impact to adjacent users.	Noted. As stated in the previous response, a detailed assessment will appear in the relevant Key Issues Report.
7)	Section (d) question ii) - There would be other potentially contaminated areas which are not within the RTS building, for example, the ramp area and also the container loading/storage areas. Based on KBTS experience, containers do leak and the ramp surface does get contaminated easily either by grease or leachate. Hence, wastewater from these areas should be considered as Group 2 effluent and hence the drainage system should be designed on this basis.	Group 2 wastewater does include runoff from potentially contaminated areas. An assessment will be included in the relevant Key Issues Report.
8)	WSD's comment question b) - Have details of site formation work been sent to WSD for approval?	It is not for the EIA Consultant to make site formation submissions to WSD. The Contractor is aware of WSD's requirements in this respect.
9)	My additional comments as detailed in my memo dated 14.8.91 of this series.	
10)	Response b(iii) Have the consultants consulted the Labour Department on the proposed Occupational Health Criteria for the protection of workers in the site.	These criteria are not proposed by this Study, but are defined in the Tender Specification. It is assumed, therefore, that they were approved at that stage. It is outside the scope of the EIA to establish or review occupational health criteria. If this is felt to be a key issue, however, Labour Department could be circulated with the study reports. No direct consultation has been made.
11)	Response b(v) The consultants should provide in the Key Issues Report with *technical rationale* on the effectiveness of the propose odour removal system in order to attain odour level of 2 O.U. at the site boundary.	Noted.
	Puracarb/Purafill do not seem to remove CO of RCV emissions from the ventilation exhaust.	It is not necessary that they do so. The dilution effect of the ventilation system will be sufficient.
	Layout plans has not been attached with	Apologies for the omission.

the responses.

12) Response b(vi) and b(vii)
The consultants have not responded or noted our comments. Nevertheless, details of the *odour panel monitoring, post-project audit* and *action plan for compliance monitoring* should be provided in the Key Issue Report.

This is not true. Responses were included with those submitted on 22 August 1991 (ref. CES/NFH/94610/EC/L1317). Details requested will be provided in the Key Issues Report.

13) Para 5.3.3
As a result of the consultant's responses to comments, I presume that "surface drainage water from potentially contaminated areas" refers only to floor washwater and drippings from containers etc., and rainfall has been adequately precluded. Furthermore, I presume that all potentially contaminated areas are housed within covered areas.

Not all potentially contaminated areas are covered. However, drainage from potentially contaminated areas is included with Group 2 Wastewater and provision for handling this is described in detail in the relevant Key Issues Report.

1 Project Management Section 20, Page 3, 6th paragraph It is not exactly true that USD specified the daily acceptance period of 0730 to 2330, I suggest that the sentence be amended to read "The daily refuse acceptance period will be 0730 to 2330".	Noted.
2 Section 4.1.1, Page 6, 2nd paragraph The permitted hours of operation for percussive piling are presented in Table 4.2, not 4.3 as stated.	Noted.
3 Table 4.3 The anticipated duration for U.G. Drainage works appears to be out-dated. The Consultant should check with the IETS Contractor for updated programme and revise as appropriate.	The programme was correct when the Draft Initial Assessment Report was submitted and no comment was received to indicate otherwise. It is not appropriate to update this report.
4 Section 5.2.3, Page 16, 5th paragraph The Consultant should not rely too much on the self-cleansing velocity. Blockages of drainage channel are frequently encountered at KBTS subsequently causing odour problems. Manual cleaning would be required.	Noted.
5 Section 5.3.2, Page 19, 1st paragraph Table 5.4 does not exist.	The reference should have been to Table 5.3.
6 Section 7.3, Page 25, last sentence of 3rd paragraph Please also refer to my earlier comment made on 14.8.91. The definition of a failure to comply with the environmental requirements for the IETS project, as given in Section L and Document 30 of the Contract Document, is very much different from the KBTS project of which the Consultant have obviously drawn its reference from. For KBTS, failure to comply would be judged by less than 80% compliance with the standard, measured on a minimum of 5 consecutive daily sample. However, this is not the case for IETS which has adopted a completely different approach in contrast to the failure/compliance definition as defined in Section 7.3 of this report.	This comment has also been raised in connection with Key Issues Report No. 2. The Key Issues Report will be updated as necessary.
7 Refer 6 above. Noted i) of Table 7.1 should be amended as appropriate.	Noted.

8 Appendix 4, Section 2.2 A special marine vessel has been provided for the collection of marine litter around the barge.	Noted.
9 CES's response to further comments, Page 52,Q2 Contaminated recycled wastewater does give rise to odour problem at KBTS. On what basis do CES consider wastewater not a source to odour nuisance?	We contend that there is no odour problem at KBTS from this source because no complaints of nuisance have been recorded and no default payment provisions have been implemented in respect of exceedance of the appropriate limit. The fact that odour from this source is detectable within the site is not in itself problematic.
10 Air Quality/Odour Impact Our comments on Draft Key Issues Report No. 2 are still valid.	Noted.
11 Noise, Para 4.1.1, last sentence Noise emanating from construction activities is now controlled under the NCO. Percussive piling between 1900-0700 hour will be prohibited unless to get exemption from section 35 of NCO.	Noted. This was stated in paragraph 2 of this section.
12 Para 4.1.2, 2nd/3rd paragraph It should be noted that to carry out construction work during restricted hours required a CNP. The issue of such CNP would be subject to an assessment of noise emanating from the site according to the TM by the Noise Control Authority.	Noted.
13 Para 4.1.3 and 6.1.1 I have reservation on the calculation presented as the screening provided by surrounding buildings would be incomplete. Again the issue of a CNP for percussive piling would be subject to an assessment of noise emanating from the site according to the TM by the Noise Control Authority.	Noted.
14 Para 5.1.6 It appears that some normal indoor and outdoor maintenance activities between 2300-0700 would not be unusual, this differs from the Consultant's response to our comment in c(ii) in Appendix 5, that "night-time maintenance activity would be extremely exceptional". Please clarify the likely activities and plants/tools would be involved e.g. pneumatic tools, both indoor and outdoor for our consideration.	Para 5.1.6 states that if work is carried out at night it would take place inside the building. The report concluded that no further assessment of noise during this time period would be necessary. The contractor has since confirmed that there would be no significant activity at night, as indicated in our earlier response and stated clearly in para 5.3.2 of Draft Key Issues Report No. 2.

15 Appendix 4, para 3 Is there any temporary operation between 2300-0700? If positive, noise assessment and recommendations would be required.	No.
16 Waste management Section 1.1 Please delete "Kennedy Town Incinerator" at the end of the paragraph because the plant may still in operation after the commissioning of IETS. Proposal has been made to delay the closure of the plant to cope with future waste arising forecast in late 92.	Noted.
17 Section 5.5.2 If poisonous baits are used, regular inspection on the hidden place of the buildings would be required to avoid accumulation of dead bodies of rodent.	Noted.
18 Solid Waste Control Section 2 With reference to the normal refuse handling capacity of 1200 tonnes per day and 240-300 RCV's per day, please provide some information on the amount of refuse delivered and the no. of trips travelled by the public sector as well as those by the private sector.	The Consultants do not have this information. It is not considered germane to the assessment.
19 Is there any information on the total numbers of RCVs owned by the USD that are using the existing temporary refuse disposal facilities?	See response to 18, above
20 Figure 2 Is the vehicle was plant a "wheel washing" plant only? Is it an enclosed structure? Does it need any operator?	The wash plant washes the entire vehicle. It has a roof and side walls. It operates automatically.
21 What is the anticipated no. of operators in the control room? It seems that the width (i.e. 2m) is too narrow.	This is not an environmental issue.
22 How could the license plant no. of the RCVs be seen and recorded when they are stopped on the weighbridge?	This is not an environmental issue.
23 How could the refuse delivered by the private RCVs be inspected before they are disposed into the tipping bay. Would there be some access facilities for inspecting the refuse.	LJK please advise.

24 Please show on a diagram the manoeuvre of RCVs and containers inside the Tipping Hall as well as the position of the sea vessel's gantry crane.	The manoeuvre of RCVs and the gantry crane position are operational details with no relevance to the environmental assessment. There are no containers in the tipping hall.
25 Liquid Waste Project It would be helpful if a preliminary building layout plan showing the various facilities as well as some drawings on sketches showing the schematic layout of the facilities are included in the Report.	Noted. A drawing will be included in the Final Key Issues Report No. 2, if available. [LJK - can you supply?]
26 Please indicate the position of the wastewater treatment plant and the connection into the sewer.	[LJK - can you provide drawing? Possibly same as that above (comment 25)].
27 Water Quality Our comments on Draft Key Issues Report No. 2 are still valid.	Noted.
28 Liquid Waste Control 4.3.1 Although there are at present on statutory standards to limit site run-off at Chai Wan, control by good house keeping and sensible site management are required. I will not rule out the use of Practice Notes for control of site run-off in due course.	Noted.
29 4.3.2 Run-off should be minimised and water re-use should be considered wherever possible in order to reduce the impacts of the site drainage.	Noted.
30 Appendix 4, 2.1 I have mentioned in my comments on Draft Key Issues Report No. 1 that the consultant should consider the feasibility of using tankers to pump out the wastewater in the storage tanks instead of accumulating there for transfer to the barge during low tide. What is the progress of this issue in reducing the odour and water pollution impact due to the temporary refuse transfer operation?	A response to the earlier comment was provided, and is repeated here for ease of reference: "There is absolutely no necessity to use tankers to pump out the tank. There is no odour nuisance from the tank and it has sufficient capacity to avoid overflow. It should be noted that the existing arrangement is a requirement of the contract, is compliant with the specification and is approved by the Client. There can be no justification for review of this arrangement."
31 Environmental Monitoring and Audit Our comments on Draft Key Issues Report No. 2 are still valid.	Noted.

32 Further to my previous comments on the Draft Key Issues Report No. 2, I enclose herewith the draft revised Siu Sai Wan ODP No. D/H22A/1C for your reference. The ODP proposes, amongst others, that sites for district open space and undersignated government use adjoin the transfer station. Further east will be sites for a sport ground, and public and private housing developments.	Noted.
33 Figure 1 (Site Location Plan) and Section 3.1 (Air Description) The figure and the section should be revised as per the current Siu Sai Wan ODP.	Any necessary revisions are covered in Key Issues Report No. 2.
34 Figure 2 (Site Layout Plan) According to HKPSG, considerations should be given to the provision of fully enclosed station. Obviously, Figure 2 does not comply with the HKPSG's requirement which should be followed as far as possible.	The transfer operation (i.e. tipping, discharge via pushpit, compaction into containers and wastewater treatment) is enclosed within the building. Only vehicle access, weighbridges and vehicle wash are external to the main building and the latter is partly enclosed. We believe that the facility is compliant with the HKPSG.
35 Section 5 (Initial Assessment of Environmental Impacts During Operation) Please ensure that the mitigation measures provided can reduce the environmental impact to the adjacent planned uses.	Noted. Please see Key Issues Report No. 2.
36 Para (b), P.49 (Responses to HK DPO's previous comment) It is not acceptable that the operations within the transfer station only cannot be viewed from Sun Yip Street. The operation which includes the berthing activities should not be seen from all landward sides.	Operations within the transfer station are indeed unvisible from all vantage points. It is impractical and unnecessary to screen the external operations (vehicle approaches and container loading.
37 The closest sensitive receivers who can see the site may be those persons in the adjacent planned district open space, sport ground and housing estates. It is considered necessary to further assess the visual impact.	The entire transfer operation is enclosed within a purpose-built building. The only activities which may be visible are the vehicle movements and the loading of containers onto the sea vessel. These are not considered to be visually intrusive within the context of the surrounding I and G/C uses. The Contractor is required to meet certain requirements regarding external finish of the building which, as a result, will be far less visually intrusive than many of the existing industrial buildings in the area.

38 Given an average RCV turnaround time of 10 minutes and the peak hour RCV arrival of 45 Nos., the provision of 25-30 vehicle waiting spaces in front of the tipping hall is considered inadequate to accommodate the RCVs within the site. As a result, the following RCV's will tailback onto the public road. Hence, you are requested to submit calculations to prove that no tailback of RCVs queuing onto Sum Yip Street will occur.	Five pushpits are provided each of which can accommodate three RCVs, so that five RCVs can discharge their payloads simultaneously. The time spent by each RCV in the tipping hall is about 5 minutes, so that the station can process 3 x 5 x (60/5) = 180 vehicles per hour. Even if the average time sent in the tipping hall were to be 10 minutes, the facility could process 90 vehicles per hour in theory. In practice even with only one RCV per pushpit, the facility could accommodate 30 vehicles per hour and retain sufficient residual queuing capacity and still retain sufficient capacity for the queuing of the remaining vehicles.
39 My only comment on the above Report, ref 4.3.2 and 6.1.3 of the Report, is that sedimentation tanks as well as sand traps should be provided on a mandatory basis to treat surface and construction run-off contaminated with silt, cementations materials, debris etc prior to discharge from the site to avoid pollution and blocking up of any external public drains located in the vicinity of the site. Needless to pay, such facilities should be cleaned and attended to regularly to maintain their operating effectiveness.	The Contractor is compliant with the requirements of the Specification in this respect.
40 Only last year, quite a few public drains were blocked by contaminated discharge, particularly with cementations materials, from construction sites in Chai Wan alone. Although the blockage or affected drains were subsequently removed or replaced as appropriate in each case at the cost of the responsible party, such incidents not only created extra burden on our heavy workload but great inconvenience to other drain users as well. It is therefore absolutely essential that adequate precautionary measures, such as sand traps and sedimention tanks, must be provided and regularly attended to on site.	Noted. (See also response to comment 39, above)
41 As the subject development will require this Division to carry out permanent drainage connection works to the public drainage systems. You should forward drainage proposals for our comment/approval well in advance of any required completion date.	The Contractor is aware of his obligations in this respect.
42 Our comments on the Draft Key Issues Report No. 2 are still valid.	Noted.

43 Our comments on the Draft Key Issues Report No. 2 are still valid.	Noted.
44 Our comments on the Draft Key Issues Report No. 2 are still valid.	Noted.
45 It is a fact that there is constantly a misty atmosphere within the Kowloon Bay Transfer Station tipping hall and this still remains the constant source of complaint of poor ventilation by the drivers of the refuse collection drivers. Although in IETS, individual ventilating ducts are provided above each RCV exhaust when positioned for tipping to collect exhaust emission fumes and particulates, I still consider that there is an actual need to promote better ventilation by increasing the air change in the tipping hall to more then 8 volume changes per hour. This would double the dissension attitude of the RCV drivers is eased during off loading of waste in the tipping hall.	This comment was raised in respect of Key Issues Report No. 2 and a response is provided elsewhere. It remains our contention that (a) the misty atmosphere is created by condensed water vapour which is not harmful to health, (b) increasing the overall ventilation rate would not solve the "problem" and (c) that the USD drivers might be less inclined to dissension if they were informed of these facts.

RESPONSES TO OUTSTANDING COMMENTS
FROM F4574 DATED 13/3/92

	Comment	Response
23	How could the refuse delivered by the private RCVs be inspected before they are disposed into the tipping bay? Would there be some access facilities for inspecting the refuse?	The point of the question as an environmental issue is not clearly understood. It is anticipated that, if and when, private sector deliveries are accepted, then contractors will be "account customers", using IETS on a regular basis. Relevant extracts from the Contract are enclosed: Tender Document - Section L3-15, Tender Submission - Section U.
25	Liquid Waste Project	
	It would be helpful if a preliminary building layout plan showing the various facilities as well as some drawings on sketches showing the schematic layout of the facilities are included in the Report.	Registered Design drawings of the general layout are enclosed, drawing nos. 7A/A/002 and 003.
26	Please indicate the position of the wastewater treatment plant and the connection into the sewer.	The effluent connection from the wastewater treatment plant is shown in Drawing No. 20B/D/001 (Rev. D), extract attached. The connection leads to a foul water manhole and into the foul water drainage system.
	From Appendix B re Draft Key Issues Report No. 2	
6	Para. 4.3.23	
	The waste water treatment plant is separated from the compactor hall by four walls. Apart from the two entrance doors which I believe, should normally be closed during normal operation, no other openings for fresh air inlet has been indicated in the Contractor's design. If that is the case, it is doubtful that the fans proposed can provide sufficient air changes to the waste water treatment plant.	The Design provides for make-up air to be ducted directly to the wastewater treatment plant via a 2m x 0.5m louvre located above a roller shutter at the external face of the building. This intake is equipped with an axial fan rated to achieve the necessary air changes on a 24-hour basis.
12	Section 6.4	
	Should this section also address the sludge disposal process, treatment for wasted water from the vehicle wash?	Vehicle wash water is included in Group 1 which is pretreated in the onsite waste water treatment plant before discharge to foul sewer. The vehicle washing water places no additional or specific demands upon the waste water treatment plant than the other Group 1 components and therefore was not discussed further in Section 6.4

Treatment of sludge is as shown in the attached Schematic Diagram CEL/IETS/004 (Rev. F). In summary, effluent is pumped to a filter press. Clarified filtrate is returned to the influent sump pit and sludge is removed to be co-mingled with solid waste and transported to the landfill.

20 S.3.1.4, 9.2.3 and 9.2.4

Concerning the odour monitoring, sampling should also be conducted once every six days instead of weekly. The compliance criterion suggested by the Consultants is definitely unacceptable since odour perception is an instantaneous response. Sampling at hourly interval for 4 consecutive hours would defeat the purpose of spotting the real odour level. Sampling should aim at capturing the most odourous parcel of air that would most likely to give rise to odour nuisance to the public. Therefore, the most appropriate location to take air sample is at the spot where odour is expect to be strongest. In general, this would be in the downwind position during the peak operation hour of the plant. Air sample should then be taken at the moment when odour is sensed to be most obvious. A compliance failure should be counted if the measured odour level exceeds the 2 odour units standard at any one time. Under normal circumstance, two samples should be taken according to the above samples should be taken according to the above principle. Any one of the results exceeding 2 odour units (determined by an odour panel) is considered to be a compliance failure.

In Section 9.2.3 and 9.2.4, the Consultants stated that the monitoring frequency specified in the Environmental Review was not sufficient to determine compliance and also that the compliance criteria specified in the Environmental Review were inconsistent with the fact that odour nuisance may occur when the limit is exceeded for a very short time. Why are you telling us that the compliance Criterion is unacceptable when it was presented to us as part of the Tender Documentation by the Government and we have already stated that we did not believe that the monitoring frequency and measurement methodology was adequate?

We do however, stand by our statement that a daily odour patrol around the entire site perimeter would be more effective than air sampling over 5 minutes in a week as part of an odour panel and that the operators could then act upon the findings because results from sampling are not available in real time. We acknowledged that odour patrols will not quantify odour level. In terms of remedial action, is odour quantification as important as odour identification since the patrol will almost certainly identify odour more often than once every 6 day panel/sampling procedures.

We agree that downwind in peak hour operation will generally be the location where odours could be detected and therefore we would recommend that the odour patrol be undertaken during this time.

21 S.9.2.4

I agree that mounting daily informal odour patrol is useful and necessary as a supplement to the routine odour formal sampling and odour panel. It's recommended that the odour patrol be conducted during the peak operational hour of the plant and by a person not normally working on the site.	We agree that the odour patrol should be conducted during the peak operational hour and that this data (i.e. compliance/non compliance) should be compared with results from the requisite odour sampling procedure particularly with a view to modifying the sampling procedure where necessary at audit stage. However, there is no standard method in Hong Kong for undertaking an odour panel (given the carcinogenicity of screening chemicals) and EPD are the only organisation who have the sampling/testing equipment that we are aware of.
Comments on first responses	**Consultants' 2nd Responses**
i) Project Management	
a) Comments on Draft Key Issues Report No. 2	
2) The report needs to be revised accordingly.	Noted.
5) It is correct that the provision of a water hose is primarily for the washing of tailgates. However, during the dry and windy weather, it is used for dust-suppressing because it is not uncommon to find that the operator keeps hosing at the refuse mass during the discharge operation.	Noted. Please see previous response. The point being made was as follows: in contrast to the comprehensive air quality protection measures to be incorporated into IETS, under the Temporary Arrangements where up to 700 tonnes of loose waste are received each day (with or without a single hosepipe as the sole means of mitigation), there are no adverse results detectable off-site.
6) No response is given.	
8) The bleed-off from the vehicle wash water treatment system should not be classified as Group 4. In Section K.9.2.2 of the tender document, Group 4 effluents are defined as discharges from accommodation only. The bleed off from the vehicle wash water treatment system can be discharged into foul sewer provided that the effluent is treated to a standard equal or above the discharge standard stated in Document 27 of the tender document.	Please see attached responses where this comment is addressed. Apologies, previous comment should have read Group 1, which is pretreated in the on site waste treatment plant before discharge to foul sewer.

b) Comments on IAR

9) The logic that the Consultants contend that there is no odour problem at KBTS from this source is questionable. No complaint does not necessarily mean that there is no odour problem. Most people tend not to complain on minor problems simply because they do not want to spend time on the issue. However, they will, when the problems persist for a long time or become more intense. Although no odour complaints (vehicle wash effluent) have been received from the public, verbal complaints have been received from the RCV drivers with respect to the odour given off from the recycled water. It is correct that no default payment has been deducted due to exceedance of the appropriate limit set out in the KBTS Contract. Again, this does not necessarily mean that there is no odour nuisance generated from the recycled water because under the KBTS contract, an odour failure can only be counted if a total of four consecutive samples taken at one hour interval exceed the 2 odour unit limit and default payment can only be deducted when the number of failures in a month exceeds 5. Under the IETS contract, this procedure will change and any odour count above 2 odour unit will constitute a failure. As the vehicle wash is located near the exit of the station, I find it hard to accept that detectable odour from this source is not in itself problematic unless the Consultants can quantity its odour level and demonstrate that it will be below 2 odour units.

EPD are well aware that odour level from the vehicle washing plant cannot be quantified at this stage. Nor can we demonstrate that it will be below 2 odour units. We can however state that if odour is detectable from recycled water that the ratio of recycle to water bled from the wash system would have to be reviewed. This is clearly an operating procedure. The Client is also aware of the degree of odour level compliance that has been called for in the Tender.

Project Management Group were responsible for evaluating the Tender, negotiating the Contract and giving Consent to each of the detailed design drawings.

ii) **Air Quality/Odour Impact**
Comments on Draft Key Issues Report No. 2

a) Response 17 on S.4.3.3
It's still not clear, on what basis, how the Consultants could arrive in the figure that the average number of RCVs in the tipping hall is estimated to be not more that 3.6. Doesn't it mean that the tipping hall would be over-designed? Please clarify and resubmit calculations.

The number of RCVs entering the station at peak hour is 44. They spend an average of 12 minutes on site. 44 ÷ 12 = 3.6. Questions on the size of the station were surely addressed at Tender stage.

b) Response 19 on S.9.2.1 and Table 9.1

My view on the response is that the Consultants should take note of the under-meaning of monitoring at once every 6 days instead of once weekly and recommend appropriate monitoring frequency to be carried out in the operation of IETS. Blindly following something proposed in the ER stage is not appropriate approach of an environmental impact assessment.

Firstly, we are well aware of the reason for monitoring on a once in six days vs once in seven days basis. In this case, because the latter was specified in the Environmental Review, a Government Report forming part of the Tender Documentation, we saw no reason to change this since in this context we do not believe that there is a significant risk of repeatability error. However, if so required we have no objection to the monitoring being undertaken on a once in six days basis and will state so in the EIA as well as noting that this is a contract variance. Secondly, the Brief for this project stated that the Work undertaken in the Environmental Review was not to be repeated. Given the two issues above, we take exception to the rude tone of this comment as previously stated on our telephone conversation Hosking/Ng.

c) Responses 20 & 21 on S.3.1.4, S.9.2.3 and S.9.2.4

I am still waiting for the Consultants' responses.

Please see additional responses attached in which this comment is addressed.

iii) **Noise Impact**

Comments on IAR

Para. 4.1.1 (last sentence) - No.11

It should be noted that construction noise is now under the abet of NCO which repealed the S.O.O. Reference made to S.O.O. would be misleading.

Noted. The reference will be removed.

Comments on Draft Key Issues Report No. 2

a) Para. 3.2.4 (No. 24)

This should refer to our same comment made in the final ER report in '89, your then response/ explanation should be incorporated in this report to clarify these criteria.

We did not produce the Environmental Report.

b) Para. 9.3.2 (No. 28)

Noise monitoring at the nearest NSR i.e. the THA is required.

As discussed in our telephone conversation Hosking/Poon the requested noise monitoring is to ascertain whether traffic noise from the RCVs (at the start of the operational day of IETS before normal traffic peak hour) adversely affects residents of the THA. As previously stated, the IETS operators have no control over the vehicle route that the RCV drivers take.

However, in the interest of identifying whether there is a problem or not, although we believe that the RCV drivers will probably not use these roads, noise monitoring could be undertaken over a month on a once every six days basis and if RCV noise adversely impacts upon the residents the RCV drivers should be told to use different routes by DUS. The monitoring period would have to be no less than one hour each assessment time. As also previously discussed, there is no point monitoring for operational noise at the THA and given that EPD's concerns primarily relate to the traffic noise alone, the recommended noise monitoring at the site boundary may also be reduced from one hour/week of the day and night for the first year to one hour/month of the day and night. We await your advice.

iv) **Waste Management**
Comments on Draft Key Issues Report No. 2

a) Regarding item 30 (section 4.3.15 to 4.3.17), it seems that the Consultant should elaborate the possibility of recycling/reusing of the Purafil and its associated cost implication.

Recycling of chemisorbent materials is impractical because the scrubbing process is made up of chemical reaction as well as physical adsorption. Reusing activated carbon beds is typically undertaken because it relies on physical adsorption alone. Where there is a chemical reaction, as is the case with oxidisers like Permanganate, the reversible reaction, if possible, is often highly energy inefficient, requiring steam. From an environmental viewpoint, regeneration of a scrubber also generates a liquid waste stream.

b) It is advisable to refer to the existing KBRTS for the frequency of replacement of the chemisorbent.

As at Kowloon Bay Transfer Station, stocks of replacement chemisorbent are imported and held in store and utilised as and when necessary.

v) **Solid Waste Control**
Comments on Draft Key Issues Report No. 2

<u>No. 32 (clause 2.3.4)</u>
Although the transfer station is not designed as a storage facility, it is necessary to consider a contingency plan of marine/road transport and temporary storage facilities to cater for an adverse marine environment or a temporary break down of the specially designed vessel. I anticipate an impact on the waste delivery and RCVs' routing if such circumstances are not meditated.

As explained in Clause 2.3.4, a contingency plan for road transportation is a contractual obligation. This will also form part of the Performance Tests.

vi) **Liquid Waste Control**

Comments on IAR

Item No. 30 (Appendix 4.2.1) - Since the liquor is highly polluting, please clarify the followings:

a) Where is the liquor finally disposed of?

As explained in Appendix 4 Clause 2.1, all the leachate is reabsorbed by the refuse in the barge and thus discharged at the tip face of Tseung Kwan O Landfill. This is "the best practicable means" called for in the Tender Documents and has been employed staisfactorily since mid-1991.

b) What quantity is involved? How often is it pumped out of the barge?

c) What is the specification under the contract?

d) Is the liquor discharge under a licence issued by Junk Bay Water Control Zone?

General Comment

1. I would like to point out that there is no policy to close KTIP when IERTS becomes operational.

Noted. References to closing KTIP will be removed from the EIA, but please be reminded that "Environment Hong Kong 1991" states in Chapter 4, Paragraph 4.25 that "Upon the commissioning of the transfer station, now expected in late 1992, the Kennedy Town Incinerator will be closed down."

2. In order to obtain the agreement of the Urban Council to the adoption of the Waste Disposal Plan, the retention of two waste disposal points on each the side of the Harbour was promised. This agreement must be adhered to. I should be grateful if the report is amended to reflect this.

The agreement can be upheld by the retention of the refuse barging point adjacent to KTIP. This currently receives an average of 300 tonnes (rising to 400 tonnes) of unprocessed refuse per day and could continue to do so until the commissioning of the Island West Transfer Station.

Comments on IAR

Paras. 36 and 37

In August, 1991 well before the rezoning of the nearby 'I' and "G/IC" sites for the open space, sport ground and housing developments, this office has already requested for detailed proposal for visual impact as it is considered any operation within the station, including container loading will be visually intrusive. It is strongly requested that any operation within the station, especially the container loading should not be seen from any directions from landward side. The proposed chain-link fence is not acceptable.

Please note that the Contract was signed in April 1991, tender preparation and evaluation having been conducted in 1990.

No operation within the Station building is visible. The only activity that may be visible from land to the East is the exchange of containers from the vessel. This is not objectionable. If future building development were to include high-rise structures, it is difficult to envisage how sight of the vessel activity could be prevented.

Comments on Draft Key Issues Report No. 2

Para. 50

(i) What is the purpose of the final report ?

To incorporate comments on the draft report such as have previously been made and responded to.

(ii) It is considered necessary to take into account of the new planning proposals contained in the draft Siu Sai Wan ODP No. D/H22A/1C (circulated to you before) as early as possible. Please ensure adequate measures will be provided to reduce to the minimum the environmental nuisance caused to the adjacent planned potential sensitive receivers.

Please see answer to comments on Paras. 36 and 37 above.

Comments on Draft Key Issues Report No. 2

a) 55 & 56
What is meant by "first flush of Group 2 effluent" ? If this means that not all Group 2 effluent will be treated, the response to 56 that "Group 2 effluent will be treated as matter of course except . . ." may appear misleading.

The first flush refers to the first 5 mins of a storm of intensity 250 mm/hr.

b) 57
The design flow is not printed in the response. Please provide together with a break down of the max design flow adopted to illustrate the Consultant's response that "this is adequate to receive all flows".

Notwithstanding the description given in Clause 6.2.3, the calculation of volumes in Group 1 (contaminated) and Group 2 (potentially contaminated), being a total of 20 cubic metres per day, was derived from experience gained from operating KBTS and on a comparison with the waste volumes and methodologies at IETS.

1. I cannot lend my support to the Consultant in saying that the misty atmosphere within the KBTS tipping hall is only a result of condensation of water vapour originated from vehicle exhaust emissions.

As has been repeatably commented upon, the EIA has found that the AQOs and specific air quality requirements pertaining to this project are complied with and that the proposed ventilation rate more than adequately serves to maintain this condition. In addition, air quality measurements taken at KBRTS also verify that the AQOs are complied with at that station even though the drivers have made complaints. Subjective views of RCV drivers cannot be assessed in any other way with the current AQO criteria.

2. The tipping hall is a place where the transfer of reduce (from RCVs to the push pit) takes place. The mist observed by our RCV drivers is in fact a mixture of water vapour, vehicle exhaust and dust particles from the push pit and they are afraid that their health will be at stake if they have to work in such a working environment everyday. It is therefore believed that a ventilating system with greater air change will help get rid of this mixture more quickly and efficiently.

Please see the above response.

3. It is evident that the humidity of the tipping hall is constantly on the higher side than that outside as a result of:

   (a) frequent hosing down of the tipping hall ground surface;

   (b) water vapour from the sprinkler system above the push pit;

   (c) the relatively high moisture content of domestic waste delivered for disposal.

   I do have reservation on the Consultant's remark that additional ventilation to draw in more drier air from outside will in no way reduce the "mist". I also do not agree that it is correct to address that the workers are working in healthy environment which is persistently moist and damp.

Yes, the humidity inside the Tipping Hall may be higher than that outside. However, do DUS really believe that bringing in drier air perhaps of 95% humidity rather than 96% humidity will help?

KEY ISSUES REPORT NO 1
IMPACTS OF CONSTRUCTION

OF

ISLAND EAST TRANSFER STATION

May 1993

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LIST OF FIGURES

1

INTRODUCTION

1 INTRODUCTION

1.1 Background

1.1.1 In accordance with Government plans to provide a network of refuse transfer stations around the Territory, the first station at Kowloon Bay became operational in April 1990. Work is now under way for a second station, to be located in Chai Wan on the site of the former Chai Wan Composting Plant which will be demolished. The transfer station will replace both the existing inadequate facility and the Kennedy Town Incinerator, which will be decommissioned when the transfer station is operational.

1.1.2 The requirement for an Environmental Impact Assessment (EIA) was identified by Government prior to the outline design study, which involved tender documentation preparation. This requirement was formalised in the Environmental Review, produced as part of that Study in February 1990, which stated that a full EIA should be undertaken by the successful tenderer.

1.1.3 The EIA Study has been undertaken with reference to the relevant requirements of the Environmental Review, other environmental monitoring and performance specifications included in the tender documentation and the tenderer's design and performance information included in the tender submission.

1.2 Objectives

1.2.1 This report follows on from the Initial Assessment Report (IAR) as one of two key issues reports to provide more detail on the impacts associated with construction and operation of the plant. The Construction Impact Assessment Report provides further details on those issues discussed in the IAR with more information now being known on construction activities and scheduling in order that further mitigation measures as well as control and monitoring requirements can be addressed. A decision was taken to address construction impacts at an early stage of the Study in recognition of the fact that the demolition of the existing plant, implementation of temporary positions for refuse transfer and early stages of construction would all commence prior to completion of the EIA Study. This was intended to maximise opportunities to respond to the findings of the EIA in respect of the construction works, but it must be recognised that these opportunities are limited by contractual and programme constraints.

1.2.2 The objectives of the assessment relevant to the construction phase are:

- to describe the proposed installation and related facilities and the requirements for their development;
- to identify and describe the elements of the community and environment likely to be affected by the construction of the proposed installation;
- to minimise pollution, environmental disturbance and nuisance arising from the total development and its construction;
- to identify and evaluate the net impacts expected to arise during the construction of the total development in relation to the community and neighbouring land uses;

- to identify methods and measures which may be necessary to mitigate these impacts and reduce them to acceptable levels; and
- to recommend any monitoring requirements which are necessary to ensure the effectiveness of the environmental protection measures adopted.

2

DESCRIPTION OF CONSTRUCTION WORK

2 DESCRIPTION OF CONSTRUCTION WORK

2.1 Form and Location

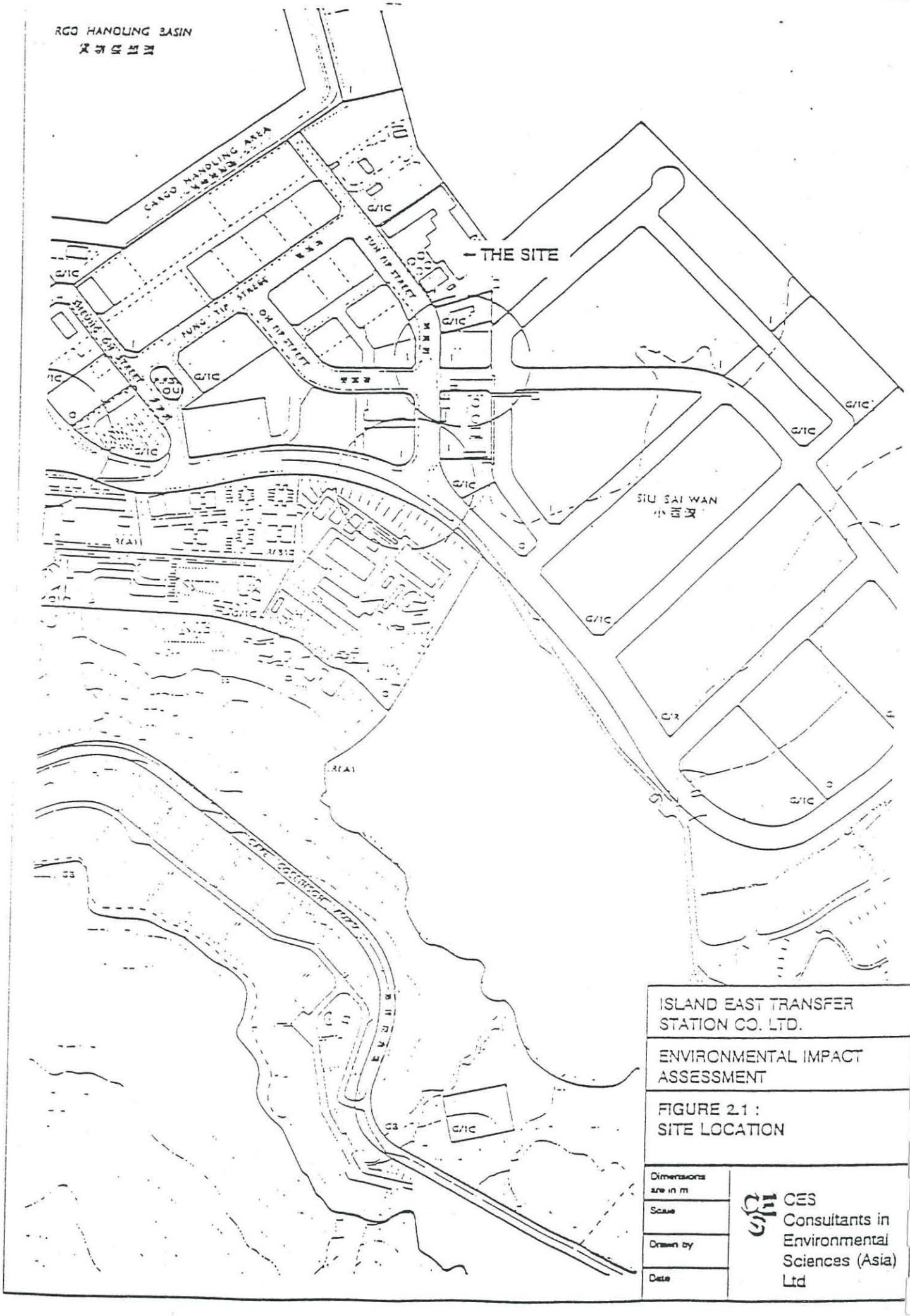
2.1.1 The transfer station is located on the site of the former Chai Wan Composting Plant on Sun Yip Street. The site occupies 0.9 ha. It is in an industrial area and is flanked by the Chai Wan Sewage Treatment Works and a sea water pumping station. The section of Sun Yip Street between the site and the junction with Chai Wan Road also accommodates a bus depot and oil storage area. The site location is shown in Fig. 2.1.

2.1.2 The transfer station building will consist of a two-storey, double-skinned steel formed building. Internal floors will be of concrete and the whole will be founded on driven steel piles. Access will be from Sun Yip Street.

2.2 Method of Construction

2.2.1 The construction phasing and nature of operations in each phase is shown in Table 2.1. These activities have been used as the basis for a quantification of impacts based on the number of plant, frequency of vehicle movements, extent of material handling and site area.

2.2.2 The programme for construction is due for completion in July 1992. Demolition work, programmed for completion in September 1991 was the subject of a separate technical note which is reproduced in Appendix B for reference and summarised in Section 5 of this report.



ISLAND EAST TRANSFER STATION CO. LTD.

ENVIRONMENTAL IMPACT ASSESSMENT

FIGURE 2.1 : SITE LOCATION

Dimensions are in m	
Scale	
Drawn by	
Date	

CES Consultants in Environmental Sciences (Asia) Ltd

Table 2.1 Construction Activity Schedule

Activity	Period	Proposed Constructional Plant	No of units
Trial Pile	1.8.91 - 1.9.91	Diesel hammer driving steel pile	1
		Boring rig	1
		Generator set 300KVA	1
		Hydraulic excavator fitted with breaker	1
Demolition	1.8.91 - 15.9.91	Mobile hammer driving 35 tonne	2
		Hydraulic excavator fitted with breaker	2
Piling	1.9.91 - 1.12.91	Diesel hammer driving steel pile	2
		Boring rig	2
		Generator set 300KVA	1
		Hydraulic excavator fitted with breaker	2
Pile caps and U/G Drains	1.11.91 - 15.1.92	Hydraulic excavator	2
		Vibratory plate compactor	2
		10 ton smooth wheel vibratory roller	1
		Hydraulic crane truck	1
		Steel bar benders	2
		Trucks	5
		Concrete pumping truck	1
		Mixer trucks	5
Superstructure R.C.C. work	15.12.91 - 15.3.92	30 tons mobile crane	1
		Steel bar benders	2
		Stationary concrete pump	1
		Mixer trucks	2
		Pneumatic poker vibrator	2
Steel structure	5.3.92 - 15.8.92	Mobile crane	2
Road works	1.4.92 - 15.7.92	Hydraulic excavator plus constructional plant similar to item '5'	1

3

ENVIRONMENTAL STANDARDS AND EXISTING CONDITIONS

3 ENVIRONMENTAL STANDARDS AND EXISTING CONDITIONS

3.1 Air Quality

Standards

3.1.1 The Air Pollution Control Ordinance encompasses a number of Air Quality Objectives (AQOs) including those relevant to dust emissions from construction sites. The AQOs relevant to this assessment include Total Suspended Particulates (TSP) and Respirable Suspended Particulates (RSP). These are presented in Table 3.1.

Table 3.1 Statutory Air Quality Objectives and Guidelines for TSP and RSP

Parameter	Average Concentration, $\mu g.m^{-3}$		
	1-Hour	24-Hour[i)]	Annual[ii)]
TSP	500[iv)]	260	80
RSP[iii)]		180	55

i) Not to be exceeded more than once per year
ii) Arithmetic means
iii) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or smaller.
iv) Not statutory

3.1.2 The additional maximum short term average TSP of 500 $\mu g.m^{-3}$ per hour has also been applied generally to construction sites in Hong Kong although it is not a statutory limit. This recognises that dust levels on construction sites can be very high over short time periods. The Environmental Review stated that dust levels on the site should not exceed 5 $mg.m^{-3}$ but the basis for this was not included. Clearly, a dust level approaching 5 $mg.m^{-3}$ just inside the site boundary would be inconsistent with maintaining an ambient hourly average concentration of 500 $\mu g.m^{-3}$ outside the site boundary. The lower of these two figures, i.e. 500 $\mu g.m^{-3}$ per hour has therefore been adopted as the site boundary limit for the purposes of this assessment.

Existing Conditions

3.1.3 Particulate concentrations in the area were evaluated by a 2 week pre-construction TSP ambient monitoring programme within the site close to the boundary. The maximum 24 hour TSP reading was 114 $\mu g.m^{-3}$. The range however, was from 29 to 114 $\mu g.m^{-3}$. Low levels were recorded on rainy days. The data are given in Table 3.2.

Table 3.2 Results of TSP Ambient Monitoring

Date (time) to Date (time)		24 hr Average TSP ($\mu g.m^{-3}$) at 25°C	Weather Condition
5.6.91 (11:10)	6.6.91 (11:30)	114	Sunny - Sunny
6.6.91 (12:30)	7.6.91 (11:10)	55	Sunny - Sunny
7.6.91 (11:15)	8.6.91 (11:30)	50	Sunny - Rainy
8.6.91 (11:15)	9.6.91 (11:25)	31	Rainy - Rainy
9.6.91 (11:30)	10.6.91 (11:10)	29	Rainy - Rainy
10.6.91 (11:20)	11.6.91 (11:10)	33	Rainy - Sunny
11.6.91 (11:15)	12.6.91 (11:40)	38	Sunny - Cloudy
12.6.91 (11:45)	13.6.91 (11:10)	41	Cloudy - Sunny
13.6.91 (11:25)	14.6.91 (11:25)	39	Rainy - Sunny
14.6.91 (-)	15.6.91 (-)	N.A. *	-

* Not Available

3.1.4 The nature of the area results in contributions from other sources. These include nearby industrial buildings and from land formation work following reclamation work and associated traffic.

3.2 Noise

Standards

3.2.1 Noise generated by general construction activities and by percussive piling is controlled under the Noise Control Ordinance (NCO). Under the NCO, the acceptable noise levels (ANL) for general construction work are determined by the methodology specified in the Technical Memorandum on Noise from Construction Work other than Percussive Piling, gazetted in November, 1988. The ANL are presented in Table 3.3. The nearest sensitive receiver, the THA, has been given an Area Sensitivity Rating (ASR) of C, due to its proximity to industrial areas. Siu Sai Wan Estate falls within the airport NEF30 contour, and in accordance with the Technical Memorandum, has an ASR of C. There is no statutory limit for daytime construction operations, but a recommended limit has been adopted for the purposes of this assessment in keeping with the spirit of the White Paper on Pollution and in accordance with criteria approved for construction work elsewhere. The limit proposed is 75 dB(A) or 5 dB(A) above the baseline noise level at the THA. It is designed to prevent general nuisance from construction work during the day.

3.2.2 Noise generated by Percussive Piling is similarly subject to control under the NCO as outlined in the Technical Memorandum on Noise from Percussive Piling. The Percussive Piling memorandum differs from the construction memorandum in that the Construction Noise Permit required for piling includes restrictions on the hours during which piling can take place, as outlined in Table 3.3. The acceptable noise level (ANL) for the THA and Siu Sai Wan estate is 85 dB(A). The restrictions are based on the extent to which the Corrected Noise Level (CNL) at the sensitive receiver exceeds the ANL.

Table 3.3 Acceptable Construction Noise Levels at THA and Siu Sai Wan Estate

Time Period		L_{eq} (5 minutes), dB(A)
Daytime	0700 - 1900	75 or baseline + 5
Evening	1900 - 2300	70
Holidays/Sundays/evening	0700 - 2300	70
Night-time	2300 - 0700	55

Table 3.4 Permitted Hours of Operation for Percussive Piling

Amount by which Percussive Piling CNL exceeds 85 dB(A) at the THA	Permitted Hours of operation on any day not being a general holiday
More than 10 dB(A)	0800 - 0900, 1230 - 1330 and 1700 - 1800
Between 1 dB(A) and 10 dB(A)	0800 - 0930, 1230 - 1400 and 1630 - 1800
No exceedance	0700 - 1900

3.2.3 It is an offence, under the Summary Offences Ordinance (Cap 228) to drive piles between the hours of 1900 and 0700 unless an exception has been granted.

Existing Conditions

3.2.4 As part of the pre-construction baseline monitoring programme, noise was monitored at the refuse transfer station site boundary for a period of 24 hours. The results of the monitoring programme are summarised in Table 3.5 and the data are appended to this report (Appendix A).

Table 3.5 Summary of 24 hour Ambient Noise Monitoring at Site Boundary

Assessment Period		max L_{eq} (1 hour), dB(A)	Time period when maximum L_{eq} obtained
Day	(0700 - 1900 hours)	76.1	1430 - 1530
Evening	(1900 - 2300 hours)	65.8	2030 - 2130
Night	(2300 - 0700 hours)	62.5	0030 - 0130

3.3 Water Quality

Standards

3.3.1 The site falls within the Eastern Buffer Water Control Zone which is due to be gazetted in 1992/3 under the Water Pollution Control Ordinance. It is unlikely that construction work will continue past this date when compliance with the proposed Water Quality Objectives for effluents will be mandatory. The Technical Memorandum on Effluent Standards under the Water Pollution Control Ordinance provides standards for those discharges released directly to inshore waters. Those applicable here are presented in Table 3.6. If discharges are released into the foul sewer system then less stringent standards are accepted.

Table 3.6 Standards for Effluent Discharged into the Inshore Waters of Eastern Buffer Water Control Zone

	Flow Rate, $m^3.day^{-1}$		
Determinand, $mg.l^{-1}$	≤10	>10 and ≤5000	>5000 and ≤6000
Suspended Solids	50	30	30
BOD	50	20	20
COD	100	80	8
Oil and Grease	30	20	10

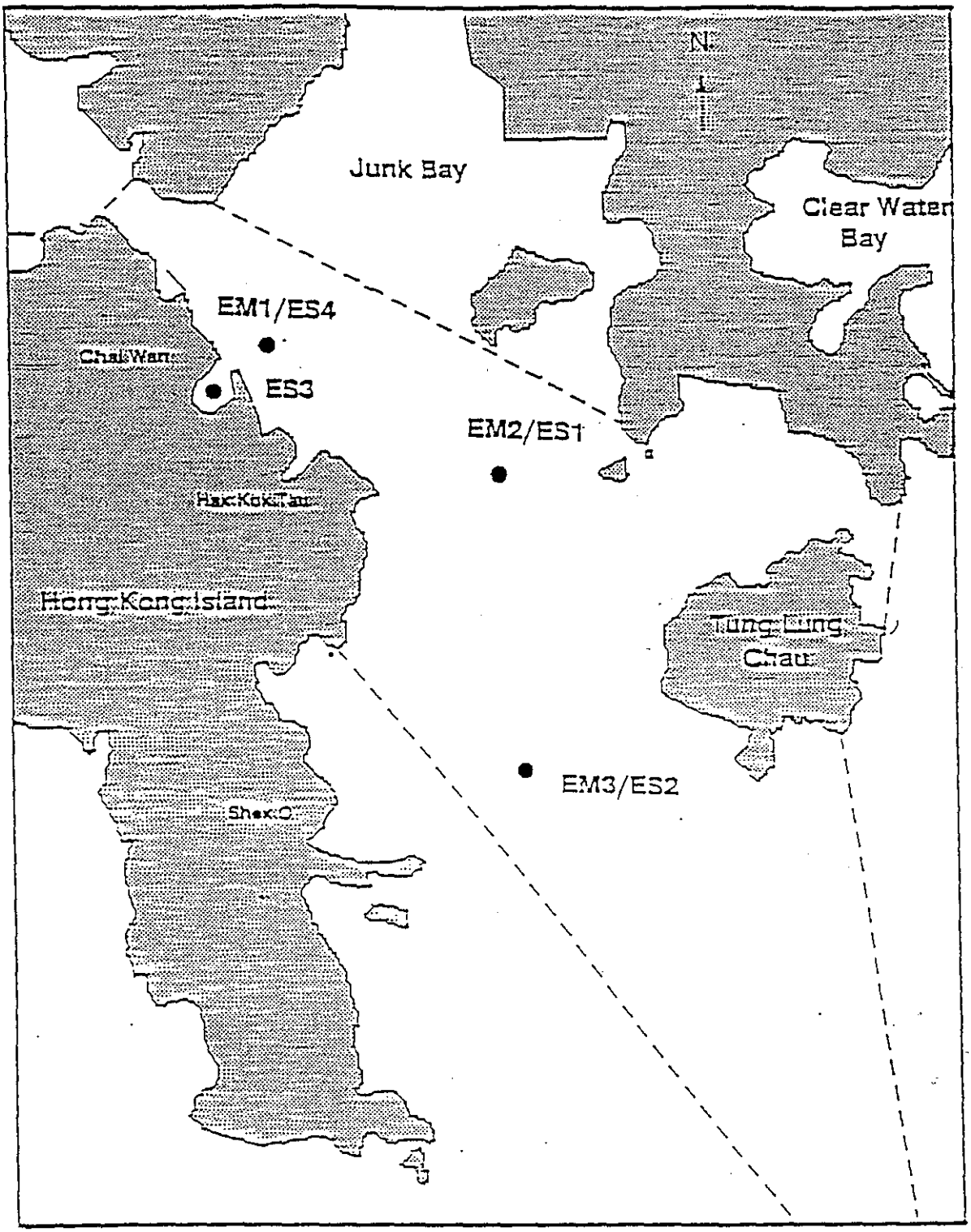
Existing Conditions

3.3.2 The results of EPD's previous four years monitoring data for the Eastern Buffer WCZ have been examined to provide baseline data on water and sediment quality in these areas. The locations of water and sediment quality monitoring stations in the Eastern Buffer Zone are shown in Figure 3.1. The results of monitoring for dissolved oxygen (DO) indicate generally good water quality in the area. The previous four years results indicate that all stations had annual mean DO levels of greater than 70% saturation at all water depths. In addition supersaturation of DO (>100%), which may be indicative of eutrophication, was not recorded at any of the monitoring stations.

3.4 Solid Waste

Standards

3.4.1 Standards applicable in the context of this report are those relating to dredged spoil requiring disposal. Spoil is classified on the basis of the level of contamination with heavy metals. The Deep Bay Guidelines on Dredging, Reclamation and Drainage Works specified Interim Threshold Guideline Values for several contaminants which are currently used to classify dredged material (see Table 3.7).



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ENVIRONMENTAL IMPACT ASSESSMENT	
FIGURE 3.1 : WATER AND SEDIMENT QUALITY SAMPLING	
Dimensions are in m	CES Consultants in Environmental Sciences (Asia) Ltd
Scale	
Drawn by	
Date	

3.4.2 A new set of guidelines has been proposed by the Contaminated Spoil Management Study, but these have not been formally adopted and no timetable for adoption is proposed.

Existing Conditions

3.4.3 The results of EPD's monitoring of sediment quality were examined to assess the level of contamination of the marine mud. Consideration of the monitoring results for toxic metals in sediments indicates that these were typically an order of magnitude below and at most not more than 61% of the Interim Threshold Guideline Values for Significant Contamination. The results of EPD's monitoring are shown in Table 3.7.

Table 3.7 Mean Heavy Metal Levels in Bottom Sediment in the Eastern Buffer Zone

Parameter	Interim Threshold Guideline Value, $mg.kg^{-1}$	Mean Annual Value, $mg.kg^{-1}$	
		ES3	ES4
Cadmium	15	0.4	0.4
Chromium	500	86.3	37.0
Copper	500	306.7	215.0
Lead	200	67.0	56.5
Mercury	5	0.3	0.2
Nickel	500	20.3	14.5
Zinc	2000	190.0	91.5

4

SENSITIVE RECEIVERS

4 SENSITIVE RECEIVERS

4.1 Neighbouring Land Uses

4.1.1 The site is located in an area zoned for industrial use. It is adjacent to Victoria Harbour and positioned between the Chai Wan Sewage Screening Plant and a sea water pumping station. Other buildings in the immediate vicinity of the site are flatted factories, bus depots and an oil storage facility.

4.1.2 There is a Temporary Housing Area (THA) approximately 150 metres southwest of the site on Fung Yip Street. There is no direct line of site between the transfer station and the THA, which is completely shielded by 9 - 12 storey flatted factory units. The THA will not be directly affected by site noise or direct impingement from dust plumes.

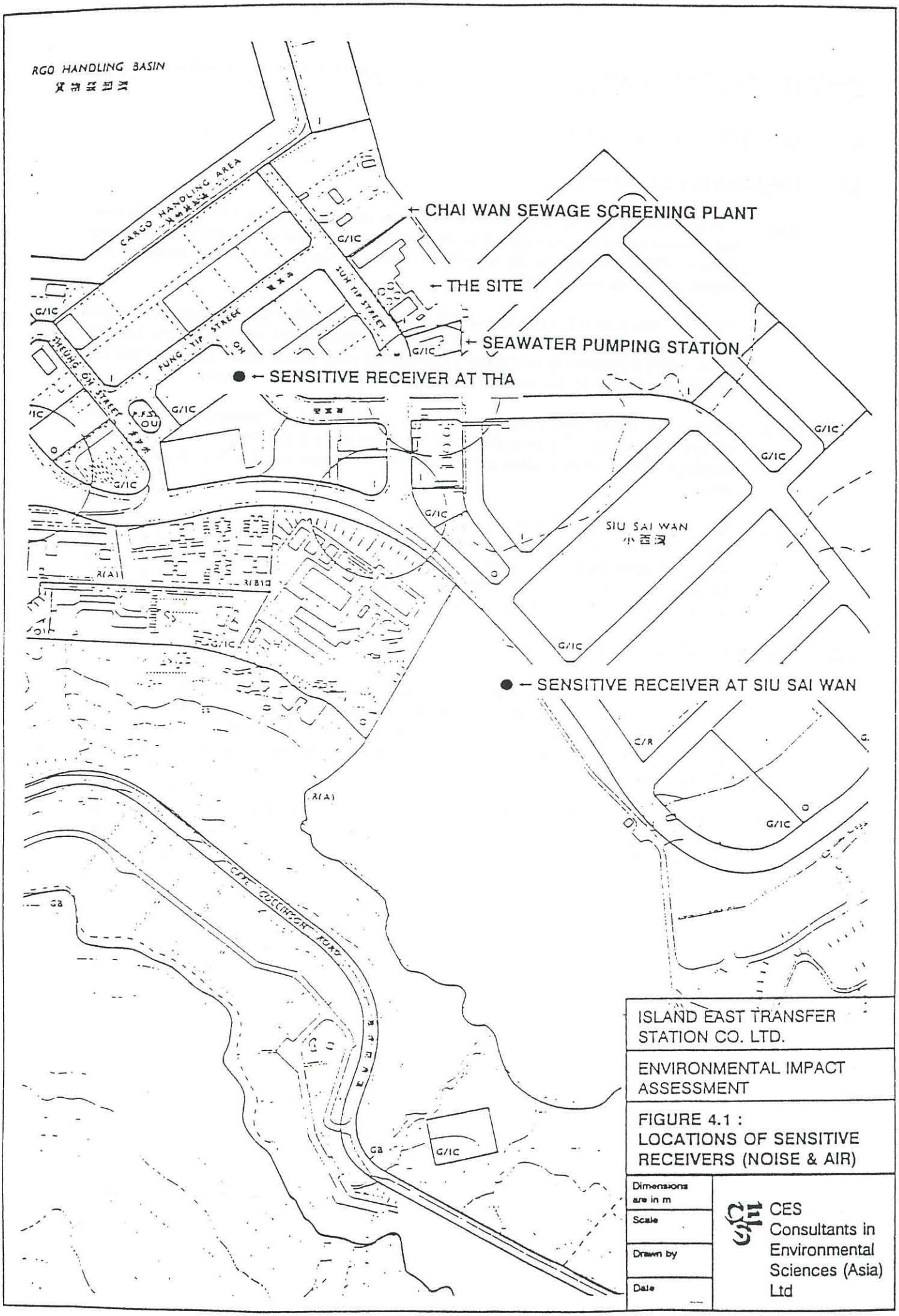
4.1.3 The transfer station site is approximately 250 metres north of residential developments adjacent to the Chai Wan swimming pool, but again there is shielding from the industrial buildings. These developments are opposite the bus depot on Chai Wan Road housing estate.

4.1.4 The estate at Siu Sai Wan is the only sensitive receiver in direct line of sight with the transfer station, but is approximately 400 m away. Between the site and the estate is a large area of reclamation which is likely to have considerably greater air quality impact on Siu Sai Wan than the construction of the transfer station. No sensitive receivers will occupy the reclamation prior to completion of the construction.

4.2 Locations of Sensitive Receivers

4.2.1 The sensitive receivers selected for the quantitative assessment were the THA on Fung Yip Street and the estate at Siu Sai Wan. The locations of these receivers are shown in Fig. 4.1. The residential buildings on Chai Wan Road were not used in the quantitative assessment because they are more distant than the THA and are in any case shielded from direct line of sight.

4.2.2 The waters of the Eastern Buffer Zone constitute a sensitive receiver, although there are no sensitive uses located close to the transfer station with the exception of the sea water pumping station.



ISLAND EAST TRANSFER STATION CO. LTD.

ENVIRONMENTAL IMPACT ASSESSMENT

FIGURE 4.1 : LOCATIONS OF SENSITIVE RECEIVERS (NOISE & AIR)

Dimensions are in m	CES Consultants in Environmental Sciences (Asia) Ltd
Scale	
Drawn by	
Date	

5

SUMMARY OF DEMOLITION IMPACTS AND TEMPORARY ARRANGEMENTS

5 SUMMARY OF DEMOLITION IMPACTS AND TEMPORARY ARRANGEMENTS

5.1 Background

5.1.1 Prior to commencement of the contract to design, build and operate the Island East Transfer Station, the existing Chai Wan Composting Plant had been used for several years, with some modification, as a transfer station. There is no provision for temporary diversion of the waste received at Chai Wan to another site. Consequently, the operation must be continued throughout the period of construction of the Island East Transfer Station through the implementation of temporary arrangements.

5.1.2 Demolition and clearance of the Composting Plant was required prior to construction of the transfer station. Consequently, early implementation of the temporary arrangements was necessary. Since the timing of this and of the commencement of demolition was early in the overall programme, the environmental issues were given priority consideration. Details of environmental impacts and mitigation measures required were presented in two Technical Notes. The first, on demolition, is reproduced as Appendix B to this report. The Note on temporary arrangements essentially covers operational impacts and is discussed in detail in the second Key Issues Report; a summary is included here for ease of reference because the temporary arrangements will run in parallel with construction.

5.2 Impacts of Demolition

5.2.1 The structure to be demolished was a steel-clad, steel-framed building and the works involved mainly steel cutting and disassembly of the structure. Concrete breaking was also required. Dust and noise impacts were not expected to be as sustained or significant in magnitude as they are on other demolition sites in the Territory.

5.2.2 Sensitive receivers within the vicinity are sufficiently distanced so that noise and dust impacts of demolition operations had little effect. The predicted demolition noise level at the nearest sensitive receiver was 67 dB(A). This was below the Acceptable Noise Levels defined under the NCO for work during all periods except night time (2300 - 0700).

5.2.3 Demolition traffic was not found to have a significant impact upon the community, there being only 2 vehicles per hour entering and leaving the site.

5.2.4 During demolition some asbestos - containing material (ACM) was identified. The presence and locations of ACM were confirmed by a specialist survey commissioned by the Island East Transfer Station Co. Ltd. The material was removed, transferred and disposed of to landfill in a safe manner in accordance with the recommendations of a management report endorsed by DEP. The report is included as Appendix F for reference.

5.3 Impacts of Temporary Arrangements

5.3.1 The arrangements for the continued transfer operation are temporary only and differ from the system which operated prior to demolition of the composting plant in that refuse is not pulverised prior to transfer to the barge, but is transferred directly from the refuse collection vehicles. The net effect is to reduce the amount of time that the refuse spends on site. Direct transfer is also expected to reduce the potential for odour generation.

5.3.2 Since the transfer operation is located outside the composting plant pollution control measures incorporated into the design of the temporary facility are mainly concerned with the surrounding water quality in minimising the amount of refuse entering the harbour and in the prevention of leachate discharge. Measures include the use of extensions on the barge hold, heavy curtains vertical to the ramp edge and fencing along the sides of the ramp in order to reduce the amount of refuse entering the water. Contaminated discharge from the ramp is diverted into storage tanks beneath the ramp which collects all leachate both from washing down of the ramp and from vehicle washing. This contaminated water is transferred to the barge during low tide.

5.3.3 During this time there is no provision for on-site storage of waste and if exceptional quantities of waste are diverted to Chai Wan by USD extra barges will be required.

6

AIR QUALITY IMPACTS

6 AIR QUALITY IMPACTS

6.1 Source of Emissions

6.1.1 Any air quality impact during the construction of the IETS will result from dust emissions. Vehicle and plant exhaust emissions are not considered to constitute a significant source of air pollutants. Major dust sources are likely to be site preparation, excavations, material handling and vehicle/plant movements on unpaved roads and over the site.

6.2 Assessment Methodology

6.2.1 Dust emission levels arising from construction work may be estimated using USEPA Compilation of Air Pollutant Emission Factors (AP-42). In order to predict air quality impacts the following information is required: site area, nature of activity, quantities of stockpiled materials, vehicle movements to and from the site, vehicle speed over the site, silt content of excavated material and rainfall data. The basic emission categories are: dust from vehicles movements on unpaved roads, dust from material movement, dust from the erosion of stocks of spoil and aggregate, and concrete batching. The UNAMAP ISCST (area source) dispersion model was used for the dispersion modelling to assess the effects on the sensitive receivers. Construction schedules and equipment usage data are given in Table 2.1.

6.2.2 Meteorological conditions of wind speeds 1 and 2 ms^{-1}, worst case wind direction, stability class D and a mixing layer height of 500 m were adopted for the modelling. The effects of dust impact on Siu Sai Wan Estate were considered to be of potentially greater importance because the THA is shielded by 9-12 storey industrial buildings so would not be subject to direct plume impingement.

6.2.3 The dust emissions were calculated using AP-42, based on construction and equipment schedules. Table 6.1 shows the emission factors used for dispersion modelling, calculated using AP-42. The basic data are presented in Appendix C.

Table 6.1 Construction Dust Emission Factors

Activity	Emission, $kg.day^{-1}$
Dust from Unpaved Roads	30
Spoil Deposition (Excavators to Trucks)	0.13
Erosion of Spoil Heaps	N/A
Concrete Batching	N/A

6.3 Impact on Receivers

6.3.1 Table 6.2 shows the predicted dust concentrations at the sensitive receivers.

Table 7.2 Dust Concentrations at Receivers for Wind Speeds 1 and 2 $m.s^{-1}$

Receiver	Dust Concentration, $\mu g.m^{-3}$	
	Wind speed: 1 $m.s^{-1}$	Wind speed: 2 $m.s^{-1}$
Siu Sai Wan Estate	54	27
THA	176	89

6.3.2 There will be no exceedance of the 500 $\mu g.m^{-3}$ hourly average limit at either the Siu Sai Wan Estate or the THA for wind speeds of 1 and 2 ms^{-1} under worst case wind directions. Concentrations at the THA are likely to be considerably lower than indicated by the modelling due to increased plume dispersion caused by sheltering of the receiver by the industrial buildings between it and the source. The increased plume dispersion is not accounted for in the modelling.

6.3.3 The levels of dust predicted will only occur under mutually exclusive worst case conditions, assuming a maximal level of activity of plant and materials handling on site. Since these conditions will not persist for up to 24 hours, the 24-hour average concentrations at the sensitive receivers are expected to be much lower than the hourly average concentrations. Since the predicted one - hour average levels are below the 24 - hour average AQOs exceedance of the statutory limits will not occur as a result of construction work on the site, even taking into account the likely background levels of TSP (see Table 3.2).

6.4 Recommendations for Dust Reduction

6.4.1 Although the modelling results indicated that dust generated by construction activities does not constitute an air quality impact of significant import, site dust emissions should still be reduced where possible by adopting good operating practices.

6.4.2 Watering of exposed site surfaces is the most commonly selected dust control method but its effectiveness depends on the degree of coverage and frequency of application. Up to 50% reduction in dry dust emissions can be achieved by twice daily watering with complete coverage. Other methods which can be employed include screening and enclosure of particularly dusty work areas, where this is practical.

6.4.3 Common control methods employed for unpaved site roads include surface treatment with penetration chemicals, oils, stabilisation chemicals, watering, use of geotextile surfaces and traffic speed control regulations. The agreed contract does allow for the incorporation of dust suppression measures during construction of the transfer station and as such the following measures are recommended:

- use of regular watering to reduce dust emissions from unpaved roads;
- imposition of speed controls for vehicles on unpaved site roads, 8 $km.hr^{-1}$ being the limit recommended by EPD;

- use of frequent watering for particularly dusty static construction areas;
- tarpaulin covering of all dusty vehicle loads transported to and from the site;
- establishment and use of a vehicle wheel and body washing station at the exit point of the site, combined with cleaning of public roads where necessary and practical;
- where feasible, routing of vehicles at maximum possible separation distance from sensitive receptors;
- instigation of a control program to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions arise.

6.5 Recommendations for Monitoring

6.5.1 In order to ensure that the dust control measures are effective, a programme of monitoring will be required. Total suspended particulates (TSP) should be monitored for compliance with the accepted limits for construction sites of $<500\ \mu g.m^{-3}$ as an hourly average and $<260\ \mu g.m^{-3}$ as a 24-hour average concentration.

6.5.2 Monitoring should be carried out according to Document 29 of the Invitation to Tender (Appendix E) such that the Company has the authority to impose controls and restrictions on activities causing or likely to cause exceedance of guidelines or statutory limits. 24-hour TSP and RSP monitoring every six days is normally adopted, with occasional hourly monitoring undertaken. USEPA approved high volume samplers should be used and the data reviewed for the remaining period of the week. It should be noted that the value of such monitoring will be limited due to dust arising from the adjacent reclamation. However, if samplers are located on the south-west or southern site boundaries, reasonable results should be obtained for wind directions north to south west. However, winds from other directions are likely to carry dust from the reclamation. It is not recommended that monitoring is carried out at the receivers themselves, due to both the practical difficulties and the uncertainty of dust sources (such as the reclamation and the concrete batching plant). Careful attention should be given to monitor placement, based on prevailing wind directions. Monitoring should not be carried out when it is raining.

6.5.3 Suggested actions to be taken by the monitoring authority and contractor in the event of non-compliance are shown in the Action Plan presented in Table 6.3.

Table 6.3 Suggested Action Plan for Compliance Monitoring Failure

EVENT	ACTION BY	
	Monitoring Staff	Site Engineer/Contractor
Any one 1 hourly sample exceeds limit values specified.	Staff inform Project Manager and continue to monitor for a further hour.	Project Manager checks working method and Contractor rectifies any unacceptable practices, if found.
Two consecutive 1 hourly samples exceed limit values specified.	Staff inform Project Manager and continue to monitor for a further hour.	As above. If Project Manager considers that the working method is causing generation of dust, Contractor will consider changes to the method.
Three consecutive 1 hourly samples exceed limit values specified.	Staff inform Project Manager immediately and confirms failure to comply in writing within 24 hours.	Project Manager shows evidence of action taken by contractor to reduce impact, confirms receipt of notification of failure and indicates action taken to prevent a recurrence in writing.
Any one 24 hourly sample exceeds limit values specified.	Staff inform Engineer and proceeds to monitor on an hourly basis, as above.	Project Manager checks working method and contractor instigates remedial action as necessary.

7

NOISE IMPACTS

7 NOISE IMPACTS

7.1 Methodology

7.1.1 Noise prediction calculations were undertaken in accordance with the methodology given in the Technical Memorandum on Noise from Construction Work Other than Percussive Piling. In accordance with the Technical Memorandum, all powered mechanical equipment was assumed to be located midway between the geographic centre of the site and the site boundary nearest to the NSR.

7.1.2 Preliminary calculations indicated that the worst case noise levels would occur in November and December 1991. Further detailed assessment of noise levels consequently concentrated on this period. During all other phases of construction, noise levels would be lower.

7.1.3 Table 7.1 shows the inventory of plant on site, sound power levels, sound pressure levels at sensitive receivers and distance and shielding corrections.

7.1.4 In addition to the plant as shown in Table 7.1, piling will be undertaken up to the end of 1991 using two diesel hammers to drive steel piles. The combined noise levels at the THA and Siu Sai Wan Estate (with corrections for facade and shielding) will be 74 and 77 dB(A) respectively. Noise from percussive piling activities was evaluated according to the Technical Memorandum on Noise from Percussive Piling.

7.2 Impact on Receivers

7.2.1 The Siu Sai Wan Estate and THA are directly affected by the influencing factor of the airport. The THA is also influenced by the surrounding industrial areas. The area sensitive rating would be class C, giving a Basic Noise Level (BNL) of 70 dB(A) for evenings, Sundays and holidays. thus the Acceptable Noise Level (ANL) has been taken as 70 dB(A). The ANL for night-time work will be 55 dB(A). On the basis of the analysis, day time construction impacts are unlikely to be significant and evening work may be undertaken.

7.2.2 Noise levels from piling operations indicate that piling may be conducted between 0700 and 1900.

7.2.3 Dredging will be undertaken taken to accommodate the sea vessels, but the timing has not yet been finalised. Assuming a basic noise level of 112 dB(A), dredging operations could be undertaken during the daytime and in the evenings.

7.3 Recommendations for Noise Reduction

7.3.1 Although the predicted levels are within guideline and legislative limits, as with dust suppression, noise reduction techniques should be adopted as a matter of good working practice, where practical. The following options list the techniques available for reducing noise levels from construction sites:

- erection at site boundary of 2.4 m hoardings as has been undertaken to eliminate direct line of sight of construction activities and to attenuate equipment motor noise;

- ☐ acoustic shielding of individual plant items to reduce noise at source;
- ☐ employment of silenced plant;
- ☐ employment of quieter techniques, particularly to replace the excavator mounted breaker.

Table 7.1 Plant Items Contributing To Noise Levels (In November/December 1991)

Item	Sound Power Level dB(A)	Number of Items on Site	Sound Pressure Level Contribution at THA, dB(A)	Sound Pressure Contribution at Siu Sai Wan, dB(A)
Boring Rig	115	2	64	57
Generator (silenced)	100	1	46	39
Excavator with Breaker	122	2	71	64
Excavator	112	2	61	54
Vibratory Compactor	105	2	54	47
Vibratory Roller	108	1	54	47
Crane Truck	112	1	58	51
Bar Bender	90	2	39	32
Truck	112	5	65	58
Mixer Truck	109	5	62	55
Concrete Pumping Truck	109	1	55	48
TOTAL			74	67
Facade correction [+3 dB(A)]			77	70
Shielding attenuation adjustment [-10 dB(A) at THA]			67	70

7.3.2 The use of silenced equipment forms part of the existing contract documentation. Therefore, the generator referred to in Table 8.1 should be silenced. However, as noise from the generator is not the dominant noise source, use of the silenced version does not serve to reduce overall construction noise levels. The excavator mounted breaker is the noisiest equipment item. In "A Practical Guide for the Reduction of Noise from Construction Works", EPD 1989, it is stated that the use of commercially available hammer

brackets can achieve a noise reduction of up to 10 dB(A). This would serve to reduce the overall noise level by 3 dB(A).Although there are no statutory limits on day-time construction noise, control may be exercised through the use of contract clauses. Typically these would follow the sample specifications given in "A Practical Guide for the Reduction of Noise from Construction Works", EPD 1989.

7.4 Recommendations for Monitoring

7.4.1 In accordance with Tender Document 29 the Environmental Monitoring Programme includes a once weekly noise monitoring programme during the construction phase (Table 7.3). The compliance limits are presented in Table 3.3. The Project Manager should be responsible for any action to be taken at the site should results exceed compliance limits.

8

WATER QUALITY IMPACTS

8 WATER QUALITY IMPACTS

8.1 Source of Impacts

8.1.1 The most potentially significant impact of construction is dredging which causes an increase in levels of suspended solids and turbidity. In general the western waters of Hong Kong tend to have high levels of suspended solids and turbidity due to the influence of the Pearl estuary, whilst eastern waters have generally lower levels. Subsequently the mean suspended solids levels in the Eastern Buffer Zone are amongst the lowest in Hong Kong. Slightly elevated levels were recorded at station EM1 which may be due to the effect of the Chai Wan sewage treatment works.

8.1.2 Construction may also lead to high suspended solids concentrations in runoff, causing elevated concentrations in the receiving waters themselves and siltation of stormwater drains. It is not generally possible to predict the solids loadings arising from general construction works. Therefore, control of such discharges should be incorporated into the construction works from the outset.

8.2 Assessment of Impacts

8.2.1 An area of 10 000 m^2 will require dredging to a depth of 4.5-5.0 mPD. This will generate approximately 15 000 m^3 of dredged spoil. A worst case sediment release rate from grab or bucket dredging would be about 60 kg per m^3 of spoil, i.e. 900 tonnes of suspended solids. Utilisation of suction or cutter suction dredging with no overflow would yield about 375 tonnes of suspended solids. Spread over 5 days, the worst case release would be equivalent to about 7.5 tonnes per hour of sediment resuspension.

8.2.2 The Lei Yue Mun and Tathong channels are characterised by rapid tidal flows and high gravitational discharge rates. Hydrodynamic studies of the area suggest net discharges of 100 - 300 m^3s^{-1} from dry to wet seasons. Reasonable dispersion of suspended solids plumes in the main flow is not likely to raise suspended solids concentrations outside the immediate area by more than 60 mgl^{-1}. This is within the normal range for these waters and is therefore unlikely to cause adverse impacts.

8.2.3 The dredging methods to be employed are not yet known, nor the time span over which dredging will be undertaken. The amount of material to be removed suggests the dredging operations will be completed within a few days. The limited amount of dredging required is not anticipated to cause significant impacts on surrounding environment and should not result in any long term effects.

8.3 Recommendations for Mitigation

8.3.1 In order to minimise the impacts associated with construction runoff at the adjacent sea water pumping station, it is recommended that site drainage is diverted through a series of channels to sediment traps in order to allow the deposition of the majority of solids prior to disposal. These traps will require regular maintenance in order to maintain efficiency.

8.3.2 The sea water pumping station may require the protection of a silt curtain around the intake during the dredging period.

8.4 Recommendations for Monitoring

8.4.1 Water quality monitoring during construction is not considered necessary. Tender Document 29 does not include any monitoring of effluents or discharges during the construction phases. Good working practices incorporating the mitigation methods recommended will need to be enforced to ensure minimal water quality impacts during construction.

9

SOLID WASTE

9 SOLID WASTE

9.1 Sources

9.1.1 Spoil will be generated from construction activities in the form of dismantled structures and fittings, broken concrete members and slabs. No significant quantities of soft materials are anticipated. Much of the material is generated from demolition and is in a form which permits recycling, recovery and reuse.

9.1.2 The most significant waste material to be generated is dredged marine mud and other spoil. This in general cannot be reused and must therefore be disposed of in acceptable fashion.

9.2 Assessment of Impacts

9.2.1 There are no estimates of solid waste from construction which cannot be reused or recycled and which must therefore be disposed of to landfill. In view of the size of the site, however, any such arisings will be very small, will not impact significantly on disposal facilities and will have no measurable environmental impacts.

9.2.2 The marine mud requiring disposal will not be contaminated and may therefore be dumped at a gazetted disposal site, subject to approval of DEP. The quantity to be disposed of is relatively small and will not adversely impact on disposal capacity.

9.3 Recommendations for Control and Monitoring

9.3.1 The relatively small amount of dredging required at the site, yielding a maximum of 15,000 tonnes which includes both mud and rock, and the fact that concentrations of contaminants are within the interim values leads to the conclusion that pre-dredging sampling is not necessary.

9.3.2 The uncontaminated dredged mud extracted should be dumped in a designated dumping ground, approved by DEP and in accordance with the Dumping at Sea Act 1974 (Overseas Territories) Order 1975.

10

CONCLUSIONS

10 CONCLUSIONS

10.1 Neighbouring land uses are largely industrial or GIC. The nearest sensitive receiver with direct line of sight to the construction site is approximately 400 m away. The nearest receiver which is about 150 m from the site is substantially shielded by flatted factory buildings. The site is therefore ideally located and highly unlikely to generate adverse or unacceptable environmental impacts during construction.

10.2 The greatest potential impacts during the construction phase are those associated with air quality and noise. Air quality modelling indicates that compliance with the accepted limits will be achieved.

10.3 Predicted noise levels were calculated from construction schedules for worst-case months. These do not exceed advisory or statutory limits for day time or evening work. Night-time work would require restriction on equipment usage. Piling may be undertaken between 0700 and 1900 (except general holidays).

10.4 Water quality is unlikely to be adversely affected by the construction, although the sea water pumping station may require protection during dredging. The amount of dredging required is small and will not result in any long term impacts.

10.5 The quantities of solid waste requiring disposal are small. Marine mud is highly unlikely to be contaminated and may be dumped at a gazetted site subject to approval by DEP.

APPENDIX A

RESULTS OF AMBIENT NOISE MONITORING

Appendix A Results of Ambient Noise Monitoring

Period (1 hour intervals)			A-weighted Parameters (dB(A))		
			L_{eq}	L_{90}	L_{10}
11:30 a.m.	-	12:30 p.m. on 13/6/91	69.3	65.3	72.3
12:30 p.m.	-	1:30 p.m.	73.3	68.8	75.8
1:30 p.m.	-	2:30 p.m.	75.9	71.3	77.8
2:30 p.m.	-	3:30 p.m.	76.1	70.8	76.8
3:30 p.m.	-	4:30 p.m.	74.6	72.3	76.3
4:30 p.m.	-	5:30 p.m.	73.9	70.8	74.3
5:30 p.m.	-	6:30 p.m.	68.5	65.3	72.3
6:30 p.m.	-	7:30 p.m.	67.9	64.3	68.8
7:30 p.m.	-	8:30 p.m.	67.0	63.8	66.3
8:30 p.m.	-	9:30 p.m.	65.8	63.3	66.3
9:30 p.m.	-	10:30 p.m.	66.9	62.8	64.8
10:30 p.m.	-	11:30 p.m.	68.2	62.8	65.8
11:30 p.m.	-	0:30 a.m. on 14/6/91	63.9	62.3	63.8
0:30 a.m.	-	1:30 a.m.	62.5	61.8	63.3
1:30 a.m.	-	2:30 a.m.	62.7	62.3	63.3
2:30 a.m.	-	3:30 a.m.	62.6	62.3	63.3
3:30 a.m.	-	4:30 a.m.	62.5	61.8	63.3
4:30 a.m.	-	5:30 a.m.	63.3	61.8	64.3
5:30 a.m.	-	6:30 a.m.	63.7	61.8	65.3
6:30 a.m.	-	7:30 a.m.	65.4	62.3	67.3
7:30 a.m.	-	8:30 a.m.	70.0	64.8	72.3
8:30 a.m.	-	9:30 a.m.	73.7	67.3	75.8
9:30 a.m.	-	10:30 a.m.	72.7	67.3	75.8
10:30 a.m.	-	11:30 a.m.	70.6	65.8	73.3

APPENDIX B

ENVIRONMENTAL TECHNICAL NOTE ON DEMOLITION WORKS

1. INTRODUCTION

The existing refuse transfer facilities at Chai Wan are to be decommissioned by mid-June, 1991 with temporary refuse transfer operations being maintained from that time until the new transfer station is operational in late 1992. This Note identifies the environmental impacts of the Demolition Works upon sensitive receivers within the vicinity. Acceptable noise and air quality limits will be determined in order to comply with the relevant Ordinances and acceptable hours of demolition will be evaluated. Methods of preventing or mitigating the environmental noise impacts will be quantitatively assessed where possible and qualitatively discussed for other environmental impacts where the effectiveness of mitigation is a function of climate, geography etc.

The structure to be demolished is a steel-clad, steel-framed building and the works will involve mainly steel cutting and disassembly of the structure, rather than the more conventional type of demolition encountered in Hong Kong. Consequently, dust and noise impacts are not expected to be as sustained or significant in magnitude as they are on other demolition sites in the Territory.

2. SITE DESCRIPTION

The Island East Transfer Station is to be built on the site of the existing transfer station in Sun Yip Street, Chai Wan. The current facilities are housed in the plant originally constructed for refuse composting. The main building, in which the major items of plant, refuse reception area and bunkers are housed, is a predominantly steel frame structure. Adjacent to the main plant area along Sun Yip Street, four steel secondary digester tanks are located. In addition, there is an concrete administration and maintenance building, next to which Hong Kong Electric Switch Rooms and Transformers are installed. The approximate area in plan covered by this building is 500 m^2. Adjacent to the site are a Sewage Treatment Works and a salt water pumping station. The area is zoned Industrial and there are numerous factory buildings within the vicinity. To the east of the site a large reclamation project has been undertaken. The north-north eastern border fronts onto Victoria Harbour.

The current facilities are in a poor condition. In the refuse reception or tipping area and in the main plant area, around the multiple conveyor system used to transport the refuse, it is dirty and odourous. Workers within the conveyor area, near the metallic separating equipment, wear disposable particulate masks as there is a lot of light weight flyblown refuse in the area. A lot of refuse is also found within the vicinity of the telescopic chute, used to transfer material onto the barge.

Before the demolition work is to be undertaken, all the existing facilities will be cleared. This includes the tipping hall and around all the conveyors and the primary digesters. If no clearing is undertaken, significantly more airborne material, including some derived from refuse, will be generated during demolition. This would not be recommended from a health or environmental viewpoint. In the case of the secondary digesters, it is not known whether the tanks still contain some compost or whether they were properly cleaned on decommissioning.

The nearest sensitive receivers are the residents of the Temporary Housing Area (THA) on On Yip Street, approximately 160 m away. There is also a residential development opposite the bus depot on Chai Wan Road and Hong Ping Street, approximately 250 m from the site.

3. DEMOLITION SCHEDULE

The demolition of the refuse composting plant is to be undertaken whilst maintaining refuse transfer operations, which means that the current site will be divided into a demolition area surrounded by hoarding and a direct barge loading jetty which will be used by the Urban Services Department's Refuse Collection Vehicles (RCVs). The access road onto the site will be utilised by both RCVs and demolition trucks. The traffic impacts of dual access road use will be considered in Section 8.

Table 3.1 presents a summary of the demolition activities.

Table 3.1 Summary of Demolition Activities

1. Erect site boundary hoarding, including hoarding on top of the Sun Yip Street boundary wall and also the hoarding within the job site to define a safe access for RCVs. Boundary facing Sun Yip Street to be 2.4 m high. All other boundaries to be constructed of 18 mm plywood and 2.4 m high.

2. Disconnect all existing services such as electricity supply, water supply, telephone etc.

3. Demolish the structural steel members of the refuse reception area, the reception bunkers and the crane maintenance area adopting the following steps:-

   i) Dismantle and remove off site all furniture, equipment and plant housed by the steel structure.

   ii) Dismantle claddings, starting from the roof and proceeding down the sides.

   iii) Dismantle purlins, secondary, primary and main structural horizontal members in listed order.

   iv) Dismantle main structural vertical members.

   v) Steel members are to be dismantled by means of flame cutting or loosening of bolts with assistance of lifting facilities such as winch, mobile crane etc.

   vi) Dismantled steel members are to be piled up and disposed off site as soon as possible.

   vii) Break up and remove reinforced concrete or steel concrete composite members which are above existing ground slab level of the respective area using a pneumatic hammer.

4. Break up and remove reinforced concrete ground slab after piling of the respective area has been completed.

Table 3.1 (continued)

5.	Repeat steps 3 and 4 for the compost stockpiling area, the main plant area and the primary digester area.
6.	Demolish the secondary digester area by flame cutting with assistance of lifting facilities such as winch or mobile crane.
7.	Transformer to be removed by Hong Kong Electric Company.
8.	Dismantle the whole reinforced concrete structure of the Admin./Maintenance building, switch room and transformer room with pneumatic hammer under cover of polythene sheet.
9.	Demolish the weigh bridge and weigh bridge office by flame cutting and pneumatic hammer.

4. DEMOLITION EQUIPMENT SCHEDULE

The mechanical equipment required during demolition is listed in Table 4.1.

Table 4.1 **Demolition Equipment Schedule**

Equipment Item	No	Sound Power Level, dB(A)/item	Sound Power Level, dB(A)
hydraulic breaker, mounted	2	122	125
hydraulic excavator	1	112	112
crane, truck mounted	1	112	112
portable generator set (silenced, so as to achieve 75 dB(A) at 7 m)	1	100	100
mobile air screw compressor (silenced so as to achieve 75 dB(A) at 7 m)	1	100	100
pneumatic paving breaker (silenced)	3	110	115
		TOTAL SOUND POWER LEVEL, dB(A)	126

As specified within the tender documentation, all equipment is to be of the silenced type. However, some super silenced equipment is available which would reduce noise levels further. For example, a super silenced generator set and a mobile air compressor both have sound power levels of 95 dB(A). In the evaluation of demolition or construction noise arising from the use of powered mechanical equipment, the equipment is assumed to be operating simultaneously from one location. Using this mathematical method of analysis, the use of super silenced equipment does not appear to be beneficial in reducing Total Sound Power Level, because other noise contributors dominate the profile. However, in reality, the demolition activities and hence use of every item of equipment will not be occurring simultaneously and it is worthwhile trying to reduce demolition noise from every source where possible. The requirement for noise mitigation is evaluated in Section 7.

From Table 4.1, the noisiest equipment items are the hydraulic breakers. There are commercially made hammer brackets which can be fitted to some hydraulic breakers. The bracket is typically a casing lined with sound insulation material. Noise reductions of up to 10 dB(A) are reported in EPD's "*A Practical Guide For the Reduction of Noise from Construction Works*". Applying this reduction to the levels listed in Table 4.1 results in a Total Sound Power Level of 120 dB(A). This is a significant reduction in the noise level, considering that a doubling of noise energy results in a 3 dB(A) increase in total noise level. Noise levels should be reduced wherever possible if only to reduce the exposure of the workers to high noise levels. In any event, the workers will be provided with ear protectors.

Alternative concrete breaking techniques have been considered unsuitable for this project as they are either too slow or inappropriate for the demolition of certain structural elements.

The screw type air compressor listed in Table 4.1 can be either powered electrically or with

a diesel engine. As electric mains power will be available at the site, the electrically powered equipment is preferred as it is generally quieter and more amenable to acoustic treatment.

4.1 Hoarding

It is proposed to enclose the demolition area with hoarding, for a two fold purpose - firstly to reduce noise levels and secondly to provide safe access for the RCVs to the temporary refuse transfer facilities. It is proposed to construct a hoarding 2.4 m high of 18 mm plywood. This thickness will have sufficient surface mass to achieve a maximum screening effect of 10 dB(A), although this attenuation is not included in the noise assessment because barrier attenuation is achieved via existing buildings located between the site and the THA. In addition, the height of the hoarding is not sufficient to attenuate noise from all demolition activities, such as dismantling the roof.

5. SENSITIVE RECEIVERS

As indicated in Section 2, the nearest sensitive receivers are the residents of the Temporary Housing Area (THA) on On Yip Street. The THA is approximately 160 m from the site. Industrial buildings, located on the block between the THA and the site effectively obstruct the view of the site from the THA. Figure 1 shows the location of the THA in relation to the site.

The tentative clearance date for the THA is 1994/95. The site will then be the property of the Highways Department and will be developed with General/Industrial/Commercial (G/IC) zoning.

The residential area referred to in Section 2 on Chai Wan Road opposite the bus depot is zoned R(B) and could constitute a noise sensitive receiver due to increased road traffic as a function of the construction operations. As it is about 250 m from the site, located on a busy road, opposite an industrial area and site view is obscured, it is unlikely that noise from the demolition operations on the site itself will be noticeable. The new residential development on the hillside east of the swimming pool complex has a direct view of the site from its elevated position. It is, however, over 400 m away from the site and therefore has not been classified as a sensitive receiver.

6. EXISTING ENVIRONMENTAL AND LEGISLATIVE CONTROLS

Legislative requirements form the framework for the assessment of environmental impacts. In addition there are non statutory guidelines presented in the White Paper on Pollution and the Hong Kong Planning Standards and Guidelines that should also be adopted.

6.1 Noise

Noise generated by demolition activities is controlled under the Noise Control Ordinance (NCO). Under the NCO, the acceptable noise levels (ANL) are determined by the methodology specified in the Technical Memorandum on Noise from Construction Work other than Percussive Piling which came into operation in December, 1988. The ANL are presented in Table 6.1. The nearest sensitive receiver, the THA, has been given an Area Sensitivity Rating of C, due to its proximity to industrial areas. There is no statutory limit for daytime construction/demolition operations, but a recommended limit has been adopted in keeping with the spirit of the White Paper on Pollution. This limit is also presented in Table 6.1.

Table 6.1 Acceptable Noise Levels at THA

Time Period		L_{eq} (5 minutes), dB(A)
Daytime	0700 - 1900	75
Evening	1900 - 2300	70
Holidays and Sunday daytime and evening	0700 - 2300	70
Night-time	2300 - 0700	55

6.2 Air

The most important airborne pollutant arising from demolition is dust. The material substance of the dust will be the fines generated by concrete breaking activities and the compacted dried refuse around the defunct equipment. However, much of the demolition work involves cutting and disassembly of the steel structures and will not be a source of dust. The amount of refuse-derived dust will depend upon the extent of clearing undertaken before demolition commences.

The Hong Kong Air Quality Objectives provide maximum ambient concentrations for total and respirable suspended particles (TSP/RSP). These are presented in Table 6.2.

Table 6.2 Air Quality Objectives

Parameter	Concentration, $\mu g.m^{-3}$	
	24 hours (i)	1 year (ii)
Total Suspended Particulates	260	80
Respirable Suspended Particulates (iii)	180	55

(i) Not to be exceeded more than once per year
(ii) Arithmetic means
(iii) Suspended particles in air with a nominal aerodynamic diameter of 10 μm or smaller

In addition to the above legislative controls, it is generally accepted that an hourly TSP concentration of 500 $\mu g.m^{-3}$ should not be exceeded at the site boundary. Such a control limit has been imposed on Hong Kong construction projects in the form of clauses in the

construction contract documents. At this site it is more convenient to monitor at site boundary than at the sensitive receiver. The security of the monitoring equipment could not be guaranteed at the sensitive receiver and the proximity of the sensitive receiver to other industrial activities, including a concrete batching plant, would render the results incapable of interpretation.

It is specified in the tender documentation that during construction, 24 hr TSP and RSP monitoring is to be undertaken once a week at the site boundary. Two USEPA approved High Volume Samplers will be required to undertake the monitoring. In addition, a pre-demolition continuous TSP monitoring programme is going to be undertaken for a fortnight before demolition commences. It is anticipated that this data will provide an ambient dust level reference against which the demolition monitoring data can be assessed. It is appreciated that this additional monitoring programme is of relatively short duration and that as a result, the ambient levels determined will serve as an indication only of air quality. The continuous pre-demolition monitoring is going to be undertaken because the proximity of a large expanse of newly reclaimed land bordering the site could result in high ambient dust levels being recorded. Therefore, the ambient profile obtained before demolition will provide a semiquantitative base, which, when compared with the results of impact monitoring, will give a broad indication of the effectiveness of mitigation measures and the requirement for additional mitigation.

6.3 Water

Water usage on site during demolition will arise from wetting down of dusty areas and the operational requirements of any of the demolition equipment. It is expected that the surface runoff generated by dust control procedures will contain suspended solids. In addition, there may be some oil or grease from the demolition equipment although such materials should only be present in trace amounts if at all. The Technical Memorandum on Effluent Standards under the Water Pollution Control Ordinance provides standards for discharges into coastal waters. These are presented in Table 6.3.

Table 6.3 Standards for Effluent Discharged into the Inshore Waters of Victoria Harbour Water Control Zone

	Flow Rate, $m^3.day^{-1}$	
Determinand, $mg.l^{-1}$	≤10	>10 and ≤6000
Suspended Solids	50	30
BOD	50	20
COD	100	80
Oil and Grease	30	20

Surface runoff entering the foul sewer will be subject to less stringent standards. However, it is felt that optimum control of site operations can be made by ensuring that all surface runoff complies with the standards in Table 6.3, regardless of discharge destination.

7. ENVIRONMENTAL IMPACTS

7.1 Noise

Using the Demolition Equipment Schedule (Table 4.1), the impact of noise at the THA has been assessed and is presented in Table 7.1. Evaluation of noise at the sensitive receiver

is required in order to establish whether a Construction Noise Permit (CNP) may be issued. For a CNP to be issued, the Corrected Noise Level must be lower than the Acceptable Noise Level. The procedure adopted in Table 7.1 takes into account distance and barrier attenuation of noise generated by all demolition equipment operating simultaneously at a Notional Source Position on site. The use of supersilenced equipment, as discussed in Section 4 is unnecessary in terms of compliance with the ANL for a CNP.

Table 7.1 Demolition Noise at THA

	dB(A)
Sound Power Level at IETS at notional source position	126
Distance attenuation (165 m)	-52
Barrier Correction (buildings between THA and site obstructing view)	-10
Facade Reflection at THA	+3
Corrected Noise Level	67 dB(A)

The Corrected Noise Level in Table 7.1 is less than the Acceptable Noise Levels for day and evening in Table 6.1. Therefore, demolition could be undertaken from 0700 - 2300 hours 7 days a week provided that a Construction Noise Permit (CNP) was obtained for the hours 1900 - 2300 and for operation on holidays. Night time (2300 - 0700) demolition operations could not be entertained. The use of super silenced equipment, as discussed in Section 4 is unnecessary in terms of compliance with the ANL for a CNP.

The Corrected Noise level predicted is actually higher than the level that will be obtained on most days of demolition, because the principal noise producers, the hydraulic breakers, will mainly be used at ground level. The site boundary hoarding will provide addition mitigation and this has not been accounted for in the above analysis. The hydraulic breakers will only be visible outside the site when demolishing the higher floors of the administration and maintenance building.

The tender documentation calls for once a week noise monitoring. This will be used to ensure that the construction/demolition ANLs are not exceeded. Monitoring will only be required during working hours. A separate 24 hour noise monitoring programme will be undertaken in relation to establishment of ANLs for site operation. This will be discussed in the initial assessment report.

7.2 Air

The once weekly monitoring required during construction will enable evaluation of whether the Air Quality Objectives cited in Table 6.2 will be complied with. Dust suppression procedures will be undertaken in any event, but can be performed more regularly should the monitoring indicate that compliance may not be achieved.

It is inappropriate to model construction dust emissions for the demolition period given the locality and the suspected high ambient dust levels.

Recommendations for control of dust emissions generated by the demolition works are presented below.

- Watering equipment should be available on the site. Regular watering in dry weather is the most common method of dust suppression and up to 50% reduction of dry dust emissions can be achieved on smaller working areas.

- Damping down of aggregate or dusty material storage piles is recommended. A longer lasting effect can be achieved with the use of chemical wetting agents when up to 90% reduction in dust emissions can be achieved. Mitigation can also be achieved at stockpiles by enclosure on 3 sides and, if practicable, the covering of stock piles when not in use.

- Material likely to create dust should not be loaded to a level higher than the side and tail boards of the vehicle transporting the material offsite. It should be dampened down and covered with secured tarpaulin. In addition wheel washing facilities are recommended to be used by vehicles leaving the site.

- The reinforced concrete structure of the administration and maintenance building, the switch room and transformer room are to be covered with polythene sheet whilst being dismantled.

7.3 Water

A silt trap will be installed in the site's stormwater drain in order to prevent surface runoff containing excess silt from entering the Harbour. Watering required for dust dampening should be undertaken with caution in order to minimise discharges from the site. It is likely that the existing foul sewer terminal manhole could also be used to dispose of wastewater generated during demolition. Therefore, a silt trap should also be located at this discharge point. The effluent standards presented in Table 6.3 must also be complied with for discharge into Victoria Harbour.

As indicated in Section 6.3, these effluent standards should be adopted for all demolition wastewater discharges, even if directed to foul sewer, in order to avoid confusion on site.

8. TRAFFIC IMPACTS

8.1 Site Traffic

The present refuse station in Chai Wan currently accepts about 300 tonnes of waste per day. Each truck carries up to 5 tonnes of waste which results in approximately 65 RCV movements per day.

Refuse unloading and vehicle cleaning are expected to take a maximum of 15 minutes per truck. The peak hour period for RCVs is between 1700 and 1800 hours when a maximum number of 10 vehicles will arrive to offload. The two offloading bays will allow 2 vehicles to offload simultaneously. There is adequate provision of queuing space on the site itself for RCVs waiting to offload. It is estimated that all the peak hour vehicles could arrive simultaneously and not cause congestion. Parking in front of the gate into the demolition area will not be allowed and therefore, access to the site by the two demolition trucks per hour will be unhindered. A large portion of the queuing space is actually beyond the gate into the demolition area. As there is adequate queuing space on site, RCVs will not queue on Sun Yip Street.

During the demolition operations, waste transfer directly onto barges from RCVs will be undertaken. In addition to RCV traffic, demolition operations will result in approximately 25 demolition vehicles entering and leaving the site over a 12 hour period each day.

8.2 Road Traffic

Using 1990 data, an average of 322 vehicles enter and exit Sun Yip Street from Chai Wan Road in the am peak hour, including RCVs. The additional demolition vehicle movements will increment the peak hour flow on Sun Yip Street by less than 1%. Traffic noise levels are already significant in this industrial area because there is a high percentage of heavy vehicles. Industrial noise is also significant and the addition of approximately two demolition vehicles per hour using this road in addition to current activity is expected to have no measurable effect on noise levels.

9. CONCLUSIONS

The site chosen for IETS is well located for a refuse transfer station. Sensitive receivers within the vicinity are sufficiently distanced so that noise and dust impacts of demolition operations will have little effect. The predicted demolition noise at the nearest sensitive receiver is 67 dB(A). Therefore, a Construction Noise Permit could be obtained to undertake demolition operations in the evening. Hours of operation would therefore be 0700 to 2300.

Demolition traffic will not impact upon the community, there being only 2 vehicles per hour. In addition, it will be possible to maintain refuse transfer operations whilst the new transfer station is being constructed. There is adequate queuing space on site for RCVs. Therefore, RCVs will not have to queue on Sun Yip Street.

APPENDIX C

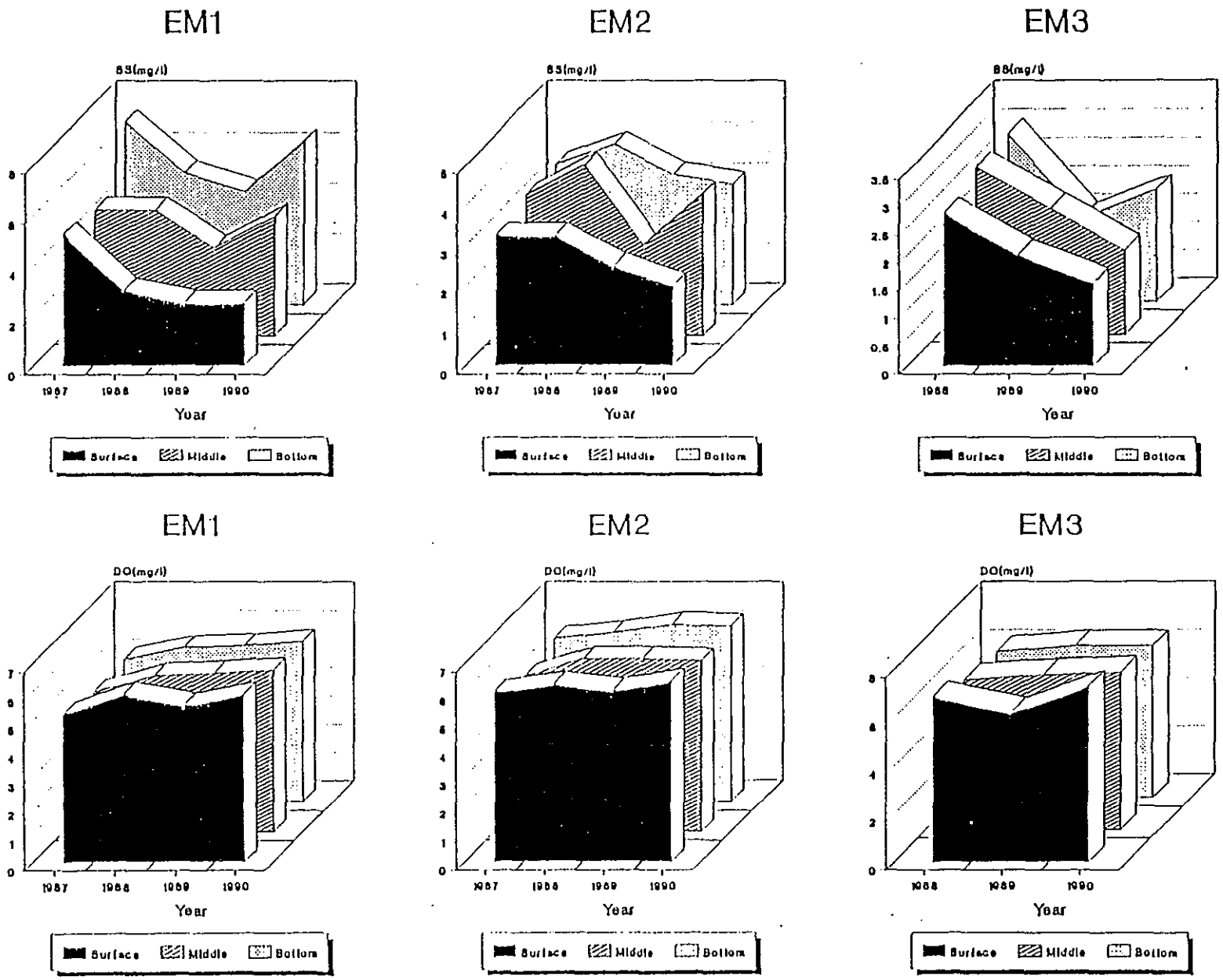
BASIC DUST EMISSION DATA

Appendix C Basic Dust Emission Data

Dust from unpaved roads	
Site area (ha)	0.9
Particle size factor	1
Silt content (%)	15
Vehicle speed (km/h)	8
Vehicle weight (t)	23
Number of wheels per vehicle	10
Days with >0.254 mm rain	0
Emission kg/veh-km	2.5
Daily Vehicle Movements on Site	40
Average distance per vehicle/day	0.3
Area emission (g/m2/sec)	0.000077
Materials Handling	
Site area (ha)	0.9
Particle size factor	1
Silt content (%)	15
Wind speed (m/s)	2
Drop height (m)	3
Moisture content (%)	5
Bucket size (m3)	3
Emission kg/tonne moved	0.0009
Density (t/m3)	1.6
Quantity moved (m3/12 hours)	90
Area emission (g/m2/sec)	0.000005
TOTAL EMISSION (g/m2 sec)	0.000082

APPENDIX D

DO AND SS DATA FOR EASTERN BUFFER WATER QUALITY ZONE



Appendix D Results of EPD Water Quality Monitoring for Eastern Buffer Zone for Dissolved Oxygen and Suspended Solids.

APPENDIX E

ENVIRONMENTAL MONITORING REQUIREMENTS FROM TENDER DOCUMENT 29

APPENDIX E

Environmental Monitoring Programme from Tender Document 29

Sample Location	Parameter	Frequency
<u>During Operation</u>: Site Boundary	Dust: TSP RSP Odour[i)]	Once per week for first year. Monthly thereafter*.
Transfer Station (at a position where RCVs unload refuse into the pushpits in the Tipping Hall)	Dust	Once per week for first year. Monthly thereafter*.
Final Effluent	Flow pH Temperature Suspended Solids BOD_5 COD Grease and oil Detergents	Continuous monitoring and recording " " Once per week for first year. Monthly thereafter*.
Storm water Discharge	BOD_5 COD Grease and oil	Monthly
Site boundary	Noise	1 hour/week of day and night for first year. 1 hour/month of day and night thereafter*.
Noise Sensitive Receiver	Noise	1 hour/week of day and night for first year. 1 hour/month of day and night thereafter*.
Tipping Hall	NO_2 CO	Once per week for first year. Monthly thereafter*.
<u>During Construction</u>: Site Boundary	TSP RSP Noise	Once per week during construction

* subject to EPD approval and subject to review by EPD.

i) non-compliance failure will be counted if a measured odour level exceeding 2 odour units as sampled on 4 consecutive occasions at non overlapping one hour intervals is recorded.

APPENDIX F

REPORT ON ASBESTOS WASTE MANAGEMENT

APPENDIX F ASBESTOS MANAGEMENT REPORT

1. INTRODUCTION

1.1 Background

CES Consultants in Environmental Sciences (Asia) Ltd were commissioned by Swire/BFI Waste Services Ltd to undertake an asbestos survey of the Chai Wan composting plant prior its total demolition and the subsequent construction of the Island East Transfer Station. In addition to the survey CES were requested to sample materials as necessary and prepare a survey report with the results of any analyses included. Should asbestos containing materials (ACM) be encountered within the building then an asbestos management strategy would also be proposed for the removal prior to demolition. This report describes the survey methods utilised during the investigation, detailed visual inspection and subsequent sampling operations. The results of laboratory analysis of samples are presented.

1.2 Site Operation

In order that the reader of this report is totally familiar with the location and function of plant items that may be mentioned, a brief description of the plant has been included. It is important to be able to understand the operation of a facility to be able to determine the most likely sites for encountering ACM.

The site was originally designed to convert refuse into compost by crushing, sorting and digesting the refuse material. The plant handled approximately 700 tonnes of waste per day brought by RCVs. Refuse was deposited by the incoming lorries into hoppers and transferred onto a conveyor system by mechanical grab. The refuse then passed through several crushing devices, the primary and secondary breakers. After passing through 3 magnetic separators the crushed refuse entered one of four digesters. The material was converted to compost by methods of microbial digestion before being conveyed back through the plant to the barge system.

The majority of machinery and storage facilities are enclosed by buildings consisting of painted corrugated steel.

The very nature of the plant operation does not make the use of asbestos likely as asbestos materials are mainly associated with heat retaining facilities. The greatest potential for asbestos in this plant therefore includes the digesters which work by microbial action and insulation in any of the electrical systems.

2. SURVEY

2.1 General

During an initial visit to the site it was apparent that the greatest problem to be overcome for the survey was that much of the demolition had already begun and was progressing rapidly.

2.2 Description of Survey

The survey and sampling exercise was undertaken on the 10th July 1991.

Examinations were made of all areas of the site with close attention being paid to the digesters, offices and any fuse boxes and other electrical works where insulation may be present.

The digesters proved to be of steel walled construction with no lining. Pipework leading from blowers had rubber expanders at the joints (Plate 1).

The storage area was constructed of corrugated metal sheeting which was noted to have a fibrous lining (probably paint applied) between the metal and the outside paint layer of approximately 0.2 mm thick (Plate 2). The control room to the storage area had woven cloth insulators within two fuse boxes (6 No. in total).

In the office building samples were taken for analysis of vinyl floor tiles and the wall plaster which was fibrous by visual inspection. These samples were labelled C3 and C4 respectively.

Within the office buildings, a significant amount of lagged pipework was present. Most of this pipework was sprayed silver and was in good condition. Suspected ACM (as lagging around pipework) was identified in the following areas:

Room 13a (shower room). Twenty-five No. pipes lagged with rope and cloth were identified all leading from the water boilers which had been removed. The diameter of the pipes ranged from 40 mm to 60 mm. Lagging was absent at the pipe joints. Samples of both rope and woven cloth lagging were taken here for analysis (C5, C6 & C7)

Room 14a (locker room) Seven lagged pipes were identified, six of which were approximately 30 mms in diameter and 2 m in length and one of 50 mm diameter and 4 m in length. A sample of suspected asbestos rope (C8) was taken for analysis.

Room 15a (toilet and sink) Four sections of pipe each with similar rope lagging were identified of

50 mm diameter and the longest section being one metre in length.

Room 17a (toilet, sink and shower) Eleven sections of lagged pipework were noted ten with rope and one of woven cloth lagging. All of approximately 50 mm in diameter.

Room 18a (kitchen) Eight sections of lagged pipe work were identified, one with woven cloth and seven with rope. All were approximately 50 mm in diameter. The longest section was 1.5 m in length.

One lagged pipe was also identified in kitchen 2.

2.3 Analysis of Samples

All eight bulk samples were analysed by Amertrack Limited using polarised light microscopy coupled with dispersion staining

3. RESULTS

Detailed analysis reports are presented in Appendix I while a summary of results is included below in Table 3.1.

Table 3.1

Sample Code	Sampling Location	Asbestos Content
C1	Fibrous lagging to corrugated metal sheeting	5-10% chrysotile
C2	Woven fabric insulation from fuse box in storage room control area	~100% chrysotile
C3	Vinyl floor tile from office building	not detected
C4	Wall plaster from office building	not detected
C5	Rope lagging from room 13A in office building	70-80% chrysotile
C6	Cloth lagging from room 13A in office building	40-50% chrysotile
C7	Rope lagging from room 13A in office building	70-80% chrysotile
C8	Rope lagging from room 14A in office building	50-60% chrysotile

4. DISCUSSION

Asbestos was found to be present in a thin fibrous layer on one or both sides of the corrugated metal sheeting used for the storage area and the main building housing the conveyor system. Most of this has now been removed. It is recommended therefore, that the sheeting not yet dismantled is done so carefully with the sheets being disconnected by the removal of rivets without the sheeting being cut, hand tools only may be used. Dismantled sheets should be stacked on site and loaded carefully into lorries or skips. All vehicles carrying this material must be covered. Disposal may only be to designated landfill and the Code of Practice on the Handling and Disposal of Asbestos Wastes must be complied with.

In order to determine the destination of the material, the Wastes Management Policy Group of the Environmental Protection Department must be contacted. (25/F, Southorn Centre, 130 Hennessy Road, Wan Chai, Hong Kong - Telephone 835 1210). The safe handling also requires the use of dust masks by the workers during dismantling and removal of this material.

All previously identified lagged pipework in the office area has been dismantled and removed from the site. Therefore normally recommended pre-cleaning measures and subsequent removal methods as normally specified for asbestos lagging are not relevant here.

However, mounds of debris (incorporating mainly timber and the remains of prefabricated walls) do remain in the building and this material requires careful hand sorting to separate suspected ACM from the non-contaminated material. It is necessary here for workers to be protected and they should adopt the use of dust-masks and disposable suits during these procedures. All ACM will require careful handling and removal from the site and must be disposed of as asbestos waste (Type 2). Subsequent to the cleaning, the area must be thoroughly cleaned using a HEPA type vacuum cleaner.

APPENDIX G

RESPONSES TO COMMENTS

ISLAND EAST TRANSFER STATION
ENVIRONMENTAL IMPACT ASSESSMENT

KEY ISSUES REPORT NO. 1

RESPONSES TO COMMENTS

	Comment	Response
	Environmental Protection Department ref. (68) EP2/H20/02 PT II of 18 December 1991.	
i)	There is no impact assessment for TKOL-I and Yung Long/WENT reception areas/facilities which are also parts of the IETS project.	These were not identified as key issues in the initial assessment report. All civil works at TKOL-I are already complete. Furthermore the Yung Long facility may not be constructed as it may be possible to obtain direct access to WENT using arrangements forming part of the WENT contract itself.
ii)	It is noted that monitoring results for pre-construction baseline conditions are presented. Has any monitoring been done since the commencement of the demolition and piling works, i.e. post-August period?	Yes. This monitoring is undertaken in fulfilment of the requirements of the Contract and the results are submitted independently by the Contractor. Further consideration of more recent data is given in the Key Issues Report No. 2.
iii)	The Consultant have not yet responded to my previous comments on the Response to Comments on the Draft Initial Assessment Report.	Responses sent under separate cover.
iv)	It would be convenient for the readers if a photograph of the existing structure to be demolished together with the surrounding view is included in the Report. A general layout sketch for the future transfer station would also be useful.	Noted. However, the structure is no longer in existence, demolition being complete. An attempt will be made to obtain a suitable photograph.
	Specific Comments:	
1)	Section 2.2, para. 2.2.2 - The station is scheduled for completion in December 1992.	Noted.
2)	Table 2.1 - Under activity 'Road works', what is item '5'?	This is the superstructure RCC work referred to in the same table.
3)	Table 2.1 - There is no Construction Activity Schedule for TKOL-I and Yung Long/WENT reception facilities.	This report addresses key issues only. (See also response to general Comment No. i), above).

4)	Table 3.2 - Only 24 hr. average TSP monitoring data were presented, how about RSP monitoring? For full compliance (Table 3.1 refers), monitoring results for 1-hour concentration for TSP should also be listed.	These data are available, but were not included in the report. They will be added as an appendix.
5)	Section 5.2.4 - No knowledge of such a management report has been submitted. Please clarify.	It is included as an appendix to *this* report.
6)	Section 6.4., para. 6.4.3 - The report recommended the establishment and use of a vehicle wheel and body washing station at the exit point of the site. No such devices were established. Will this cause any dust problems during construction?	In accordance with the recommendation, washing is carried out as necessary. Problems are highly unlikely. The site is relatively small, the level of activity relatively low, the ambient environment not especially susceptible to dust emissions (i.e. low ambient TSP levels) and sensitive receivers are relatively remote.
7)	Section 8.2 - Will dredging effect the sea water pumping station situated next to the IETS site? As stated earlier, TKOL-I and Yung Long reception facilities form parts of the IETS project - will dredging works affect these areas?	Effects are unlikely. The quantities to be dredged are small.
8)	Section 10, para. 10.4 - What precautionary measures will be required to protect the sea water pumping station?	A silt curtain or screen affixed to the intake may be required. Provision should be made in the contract for this.
9)	Para. 3.3.1 Table 3.6 The COD of the effluent with flow rate > 5000 and ≤ 6000 m^3/day shall be laid within 80 mg/l, instead of 8 mg/l as stated in the Report.	Noted.
10)	Para. 4.1.1 Please show on Fig. 4.1 the location of the Chai Wan Sewage Screening Plant and the Seawater Pumping Station for clarity.	Amended in Final Report.
11)	Para. 5.3.2 It is not considered desirable to transfer the leachate from the RCVs and the contaminated water from ramp and vehicle washing to the barge. This wastewater should be directed to the public foul sewer for proper treatment and disposal.	The arragement described is already in effect, is prescribed in the Contract Specification (*"Liquor from the Temporary Arrangements may be disposed of to the landfill."*) and is approved by the Client. It is not possible to divert this wastewater to foul sewer. If it were, the pollution load would be discharged virtually untreated to sea via the Chai Wan Screening Plant. It need not be assumed that the waste will not receive proper treatment and disposal at the landfill.

12)	Para. 9.1.1 and 9.2.1	
	Whilst recycling of demolished material is strongly supported by EPD, we are sensitive to the issue of disposal of construction waste. Therefore, we would like to encourage maximum recycling and minimum disposal. Any such disposal should, for a Contract let and controlled by EPD, set a good example in terms of means and destination for disposal. Use of landfill should be a last resort given the Current shortage. Public dump is the preferred destination.	Noted. Such material as is reusable is being stockpiled and will be used for backfill.
13)	Page 10, para 4.1.2, 2nd line, "site" should read "sight".	Noted.
	Page 14, "Table 7.2" for the Table should read "Table 6.2".	Noted.
	Page 17, para 7.2.3, 1st line, "taken" should be deleted.	Noted
	Page 18, para 7.3.2, 2nd line, "Table 8.1" should read "Table 7.1".	Noted.
14)	If the project requires marine disposal of some dredging from the captioned site in future, Solid Waste Control Group will be involved in the licensing and the associated sampling of the mud before it can be determined whether the dredged mud is acceptable for disposal at sea. Please forward relevant information for our study.	Noted. No relevant information is yet available, but reference will be made to this requirement in the Final report.
Project Manager/Urban Area, Territory Development Department.		
15)	I have no comments to offer. It is noted that the most troublesome stage in environmental impact term for the construction is over with the completion of the demolition and piling activities.	Noted. Despite the potential for greater impacts from demolition and piling, these are for the most part controlled by comprehensive statutory provisions under the Noise Control Ordinance. In these circumstances, the EIA can effect no greater degree of environmental protection than that attainable through enforcement of legislation, but it must not be assumed that the Ordinance is in any way deficient.
Chief Engineer, Port Works, CEO, CED		
16)	The piling foundation drawings for the steel piles at the area adjacent to the existing marine structure should be submitted for comment.	This requirement is noted, but is beyond the scope of this Study. Piling is complete.

Director of Agriculture and Fisheries

17)	Should existing trees be felled for the construction, related details should be provided for consideration before commencement of works.	Noted. There are, however, no trees that will be affected.

TE Division/HK Transport Department

18)	As there will be only two demolition trucks per hour entering and leaving the site during demolition operations, the traffic impact will be minimal.	Noted and agreed.

District Planning Officer/Hong Kong

19)	I have no in principle objection to the captioned Report. However, please be advised that the portion of Siu Sai Wan reclamation area near the site will be replanned for residential purposes and sport ground to tie in with ExCo approved Metroplan's recommendations. Therefore, the design of the Island East Transfer Station should be compatible with the future planned uses. It is suggested that special attention should be given to the visual impacts of the station because it will be in a prominent position as viewed from the sensitive receivers at Siu Sai Wan reclamation area, and the Victoria Harbour.	Noted.

Water Supplies

20a)	Existing watermains/waterworks reserve are affected. No development will be allowed which will require resiting of watermains/Waterworks Reserve.	Noted. This is beyond the scope of this Study.
20b)	Details of site formation work shall be approved by Water Supplies Department prior to commencement of works.	Noted. Relevant design submissions are made to WSD for approval.
20c)	No structures shall be built or material stored within the Waterworks Reserve or 6 metres from the centre line of any watermains. Free access shall be made available at all times for staff of the Water Supplies Department or their contractor to carry out inspection, operation, maintenance and repair works.	Noted and agreed.
20d)	A 5.3 m headroom shall be maintained at all time over the existing Waterworks Reserve.	Noted. There are no structures over the reserve.

20e) No percussive piling shall be carried out within the Waterworks Reserve or 6 m of the centre line of any water main. In case where piling is necessary outside the above limits and in the vicinity of our existing Waterworks installations, the maximum particle velocity and amplitude of ground movement at the installations as measured by a vibrograph shall be restricted to 25 mm/sec and 0.2 mm respectively.	Noted. These provisions have been fully complied with during piling.
Environmental Protection Department, ref. (70) in EP2/H20/02 PT II of 20 December 1991.	
Section 3.4.1	
At present, the Interim Threshold Guideline Values for Deep Bay Study is already been superceded by a set of criteria for assessment of the contamination level before licensing for marine disposal. The current criteria is nearly the same as the Deep Bays criteria except the parameters for Nickel and Zinc which is half of the original value (i.e. 250 mg/kg for Ni and 1,000 mg/kg for Zn).	Noted and amended.
Section 3.4.2	
The new set of guidelines has been formally adopted by the Steering Group for the Contaminated Spopil management Study. A Works Branch Technical Circular will be issued to adopt the new criteria in the near future. The new criteria will be implemented as soon as the option to dispose of the conatminated mud at exhausted borrow pits is confirmed to be environmental acceptable. This new criteria is more stringent than the current criteria used by EPD at present.	Noted and amended.
Section 9.2.2	
The contamination level has to be confirmed by on-site sampling and chemical analysis on heavy metals. The sampling requirement and its location have to be agreed with EPD prior to actual dredging and disposal work. Dumping licence is required for marine disposal at spoil ground.	Noted and amended.
Section 3.3.1	
The table quoted as Standards for Effluent Discharged should not be limited to those 4 determinands since others stated in the Technical Memorandum also have to be adhered to.	Compliance with the Technical Memorandum will only be required when the Water Control Zone is gazetted. Prior to that time, discharges are to be compliant with the Tender Specification, which is that given in the table.

For discharges to the foul sewer system, the standards should also reference the relevant table of the Technical Memorandum.

There will be no discharges to sewer during construction.

The COD limit quoted in Table 3.6 for discharge with flow rate >5000 and $\leq$ 6000 m^3 day^{-1} is incorrect. Please reference the TM.

Noted and amended.

Section 5.3.2

The consultant addresses the wastewater is to be collected in storage tanks beneath the ramp. Does the tank have adequate capacity to hold all wastewater including contaminated surface runoff?

The tank has adequate capacity for its purpose.

Also he should consider the feasibility of using tankers to pump out the wastewater in the storage tanks instead of accumulating there for transfer to the barge during low tide. The tank must be emptied frequently since storage of this polluting liquor will create odour nuisance and may also lead to overflow once it is full.

There is absolutely no necessity to use tankers to pump out the tank. There is no odour nuisance from the tank and it has sufficient capacity to avoid overflow. It should be noted that the existing arrangement is a requirement of the Contract, is compliant with the Specification and approved by the Client. There can be no justification for a review of this arrangement.

RESPONSES TO FURTHER COMMENTS ON IETS EIA INITIAL ASSESSMENT REPORT AND DRAFT KEY ISSUES REPORTS NO.1 AND 2

SPEL (Environment Division)

Concerning the Draft Key Issues Report 1, I wish to clarify two points:

(i) para 1.1.1. Is it correct that HKIERTS will replace KTIP?

Strictly, no. KTIP is apparently to continue in operation after IETS is opened. When IWTS is also operational the KTIP may be closed.

(ii) table 3.1. The 1-hour average concentration for TSP is, I note, non-statutory, though it has been followed in several EIA's. Perhaps considerations could be given to making this a statutory requirement in due course.

It is agreed that the matter is worth considering, but probably not within the context of particular EIA studies.

Director of Fire Services

I have no comment on draft Key Issues Report No. 1. However, as section 4.3.7 in Report No. 1 indicates that there exist the risks of explosion and fire at the bag filters of the Dust Control System, I should be grateful if the consultants could provide me further information on:

(i) the dust content that would cause the risks of explosion and fire; and

(ii) the type of integral protection measures;

for my study to ascertain whether the fire suppression system is adequate to deal with the risks.

It is presumed that the reference is to paragraph 4.3.7 of Key Issues Report No. 2 (Impacts of Operation). Paragraphs 4.3.4 - 4.3.11 provide a general discussion of the various systems available and the factors to be taken into account in selection. Paragraph 4.3.9 concludes that industrial scale equipment, such as the type of bag filter described, will not be required. Paragraph 4.3.11 describes the selected system, which is not of a type that presents a fire or explosion risk.

KEY ISSUES REPORT NO 2

IMPACTS OF OPERATION OF ISLAND EAST TRANSFER STATION

May 1993

CONTENTS

1

INTRODUCTION

1 INTRODUCTION

1.1 Background

1.1.1 In accordance with Government waste disposal policy which is based on a network of transfer stations in the urban areas serving large strategic landfills situated in the remote New Territories, the first transfer station became operational at Kowloon Bay in April 1990. Work is now under way on a second station, called the Island East Transfer Station, to be located on the site of the former Composting Plant at Chai Wan on Hong Kong Island. The Composting Plant had served in the capacity of a transfer station for several years, but was considered inappropriate to serve projected needs. It has therefore been demolished to make way for the new transfer station. However, part of the site remained operational as a temporary arrangement in order to provide a transfer capability in the period prior to the commissioning of the new station.

1.1.2 The requirement for an Environmental Impact Assessment (EIA) Study was identified by Government prior to the outline design and preparation of tender documentation. The requirement was formalised in the Environmental Review for the project, produced in February 1990, which stated that a full EIA should be undertaken by the successful tenderer for the design - build - operate contract. The Environmental Review included a detailed Brief for the conduct of the EIA.

1.1.3 The EIA has been undertaken with reference to the relevant requirements of the Environmental Review, other environmental monitoring and performance specifications included in the tender documentation and the company's design and performance information included in the tender submission.

1.2 Objectives

1.2.1 This report follows the Initial Assessment Report (IAR), which was a scoping report elaborating on the findings of the Environmental Review. It is the second of the Key Issues Reports and covers impacts of operation of the transfer station. Impacts of construction have been assessed in Key Issues Report No. 1. In addition to the formal reports required of the Study, two technical notes have been produced, the first addressing impacts of demolition of the Chai Wan Composting Plant and the second covering the operational impacts of the temporary arrangements for waste transfer during construction of the Island East Transfer Station. The technical note on demolition is included as an appendix to Key Issues Report No. 1 together with an independent short report on incidence and removal of asbestos - containing materials (ACM) encountered during construction. The technical note on temporary arrangements was included as an appendix to the Initial Assessment Report.

1.2.2 The objectives of the assessment relevant to the operational phase of the project are:

- ☐ to describe the proposed installation and related facilities and the requirements for their development;
- ☐ to identify and describe the elements of the community and environment likely to be affected by the operation of the proposed installation;

- to minimise any pollution, environmental disturbance or nuisance that may arise from the total development and its operation;
- to identify and evaluate the cumulative effects during the operation phase of the total development in relation to the community and neighbouring land uses;
- to identify methods and measures which may be necessary to mitigate these impacts and reduce them to acceptable levels;
- to recommend any monitoring requirements which are necessary to ensure the effectiveness of the environmental protection measures adopted.

2

DESCRIPTION OF TRANSFER STATION OPERATIONS

2 DESCRIPTION OF TRANSFER STATION OPERATIONS

2.1 Site Description and Location

2.1.1 The transfer station is located on the site of the former Chai Wan composting plant on Sun Yip Street. The site area is 0.9 ha. The surrounding area is generally zoned for Industrial (I) or Government/Institutional/Commercial (GIC) use. The site itself is flanked by the Chai Wan Sewage Treatment Works and a sea water pumping station. Nearby, on Sun Yip Street are located a bus station and oil storage area. The site location is shown in Fig. 2.1.

2.1.2 An area of land to the east of the transfer station at Siu Sai Wan is being formed by reclamation. When fully developed, zones within this area of reclamation will be zoned for commercial/residential (C/R) and Other (O) uses, as well as I and G/IC uses. The land which lies along the eastern boundary of the transfer station site is zoned for industrial use.

2.2 Site Access and Vehicle Routing

2.2.1 Access to the site is relatively straightforward. Sun Yip Street is a wide street and does not currently bear heavy traffic. Vehicles may reach the site from the north west or the south east directions. Access may also be gained from the east (Siu Sai Wan), although precise details will be subject to detailed design of junctions between Sun Yip Street and Chai Wan Road and between Sun Yip Street and the extension of On Yip Street into the new reclamation.

2.2.2 Chai Wan Road is the major link to the west and provides a connection to the Island East Corridor for traffic arriving from further afield. These links will suffer no capacity constraints as a result of the transfer station.

2.3 Transfer Station Operations

2.3.1 The site will be handling approximately 1 200 tonnes of refuse per day which involves between 240 and 300 refuse container vehicles (RCVs) entering and leaving the site every day. The peak time, just before the afternoon shift change, will result in a maximum of approximately 44 vehicles in one hour.

2.3.2 The site layout is shown in Fig. 2.2. The RCVs will enter the main transfer building at first floor level via a traffic light controlled weighbridge and a ramp. The RCVs will enter the tipping hall, which can accommodate 15 vehicles at any one time, and deposit refuse into push pits. The RCVs will leave via the same ramp, over a second weighbridge and through a vehicle wash system and exit on to Sun Yip Street.

2.3.3 The refuse is deposited into pushpits located in the tipping hall at first floor level. The pushpits discharge into compactor units on the floor below, where the refuse is compacted into containers with an average payload of 14.5 tonnes of refuse. The average throughput of waste is equivalent to approximately 85 containers per day. These containers are loaded onto a specially designed vessel by its gantry crane. The vessel can accommodate all containers, so that, in normal circumstances, only one vessel leaves every day.

2.3.4 Two purpose-built, self-propelled vessels have been provided. Not only does this secure redundancy, but ensures that the marine service may continue in all but the worst weather

conditions. If the marine service has to be suspended at Typhoon Signal Number 8 or above, in accordance with the Contract, containers will be transported to and from the landfill by hired-in tractors and trailers. These will depart from the transfer station via the vehicle wash.

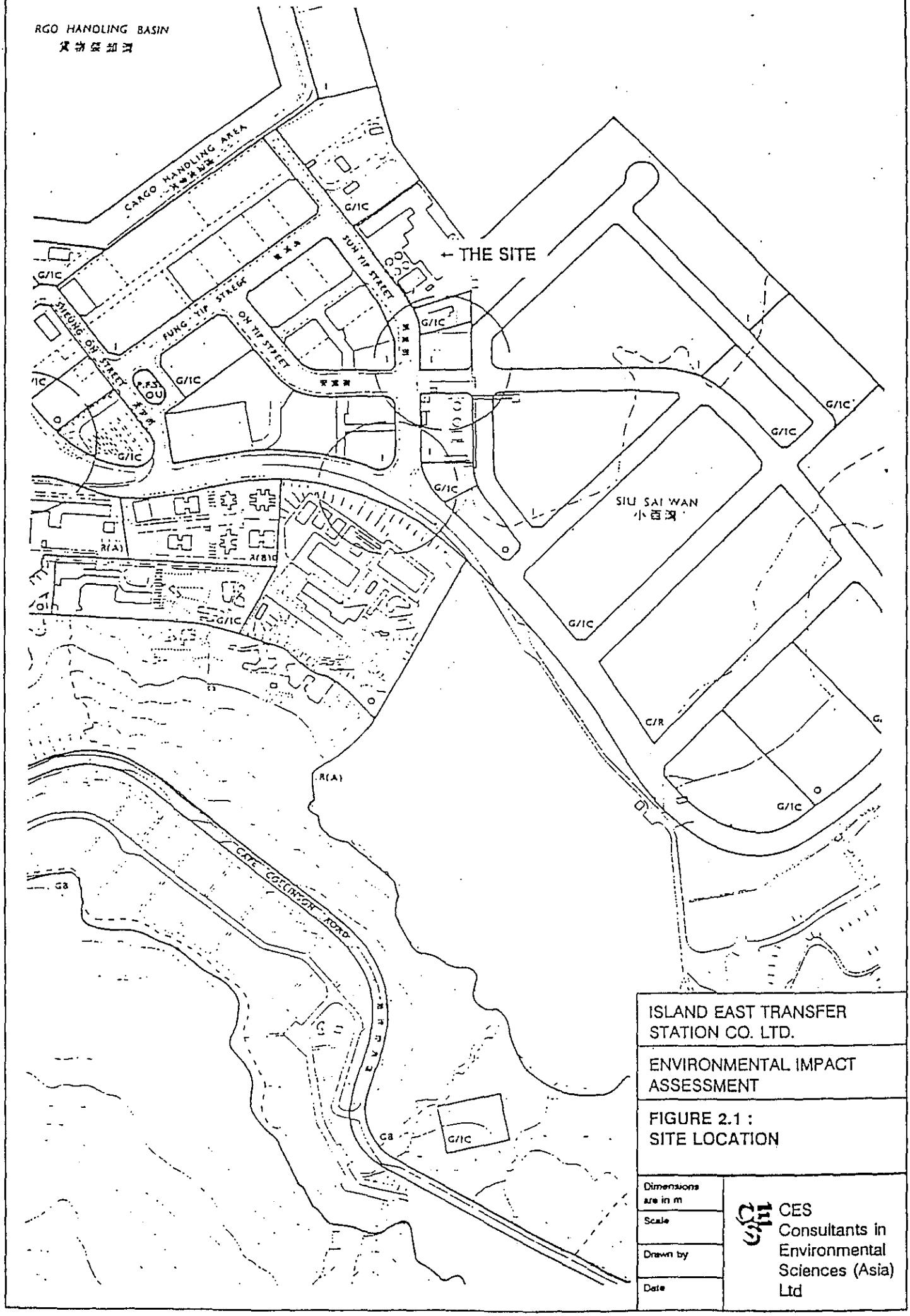
2.4 Sensitive Receivers

2.4.1 The station will be situated in a predominantly industrial area and all sensitive receivers will be located some distance away. The nearest is the Temporary Housing Area (THA) on land zoned for G/IC use near the junction of Fung Yip Street and On Yip Street. A tentative clearance date for this THA is 1994/95, by which time the site will be operational. Most of the THA is shielded from direct line of sight of the transfer station by industrial buildings.

2.4.2 There is a high rise residential development approximately 200 m south-east of the site. This also is shielded from direct line of sight of the transfer station by industrial buildings on land between the two. The development also fronts Chai Wan Road and is opposite a bus station.

2.4.3 No sensitive receivers are planned for the reclamation area immediately adjacent to the transfer station. However, potentially sensitive receivers could be located in the areas to the south and south east of the site, zoned for R(A) and C/R use, respectively. Again, there will be no direct line of sight between these sensitive land uses and the transfer station when the land is fully developed. The land zoned for C/R use to the south east will be shielded from direct line of sight by industrial development on land nearer to the transfer station site.

2.4.4 Sensitive receivers and sensitive land uses are shown in Fig. 2.3.



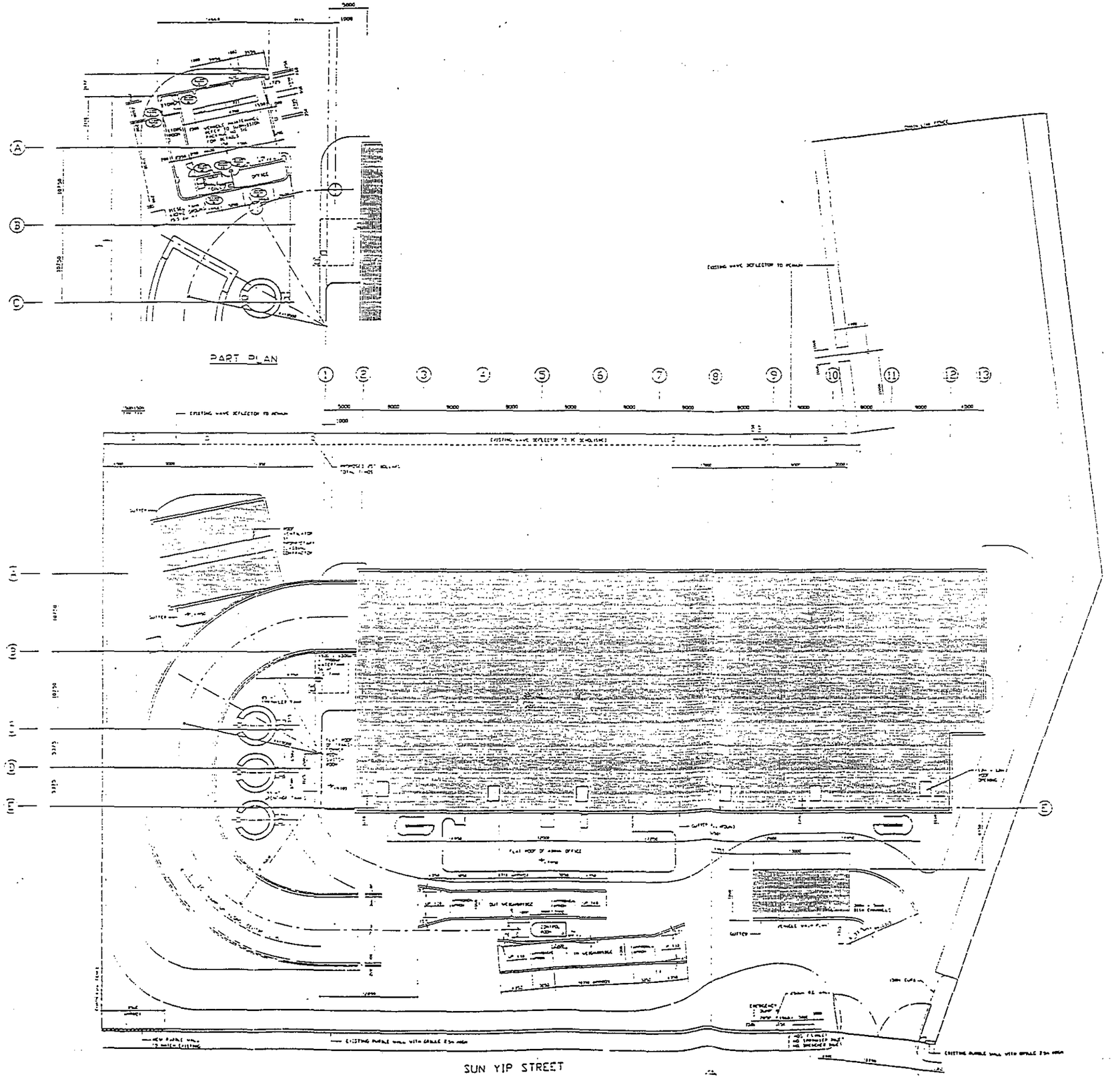
ISLAND EAST TRANSFER STATION CO. LTD.

ENVIRONMENTAL IMPACT ASSESSMENT

FIGURE 2.1 : SITE LOCATION

Dimensions are in m	
Scale	
Drawn by	
Date	

CES Consultants in Environmental Sciences (Asia) Ltd



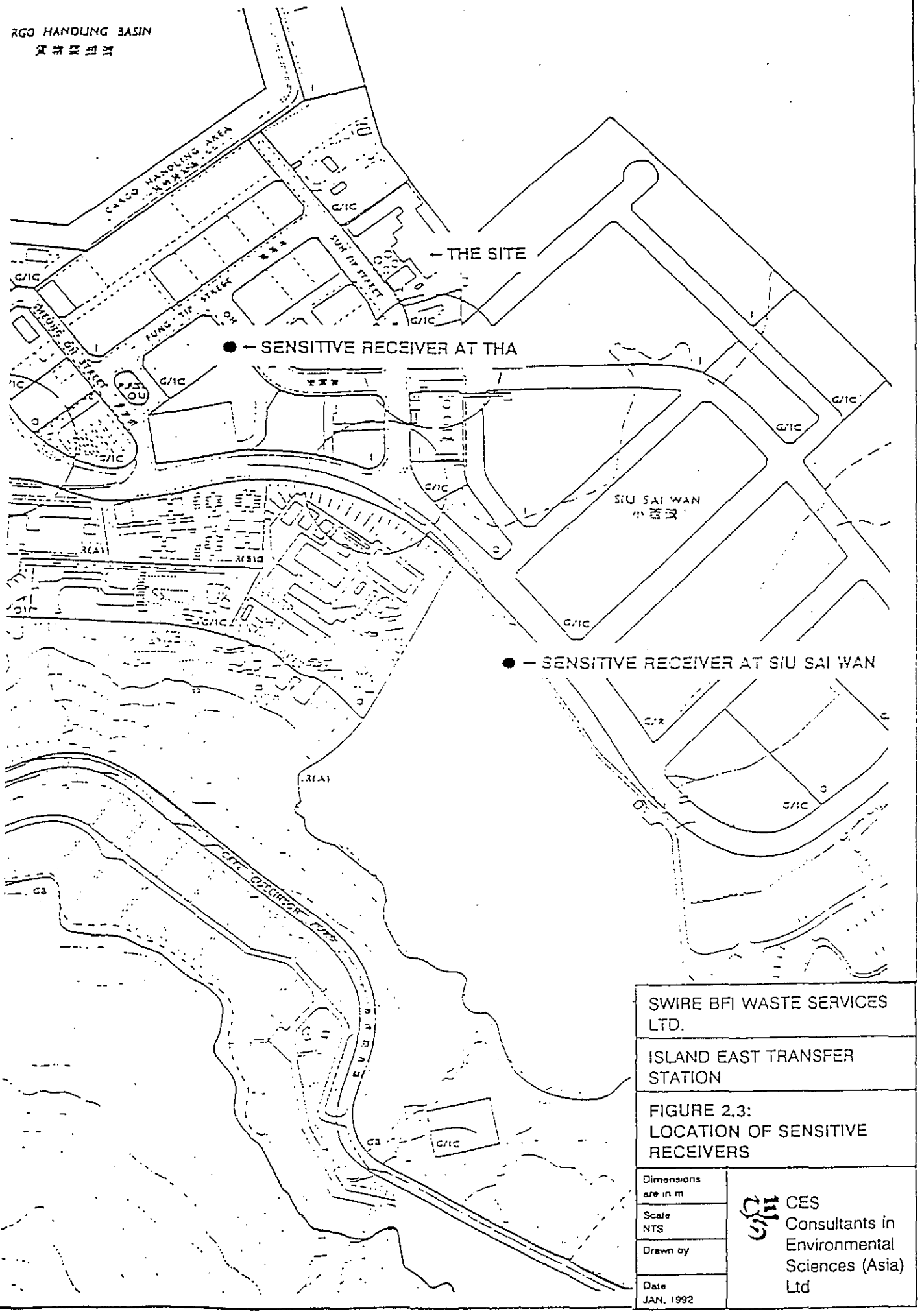
SWIRE BFI WASTE SERVICES LTD.

ISLAND EAST TRANSFER STATION

FIGURE 2.2:
SITE LAYOUT

Dimensions are in m	
Scale NTS	
Drawn by	
Date JAN. 1992	

CES Consultants in Environmental Sciences (Asia) Ltd



SWIRE BFI WASTE SERVICES LTD.

ISLAND EAST TRANSFER STATION

FIGURE 2.3:
LOCATION OF SENSITIVE RECEIVERS

Dimensions are in m	CES Consultants in Environmental Sciences (Asia) Ltd
Scale NTS	
Drawn by	
Date JAN. 1992	

3

ENVIRONMENTAL STANDARDS AND EXISTING CONDITIONS

3 ENVIRONMENTAL STANDARDS AND EXISTING CONDITIONS

3.1 Air Quality

Standards

3.1.1 The Air Pollution Control Ordinance (APCO) provides the statutory means of control of air quality in the Territory. The APCO defines air quality objectives (AQOs) for a number of common air pollutants. These are summarised in Table 3.1. The AQOs are in all cases ambient quality limits; they do not relate to specific or individual sources nor to particular locations or types of receivers. The Authority has a duty to seek to achieve and maintain AQOs through various means, including the making of regulations under the APCO and licensing of certain installations and processes. Refuse transfer stations are themselves not subject to any such regulations or licensing procedures under the Ordinance.

Table 3.1 Hong Kong Air Quality Objectives

Pollutant	Concentration ($\mu g\ m^{-3}$)(i)				
	Averaging Time				
	1 hour(ii)	8 hours(iii)	24 hours(iii)	3 months(iv)	1 year(iv)
Sulphur dioxide	800		350		80
Total suspended particulates			260		80
Respirable suspended particulates(v)			180		55
Nitrogen dioxide	300		150		80
Carbon monoxide	30000	10000			
Photochemical oxidants (as ozone)(vi)	240				
Lead				1.5	

(i) measured at 298^0 K and 101.325 kPa, (ii) not to be exceeded more than three times per year, (iii) not to be exceeded more than once per year, (iv) arithmetic means (v) particles with a nominal aerodynamic diameter of $\leq$ 10 μm, (vi) determined by measurement of ozone only.

Planning Standards and Guidelines

3.1.2 The Hong Kong Planning Standards and Guidelines (Chapter 9) provides guidance on environmental aspects of land use planning as well as more specific issues relating to sources and sensitive receivers of air pollution. General locational guidelines are:

- ☐ central location in the waste catchment with water front barge access;
- ☐ siting in an industrial or other non-sensitive area;
- ☐ sufficient space for reception and queuing of RCVs;
- ☐ short vehicular access to major transport routes;
- ☐ fully enclosed operations with odour, dust and noise control, leachate treatment and disposal provisions and air/exhaust cleaning systems.

3.1.3 The guidelines on air quality recommend buffer distances of 100 and 200 m between sensitive uses and dust and odour sources, respectively. They also summarise environmental concerns in respect of dust emissions from transfer stations, which are accorded Type I status, and odour emissions, which have Type II status. Type I status for a particular combination of land use and type of impact is equivalent to a Category (ii) project, defined by EPD's Advice Note 2/90 as a project with only limited potential for detrimental environmental effects for which mitigation measures may be included in the project design or subsequent operating procedures. Type II impacts have the potential to cause concern and are equivalent to Category (iii) projects defined by Advice Note 2/90 as likely to have significant effects which should be addressed in the planning and feasibility study for the project. An environmental assessment may be required for Category (iii) projects, but is not normally undertaken for Category (ii) projects.

Other Guidelines

3.1.4 The Authority may employ additional guidelines of both a general and specific nature with the intention of, *inter alia*, avoiding nuisance or defining non-statutory air quality objectives for pollutants and processes not otherwise covered by statutory and planning provisions. One such guideline pertinent in this case is a limit on ambient odour levels. The applicable limit is two odour units at the site boundary (equivalent in concentration to twice the odour threshold concentration where this is known), defined as the concentration of odourous material requiring dilution by a factor of two to become undetectable by a panel of individuals. The limit as normally stated does not define an averaging time or an acceptable frequency of non-compliance (which is therefore assumed to be zero). In this case, however, a failure to comply would be counted if a total of four consecutive samples taken at one hour intervals exceed the 2 odour unit limit.

Specific Project Requirements

3.1.5 In addition to the statutory limits and planning guidelines, standards were specified in the Tender Documents for this project. These standards are summarised in Table 3.2 (except where already specified above).

Table 3.2 Specific Air Quality Requirements of the Project

Parameter	Location	Limit
Nitrogen dioxide	Tipping Hall	5.6 mg m^{-3} (8 hour time weighted average)
Carbon monoxide	Tipping Hall	57 mg m^{-3} (8 hour time weighted average)
Total suspended particulates	Transfer Station (general)	1 mg m^{-3} (24 hour average)

Existing Conditions

3.1.6 The existing environmental conditions in respect of air quality have limited relevance in respect of future operational impacts because of the temporal variation that may occur in the period up to commissioning of the new transfer station. Furthermore, the existing conditions cannot be assumed to be representative of a true baseline condition because a refuse transfer operation has been continuing at the site, initially within the Chai Wan composting plant and subsequently under a temporary arrangement. The available data therefore reflect the ambient environmental conditions as jointly influenced by the existing transfer operations and the construction of the new transfer station.

3.1.7 Total suspended particulate (TSP) levels were determined daily for two weeks at the site boundary prior to commencement of the construction works. The data are shown in Appendix A. The maximum 24 hour TSP value measured was 114 $\mu g\ m^{-3}$ and the lowest was 29 $\mu g\ m^{-3}$. TSP and RSP monitoring has been undertaken during the construction works. These data are also summarised in Appendix A. TSP values measured on eight occasions over a two month period ranged between 61 and 249 $\mu g\ m^{-3}$. RSP values ranged between 40 and 152 $\mu g\ m^{-3}$. None of the readings exceed the relevant AQOs.

3.2 Noise

Standards

3.2.1 Control of specific noise sources is achieved by the enforcement of the Noise Control Ordinance (NCO). New developments are required to comply with acceptable noise levels (ANL) at the nearest sensitive receiver (NSR) according to criteria described in the *'Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites'*. The industrial nature of the area results in the existing NSRs being assigned an Area Sensitivity Rating (ASR) of 'C' and the relevant ANLs for this ASR are given in Table 3.3. Future NSRs on land yet to be developed may be assigned an ASR of "B". The ANLs for this ASR are also shown in Table 3.3.

Table 3.3 Acceptable Noise Levels at Nearest Sensitive Receivers

Time Period		L_{eq} (30 mins), dB(A)	
		ASR B	ASR C
Day	0700 - 2300 hours	65	70
Night	2300 - 0700 hours	55	60

Planning Standards and Guidelines

3.2.2 In addition to the statutory limits the HKPSG state that, in order to plan for a better environment, fixed noise sources should be located and designed so that the level of the noise at the NSR is at least 5 dB(A) below the limits given in the Technical Memorandum or, if the background noise level is more than 5 dB(A) below the ANL, no higher than the background.

3.2.3 The HKPSG sets a road traffic noise limit of 70 dB(A) (L_{10} peak hour) at facades of residential buildings, 65 dB(A) at facades of educational institutions and 55 dB(A) for hospitals and clinics. Facade noise levels are likely to exceed an L_{10} of 70 dB(A) for receivers 10 metres from the road side where the peak hour traffic flow exceeds 250 vehicles per hour at speeds in excess of 30 km h^{-1}.

Specific Project Requirements

3.2.4 Limits on operational noise at source have been specified in the Environmental Review. These are shown in Table 3.4

Table 3.4 Design Criteria for Operational Noise Limits

Criterion	Maximum Noise Level (5 min. L_{eq})
At 1 m distance from any source when all equipment is in operation	90
At 1 m distance from any source when sound is from the source alone	85
At 6 m distance from any source when the sound is from the source alone	65

Existing Conditions

3.2.5 Ambient noise monitoring over a 24 hour period was undertaken at the site boundary prior to construction of the transfer station. The noise monitoring was carried out using a B&K type 2231 Modular Precision Sound Level Meter and data recorded by a B&K type 2318 Graphics Printer. The parameters measured were A-weighted L_{eq}, L_{90} and L_{10} at 1 hour intervals. The location of the noise measurement point was at least 2 m away from any reflecting surface. The results are shown in full in Appendix A. The measured L_{90} values

for different time periods are shown in summary in Table 3.5.

Table 3.5 Summary of 24 hour Ambient Noise Monitoring

Time Period	L_{90}, dB(A)
0700 - 1900	62 - 72
1900 - 2300	63
2300 - 0700	62

3.2.6 At the time of writing, further noise measurements have been undertaken on nine occasions at a location within the boundary of the former composting plant since commencement of construction works. These indicate maximum daytime, evening and night time L_{eq} values of 89.5, 69.8 and 69.8 dB(A) respectively. High values during the day are attributed to specific events, including passby of heavy vehicles. The general noise environment in the area is dominated by multiple industrial sources (and aircraft in the airport flight path) which continue to operate during the night.

3.3 Water Quality

Standards

3.3.1 The principal statutory provision for control of water pollution is the water pollution Control Ordinance (WPCO). The Island East Transfer Station Site lies within the Eastern Buffer Water Control Zone which is due to be gazetted in 1992/93. When operational, the transfer station must therefore comply with the relevant provisions of the WPCO. Amendments to the WPCO in 1990 introduced new effluent standards, published in the form of a Technical Memorandum, which form the basis for licensing of discharges. The Technical Memorandum Standards replace the Revised Interim Effluent Guidelines, which were included in the Tender Documents for the Island East Transfer Station. The Technical Memorandum Standards which will apply in the case of discharges from the Transfer Station to foul sewer are shown in Table 3.6.

Planning Standards and Guidelines

3.3.2 Policy objectives in relation to planning against water pollution include consideration of beneficial uses of water bodies and checks on conflicting land uses as well as making adequate provision for treatment and disposal facilities. These objectives should be pursued in the preparation of Outline Zoning and outline Development Plans (OZPs and ODPs).

Existing Conditions

3.3.3 Water quality monitoring data for the Eastern Buffer Water Control Zone have been obtained from EPD and cover the years 1987 - 90. These data show that quality is generally good, with annual mean dissolved oxygen levels of greater than 70% saturation. Compliance with water quality objectives for the Zone is not likely to be compromised by the development of the transfer station. Future developments which will bring about a local improvement in water quality in the area include the connection of local sewerage into the strategic sewage disposal scheme, with flows from Chai Wan being collected and pumped

to a new treatment works at Stonecutters Island with an interim discharge to the Western Harbour and ultimately discharging to the Lema channel. The first stage of these improvements is planned to become operational by 1994, two years after commissioning of the Transfer Station.

Table 5.2 Standards for Effluents Discharged to Foul Sewer

Flow rate (m^3/day) / Determinand	≤10	>10 and ≤100	>100 and ≤200	>200 and ≤400	>400 and ≤600	>600 and ≤800	>800 and ≤1000	>1000 and ≤1500	>1500 and ≤2000	>2000 and ≤3000	>3000 and ≤4000	>4000 and ≤5000	>5000 and ≤6000
pH (pH units)	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Temperature (°C)	43	43	43	43	43	43	43	43	43	43	43	43	43
Suspended solids	1200	1000	900	800	800	800	800	800	800	800	800	800	800
Settleable solids	100	1000	100	100	100	100	100	100	100	100	100	100	100
BOD	1200	1000	900	800	800	800	800	800	800	800	800	800	800
COD	3000	2500	2200	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Oil & Grease	100	100	50	50	50	40	30	20	20	20	20	20	20
Iron	30	25	25	25	15	12.5	10	7.5	5	3.5	2.5	2	1.5
Boron	8	7	6	5	4	3	2.4	1.6	1.2	0.8	0.6	0.5	0.4
Barium	8	7	6	5	4	3	2.4	1.6	1.2	0.8	0.6	0.5	0.4
Mercury	0.2	0.15	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.2	0.15	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Copper	4	4	4	3	1.5	1.5	1	1	1	1	1	1	1
Nickel	4	3	3	2	1.5	1	1	0.8	0.7	0.7	0.6	0.6	0.6
Chromium	2	2	2	2	1	0.7	0.6	0.4	0.3	0.2	0.1	0.1	0.1
Zinc	5	5	4	3	1.5	1.5	1	0.8	0.7	0.7	0.6	0.6	0.6
Silver	4	3	3	2	1.5	1.5	1	0.8	0.7	0.7	0.6	0.6	0.6
Other toxic metals individually	2.5	2.2	2	1.5	1	0.7	0.6	0.4	0.3	0.2	0.15	0.12	0.1
Total toxic metals	10	10	8	7	3	2	2	1.6	1.4	1.2	1.2	1.2	1
Cyanide	2	2	2	1	0.7	0.5	0.4	0.27	0.2	0.13	0.1	0.08	0.06
Phenols	1	1	1	1	0.7	0.5	0.4	0.27	0.2	0.13	0.1	0.1	0.1
Sulphide	10	10	10	10	5	5	4	2	2	2	1	1	1
Sulphate	1000	1000	1000	1000	1000	1000	1000	900	800	600	600	600	600
Total nitrogen	200	200	200	200	200	200	200	100	100	100	100	100	100
Total phosphorus	50	50	50	50	50	50	50	25	25	25	25	25	25
Surfactants (total)	200	150	50	40	30	25	25	25	25	25	25	25	25

All units in mg l^{-1} unless otherwise stated; all figures are upper limits unless otherwise indicated.

Source: EPD, Technical Memorandum on Effluent Standards, *Table 1.*

4

AIR QUALITY IMPACTS

4 AIR QUALITY IMPACTS

4.1 Sources of Emissions

4.1.1 Air quality impacts have the potential to arise from any dust and odour created within the transfer station. Both the refuse itself and emissions from the refuse transfer vehicles have the potential to create emissions in terms of both particulate and odourous emissions. The potential for these impacts and recommended mitigation measures and monitoring regimes are discussed separately for both dust and odour.

4.1.2 The major dust emission sources will be from the refuse collection vehicle emissions within the transfer station and from the deposition of refuse from the vehicles into the pushpits. Dust emissions from refuse deposition was also recognised as a key issue for the Kowloon Bay Transfer Station Assessment. However, in practice, the problem was not as great as anticipated due to the high moisture content which has been shown to be greater than 30% in Hong Kong domestic waste. The EPD report *'Monitoring of Municipal Solid Waste Arisings 1987' EPD/TP10/1988*, also indicates the high moisture content of wastes

4.1.3 Odour was recognised in the Initial Assessment Report as requiring further attention as a potential adverse impact during the operational phase of the development. Possible odour emissions have been identified as arising from the following sources:

- ☐ deposition of refuse and refuse liquors in the Transfer Station;
- ☐ surfaces contaminated by refuse contact;
- ☐ wastewater treatment plant;
- ☐ RCVs;
- ☐ vehicle wash recycling system;

4.1.4 The actual chemical composition of refuse is complex and many different odours can arise. Various odourous compounds have been identified as been associated with refuse and include indoles, skatoles, methylamines (rotting fish), mercaptans, organic acids, alkyl sulphides and hydrogen sulphide (rotten eggs).

4.2 Assessment

4.2.1 There are no definable or quantifiable source terms for dust or odour arisings that could be used to assess concentrations of each within the transfer station. However, dust levels up to 1.5 mg m^{-3} and odour levels of up to 1 000 odour units could be expected in the tipping hall. It is not clear from the Tender Submission whether these expected high levels would arise under static (i.e. non-ventilated) conditions or in dynamic equilibrium (i.e. ventilated) conditions. If it is assumed that they represent equilibrium concentrations, any analysis based on that assumption must be deemed more than reasonably conservative.

4.2.2 Discharge from the transfer station of odourous and dusty air would cause exceedance of the limits for ambient air quality at the site boundary. It is of interest to note, however, that the discharge of wastes under the Temporary Arrangements is necessarily effected

boundary (i.e. up to 99.8%). Such a high removal efficiency requires application of best available technology. Odour control can be achieved by wet scrubbing, by chemical treatment or by adsorption onto suitable media. Wet scrubbing is not favoured because it produces an aqueous waste stream requiring collection and disposal. Adsorption onto chemically inert media is limited in its application because it relies entirely on the partitioning characteristics of different compounds and will not be equally effective for a range of polarities, molecular sizes and chemical reactivities. A combination of chemical and physical adsorption is considered the most likely to achieve the high removal efficiencies necessary.

4.3.2 The dust control system must achieve both the operating standard for dust levels within the transfer station and the ambient AQO externally. It will achieve these standards by dilution internally and by dust removal from the exhausted air. If the internal ventilation rate is capable of achieving the internal standard of 1 mg m^{-3}, the dust removal system must have an efficiency of not less than 75% in order to meet the AQO in the exhausted air.

4.3.3 The control of NO_2 and CO in the transfer station can be achieved by dilution with ventilation make up air alone. The dust and odour control systems will not be required to remove these pollutants from the exhausted air. The mass balance calculations in paragraph 4.2.3 can be used to estimate the concentrations of NO_2 and CO in the exhausted air from the transfer station tipping hall. The relevant AQOs are the one hour averages shown in Table 3.1. Based on an analysis time of one hour, the average number of RCVs in the tipping hall is estimated to be not more than 3.6, although the tipping hall can itself accommodate 15 vehicles simultaneously. The NO_2 emission from this number of vehicles is 53.6 ghr^{-1} and the CO emission is 188 ghr^{-1} (see para. 4.3.22) and the NO_2 hourly-average concentration in the exhausted air is 233 μgm^{-3}. This is less than the hourly average AQO. The equivalent concentration for CO is 816 μgm^{-3}, equivalent to only 3% of the AQO. Since the exhausted air is vented at roof level it undergoes further dilution and dispersion. It is therefore highly unlikely that the discharge could cause exceedance of the AQO at sensitive receivers or in the ambient air beyond the site boundary.

Selection of Dust Control System

4.3.4 Much of the following description is taken from the design for the dust control and odour control systems included in the Tender and forming part of the Contract. The assessment is in part based on the designers' estimates of pollutant levels and removal efficiencies.

4.3.5 Dust, odour and vehicle emission controls all rely on the ventilation system within the main transfer building. The system to be employed has been chosen for its energy efficiency and suitability to continuous operations.

4.3.6 Since the dust control systems at Kowloon Bay Transfer Station have been tested to the satisfaction of EPD and the system at the Island East Station will be similar in every aspect the selection of the dust control system should be based on similar premises. A variety of basic methods is available for dust removal, ranging from simple commercial-type dust filtration units, which are suitable for relatively low dust loadings and air flows, through to industrial-scale collectors, consisting of dry and wet cyclones, bag filters and wet collector units. An evaluation of the applicability and performance of these different types has been made, in relation both to the expected transfer station dust levels and the specified limits to be achieved within the station and at the site boundary. Generally, the industrial-grade

in the tipping hall area. Cleansing of the site and access routes with the "Elgin" sweeper will also minimise dust levels.

4.3.11 The control system selected (AAF Rol-O-Matic dust filters) operate upon automatic replacement of the rolled filter cloth, which is in turn controlled by the degree of cloth soiling (as detected by its photoelectric cell), the pressure drop increase across the filter cloth or time in service. Routine maintenance is limited to periodic replacement of the filter cloth rolls and both capital and operating costs are significantly lower than the other systems considered above. It is therefore considered that this type of system, in conjunction with stringent dust prevention measures, will achieve the performance levels specified in the Invitation to Tender, both inside the transfer station and at the site boundary.

Selection of Odour Control System

4.3.12 The odour control system relies on the two-fold system of prevention and treatment. The preventative system is based upon good working practices which ensure that the rapid transfer of refuse is achieved and that deposits of odourous material are quickly removed. The following design and operational requirements will contribute to odour control.

- ☐ An "Elgin" sweeper will be used to keep the site clean.
- ☐ Push pit enclosure by heavy duty plastic strip curtains and a negative pressure ventilation system will prevent odourous air dispersing away from the pushpits.
- ☐ Bulk storage will be only in closed containers, which will not be stored on the site for more than 14 hours.
- ☐ All access roads, ramp, tipping floor and vehicle manoeuvering areas will be washed and regularly swept using the Tenant and Elgin equipment.
- ☐ RCVs will be washed prior to leaving the transfer station on every trip.
- ☐ Containers will be washed at the landfill site.

4.3.13 Most of the potential for odour will be during transfer of refuse from the RCVs into the containers. This is all undertaken within the completely enclosed main building within which odour control systems will be operational. The wastewater treatment plant will be located on the ground floor. Any odourous emissions will therefore be treated by the odour control systems in the main building.

4.3.14 The use of chemical treatment to reduce refuse odours and the use of chemical odour masking agents have not been considered, therefore hazard or toxicological assessments are not required. Methods for the treatment of odorous air streams are based upon either adsorption or absorption techniques. Adsorption relies upon the molecular diffusion of gaseous components into the pore structure of a solid medium, whilst absorption involves the transfer into liquid solution of a soluble gas (the latter being referred to as wet scrubbing). Wet scrubbing is normally carried out in a counter-current spray tower where contaminated air is intimately contacted with a fine water spray, which may contain oxidising or reducing agents, acids or alkalis. The choice of scrubbing solution is influenced by the chemical characteristics of the odorous gases and therefore these types of units are best applied when the composition of the air stream is known. The efficiency of wet

Push Pits

4.3.20 The total volume of the five push pits is 2 607 m^3. The ventilation system is designed to provide at least 20 air changes per hour, giving a total air extraction rate of 52 140 $m^3 h^{-1}$. Make up air from the tipping hall is extracted through grilles extending the whole length of each of push pit and is treated for dust removal. It is considered that the greatest dust emissions will arise during tipping of refuse from RCVs. The sizing of the mesh grille has been designed to produce a particle entrainment velocity of 1.5 m s^{-1} across the wire mesh to the tipping bays. Two exhaust fans will cover the pushpits, each rated at 57 600 $m^3 h^{-1}$. Interconnections between ductwork, by means of volume dampers, are provided in order to permit ventilation of pushpits in the event of fan outage. A 20 mm mesh facing to the extraction ducting is required to exclude light debris.

Tipping Hall - First Floor Level

4.3.21 The net volume of the tipping hall, excluding the pushpits and control room, is 21 899 m^3. For comfortable working conditions, an air extraction rate of 8 air changes per hour is required, giving a total extraction rate of 175 320 $m^3 h^{-1}$. Air is extracted through ductings located directly above the RCV discharge bays. Two exhaust fans are proposed, each rated at 57 600 $m^3 h^{-1}$. Interconnections between ductwork, by means of volume dampers, are provided in order to permit ventilation of tipping hall in the event of fan outage.

4.3.22 The total fan rating for the tipping hall and pushpits combined is 230 400 $m^3 h^{-1}$. Comparison of this figure with those in Table 4.1 shows that it is more than sufficient to meet internal air quality requirements for NO_2 and CO in the tipping hall.

Refuse Compaction Area - Ground Floor Level

4.3.23 The volume of the compactor hall is 15 537 m^3. The system is designed to ventilate this area at a rate of 2.5 air changes per hour. The ventilation system for this area also covers the wastewater treatment plant room and vehicle wash control room. These have a total volume of 1 735 m^3 and are to be ventilated at a rate of 6 air changes per hour. Make up air for the compactor hall enters from the wastewater treatment plant room and vehicle wash control room as well as the vehicle entrance area. The total ventilation rate necessary is 46 440 $m^3 h^{-1}$ and this is provided by two fans, each rated at 28 800 $m^3 h^{-1}$.

Performance of the System

4.3.24 The expected dust levels at various site locations, based on the system designers' estimates are given below.

☐	Tipping Hall General	less than 0.6 mg m^{-3}
☐	Push-pit Area	less than 1.0 mg m^{-3}
☐	Refuse Compaction Area	less than 0.2 mg m^{-3}
☐	Non-Operational/Staff Rooms	less than 0.2 mg m^{-3}
☐	Site Boundary (24 hr)	0.07 - 0.20 mg m^{-3} TSP 0.04 - 0.11 mg m^{-3} RSP
☐	Site Boundary (1 hr)	0.15 - 0.35 mg m^{-3} TSP

5

NOISE

5 NOISE

5.1 Sources and Methodology

5.1.1 Potentially significant noise sources will be vehicle movements on the site as well as internal and external fixed sources. These include exhaust fans, compactor units, pushpit units, container handling equipment, maintenance activities and the wastewater treatment plant. In many cases, a high degree of attenuation is effected by the location of noisy plant inside the transfer building. This attenuation is taken into account in the assessment.

5.1.2 Noise from vehicle movements has been assessed using the methodology in British Standard 5228: Part 1, 1984, according to the following equation:

$$L_{Aeq} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$$

where L_{WA} is the sound power level of the plant (in dB);
Q is the number of vehicles per hour;
V is the average vehicle speed (km/h);
d is the distance of receiving position from the centre of haul road (in m)

5.1.3 The noise levels from other operations on site have been assessed in accordance with the *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites.*

5.2 Assessment

5.2.1 All potentially noisy operations have been assessed with respect to calculated levels at the THA (NSR 1) and the housing estate 250 m south of the site (NSR 2). The THA is the nearest sensitive receiver at approximately 150 m from the site.

On-site Vehicle Movements

5.2.2 A sound power level for RCVs of 112 dB(A) is used here. The maximum number of RCV movements in the peak hour one hour at the site is estimated to be 44.

NSR 1 L_{WA} = 112 dB(A)
Q = 44
V = 20 km/h
d = 150

Hence $L_{Aeq} = 112 - 33 + 10\log_{10}44 - 10\log_{10}20 - 10\log_{10}150$
$= 60.7$ dB(A)

NSR 2 L_{WA} = 112 dB(A)
Q = 44
V = 20 km/h
d = 250

Hence $L_{Aeq} = 112 - 33 + 10\log_{10}44 - 10\log_{10}20 - 10\log_{10}250$
$= 58.4$ dB(A)

5.2.3 At times when the barge transfer of containers cannot be used and RTVs are used there will be a maximum additional number of vehicle movements of approximately 10 vehicles per hour at peak times.

Hence Q = 54

NSR 1 L_{Aeq} = 112 - 33 + $10\log_{10}54$ - $10\log_{10}20$ - $10\log_{10}150$
= 61.6 dB(A)

NSR 2 L_{Aeq} = 86 - 33 + $10\log_{10}54$ - $10\log_{20}$ - $10\log_{10}250$
= 59.3 dB(A)

Exhaust Fans

5.2.4 A total of 6 fans with SPLs of 75, 89, 2 at 93 and 2 at 97 will be situated in the main building. The combined noise level is 101.5 dB(A). A distance correction of -52 dB(A) is applied for a distance of 150 m at NSR 1 and -56 dB(A) for NSR 2. and a correction for building attenuation of -32.8 dB(A), is applied. This is consistent with the attenuation level assumed for the Kowloon Bay transfer station, where similar building materials are used.

NSR 1 PNL = 101.5 - 52 - 32.8
= 16.7 dB(A)

NSR 2 PNL = 101.5 - 56 - 32.8
= 12.7 dB(A)

Compactor Units

5.2.5 There will be 5 compactor units each with a SPL of 85 dB(A) resulting in a total SPL of 92 dB(A). A distance correction of -52 dB(A) is applied at NSR 1 and 56 dB(A) at NSR 2 and a correction of -32.8 for building attenuation.

NSR 1 PNL = 92 - 52 - 32.8
= 7.2 dB(A)

NSR 2 PNL = 92 - 56 - 32.8
= 3.2 dB(A)

Pushpit units

5.2.6 A total of 5 units each with a SPL of 85 dB(A) results in a total of 92 dB(A). Taking into account both distance correction and building insulation the PNL for both receivers is as follows

NSR 1 PNL = 92 - 52 - 32.8
= 7.2 dB(A)

NSR 2 PNL = 92 - 56 - 32.8
= 3.2 dB(A)

Container Handling Equipment

5.2.7 The noise levels produced from the gantry crane employed on the sea vessel to load containers are not known. The assessment is therefore based on a number of assumptions. The *Technical Memorandum on Noise from Construction Work other than Percussive Piling* rates barge - mounted diesel cranes at 112 dB(A). However, the crane is driven by the main power unit of the vessel, which is located below deck. The sensitive receivers are therefore shielded both by the hull of the vessel and by the wharf when the vessel is docked and the crane in use. A minimal combined shielding/attenuation factor of 10 dB(A) is assumed for conservatism.

NSR 1 PNL = 112 - 52 - 10
= 50 dB(A)

NSR 2 PNL = 112 - 56 - 10
= 46 dB(A)

These levels will further be reduced at NSR 1 by the shielding of the main transfer building. No shielding by the main building will be provided for NSR 2.

Maintenance Building

5.2.8 Only one vehicle will be within the maintenance building at any one time producing a noise level of 86 dB(A).

NSR 1 PNL = 86 - 52
= 34 dB(A)

NSR 2 PNL = 86 - 56
= 30 dB(A)

Only partial screening is provided from the transfer station building. However NSR1 is also shielded by the access ramp and also from industrial buildings along Fung Yip Street.

Wastewater Treatment Plant

5.2.9 The wastewater treatment plant will be situated within a concrete or block wall room on the ground floor inside the transfer station building. It is assumed that an aeration blower has a sound power level of 90 dB(A).

NSR1 PNL = 90 - 52 - 32.8
= 5.2 dB(A)

NSR2 PNL = 90 - 56 - 32.8
= 1.2

The location of the wastewater treatment plant and the screening effect of the walls of the building render it inaudible at sensitive receivers.

Summary

5.2.10 A summary of noisy operations and corrected noise levels are shown in Table 5.1.

Table 5.1 Summary of Noise Levels from Site Operations

Source	SPL (dB(A))	PNL dB(A)	
		NSR 1	NSR 2
On-site Vehicles	112	51.6	48.4
Exhaust Fans	101.5	16.7	12.7
Compactor Units	92	7.2	3.2
Pushpit Units	92	7.2	3.2
Container Handling	112	50	46
Maintenance Building	86	34	30
Wastewater Treatment Plant	90	5.2	1.2
Total Noise Level		53.9	50.4

5.3 Mitigation Measures

5.3.1 Enclosure is an effective means of containing and isolating a noise source and a 30 dB(A) reduction can easily be achieved by the use of enclosures here. The main building will consist of a double-skinned insulation identical to that provided at Kowloon Bay. The actual figure used in calculations is consistent with that used in the Kowloon Bay Transfer Station Assessment. Attenuation will further be provided by the site boundary wall which will act as a barrier. This has not been taken into account in the calculations mainly because the geometry of lines of propagation in respect of future land uses is not known. This has the effect of adding conservatism to the figures.

5.3.2 No further mitigation is required for internal noise sources. The most significant source is vehicle movements. Since the peak hour vehicle flow corresponds to the worst case hour in the middle of the afternoon, the relevant ANLs are 70 and 65 dB(A) for ASRs of C and B, respectively. There will therefore be no exceedance of the appropriate limits. At night (2300 - 0700) transfer station operations cease.

6

WATER QUALITY

6 WATER QUALITY

6.1 Sources of Wastewater

6.1.1 The effluents derived from the collection and disposal of refuse can be categorised depending on their level of contamination and hence their treatment requirements. Four categories can be identified and these are described below.

6.1.2 *Group 1* includes contaminated water from the following sources:

- Liquor derived during the compression of waste and collected in tanks fitted to the RCVs. Provision will be made for the emptying of these tanks immediately prior to or after discharging the collected waste.
- Liquor held within the collection vehicle compactor body derived from the compaction of waste but not collected within the tank. This liquor will necessarily be discharged during the tipping operation.
- Free liquor within the waste not transferred to containers, but drained from the compactor or push pit.
- Wash down water from the washing down of the tipping apron, compactors, and compaction floor.

6.1.3 *Group 2* includes potentially contaminated effluents which is concerned with the surface drainage from areas where there is a potential risk of contamination such as from accidental spillages.

6.1.4 *Group 3* is limited to surface drainage from areas where there is little or no risk of contamination by the transfer station operation.

6.1.5 *Group 4* includes discharges from accommodation provided for the Contractor and Employer and any other sanitary facilities provided on the site.

6.2 Assessment of Flows and Loads

6.2.1 Group 1 wastewater flows can be estimated on the basis of flows arising at Kowloon Bay Transfer Station, where a similar operation already exists. Data from Kowloon Bay indicate Group 1 wastewater arisings of about 20 $m^3 d^{-1}$ Typical quality of these arisings is shown in Table 6.1.

6.2.2 Group 4 wastewater flows can be estimated from the number of employees on the site. This is assumed to be equivalent to 65 persons. In accordance with the Civil Engineering Manual 5 a flow of 4.6 $m^3 d^{-1}$ and a BOD_5 of 2.6 kg d^{-1} are projected .

6.2.3 Group 2 and 3 flows are not estimated for the purposes of assessing treatment requirements since these will normally be discharged to the stormwater system (see section 6.3).

6.3 Treatment Requirements

6.3.1 Any discharges to foul sewer must be licensed in accordance with the amended Water Pollution Control Ordinance. In setting licence conditions, the Authority will use the Technical Memorandum Effluent Standards for guidance. These standards replace the Revised Interim Effluent Guidelines which were referred to in the Environmental Review and Initial Assessment Report. Direct discharges in coastal waters will be required to conform with the standards in the Technical Memorandum for discharge into the Eastern Buffer Water Control Zone. Although the facility is programmed to be operational before the Eastern Buffer WCZ is gazetted, compliance with effluent standards will be required early in its operational life and provision should be made for this.

6.3.2 Group 1 wastewater will require pre-treatment prior to discharge into the public foul sewer system as the effluents will exceed limits specified in the Technical Memorandum Standards. Group 2 effluents will be discharged to the wastewater treatment facility should this be required. The performance required of the pretreatment process for Group 1 wastewaters in terms of treatment and removal efficiencies is indicated in Table 6.1, which shows the broad order of magnitude of concentrations.

Table 6.1 Estimated Quality of Group 1 Wastewater and Treatment Requirements

Parameter (mg l^{-1})	Concentration prior to treatment	Treatment requirements (flow rate >10 m^3 d^{-1} and ≤200 m^3 d^{-1}
pH (no units)	4.6	6 - 10
Total dissolved solids	8100	(i)
Total suspended solids	110	1000
Total acidity (as $CaCO_3$)	3480	(i)
BOD_5	9200	1000
Chemical oxygen demand	11000	2500
Ammonia nitrogen (as N)	120	(i)
Kjeldahl nitrogen (as N)	400	200
Total phosphorus (as P)	0.06	50
Oil and Grease	1500	100

6.3.3 Group 3 effluents will be discharged directly to the stormwater drainage system via a screen, sediment settlement tank and an oil interceptor.

6.4 Selection of Treatment Process

6.4.1 In summary, the wastewater treatment method for Group 1 will be to use the following unit process operations: a bar screen, an equalization tank that will also serve to remove oil and grease and as a pH adjustment system, 2 SBR reactors operating in parallel and a plate and frame press for SBR waste sludge dewatering. Additional information on this system follows in subsequent sections.

6.4.2 The preliminary assessment at tender stage recognised sequencing batch reactors as the most suitable wastewater treatment facility for this application. The maximum flow rate is estimated to be 20 m^3 d^{-1} through the waste treatment plant with this flow being between approximately 0700 and 2300 when the plant is operation and a zero flow at night. This treatment system is suitable for conditions when flows will cease altogether for significant

periods which can lead to problems of bulking of sludges, biomass loss rates, septicity caused by excessive retention of raw liquors in non-aerated tanks in other systems which in turn can result in flotation and odour problems. The recommended system is a modification of the activated sludge system and is tolerant of varying flow rates including complete stoppages and the design is capable of achieving those standards set down in the Technical Memorandum. The primary process control will be through the monitoring of flow through the system which is controlled by a timer or triggered by level. Secondary process control will be based on the results of the monitoring which is described in Section 9.4.

6.4.3 It is believed that the SBR will produce an acceptable effluent for the following reasons:

- ☐ Because it operates in a batch mode, an SBR is more adaptable to a varying strength wastewater.
- ☐ An SBR requires less operation and maintenance attention than a conventional activated sludge system.
- ☐ Capital investment is less because the activated sludge reactor and clarifier are contained in one tank rather than multiple tanks.
- ☐ Operation and maintenance costs are less because the aeration time is less.

6.4.4 An influent and effluent flow monitoring system will enable daily and continuous data acquisition for process control.

6.4.5 The basic operational steps of the batch reactor process are as follows. All process steps (Fill, Reactor, Settle and Decant) are completed in a single tank. Waste streams in a batch reactor are created with the same unit process steps found in a conventional plant. At the beginning of the process cycle (Fill) the reactor is at a minimum liquid level and influent flow fills the reactor. At an appropriate point, aeration is initiated and substrate oxidation begins. After a preset liquid level or cycle time is reached, the aerators shut off and the Settle period begins. During Settle the reactor functions as a quiescent clarifier with no internal movement or fluid flow. Following completion of the Settle the effluent withdrawal mechanism collects the supernatant clarified effluent.

6.4.6 The SBR process can operate successfully within a single reactor and consistently produce a 30/30 effluent or better. However, in order to provide optimum treatment, maximum flexibility and redundancy, two identical reactors are typically utilized. The process can be designed to meet an extremely diverse array of operating conditions, loadings, and degrees of treatment. The desired operating schedule of the process equipment is determined according to expected influent conditions and effluent requirements. This schedule is then programmed into the system controller which uses a programmable controller and several remote sensors to monitor and control the process. A typical operating schedule may consist of several complete six hour process cycles per day. Each cycle might consist of 4 hours of fill/mix/aerate, 45 minutes of quiescent settling, 45 minutes of effluent withdrawal, and 30 minutes of standby. With the utilization of submerged jet aeration and floating decanters, the variable liquid level is easily accommodated. The reactor is designed with enough tank depth and operational flexibility to produce a satisfactory effluent. By allowing liquid level sensors to override the timed the system simply speeds up and adjusts the operating cycle to match demand.

6.4.7 Due to the unsteady nature of the acclimated biomass, the system is highly resistant to

shock organic loads. Typically, operation cycles call for anoxic/aerobic conditions at every cycle. Shock loads are not disruptive of the normal process cycle.

6.4.8 In addition to varying cycle duration, effective process control can be exercised by varying the aeration operating of dissolved oxygen and/or BOD substrate, the system can selectively discourage the growth of many filamentous organisms, achieve nitrogen and/or phosphorus removal,and maximize aeration efficiency. Submerged, jet aeration provides mixing independent of aeration and thus integrates well with the entire batch concept.

6.4.9 Since the reactor is under true quiescent conditions during Settle, 100% of the reactor capacity is available for liquid/solids separation. Therefore, the relative loading rates during clarification are much lower for the batch reactor than for a conventional plant.

6.4.10 The activated sludge process will be subject to variation and will require close monitoring to ensure that changing conditions are accommodated. Up to 15 cubic metres per day of wet sludge may be produced, depending upon the quality and quantity of the influent.

6.4.11 A filter press has been included in the system with the objective of increasing the solid content of the final sludge to 30 per cent. The filtrate is returned for reprocessing through the SBR system.

6.4.12 The final sludge will be disposed of, ultimately to landfill. The most appropriate form of transportation is for the sludge to be co-mingled with incoming solid waste. Municipal solid waste is, of course, the source from which the sludge is derived.

6.4.13 Co-mingling will be achieved, wholly within the envelope of the main building, by introducing quantities of sludge into absorbent refuse in the pushpits. Human judgement will be exercised to ensure that sludge is discharged only into suitable waste and only in appropriate volumes that can be readily absorbed. Sludge may be conveyed to the pushpits either by an on-site tanker or by a direct piping arrangement.

6.5 Additional Mitigation Measures

6.5.1 The pretreatment plant has been designed to meet the requirements of the Technical memorandum for discharges to foul sewer. No further mitigation is required in respect of these discharges. However, the requirement that stormwater drainage from the site be uncontaminated can be met by additional on-site mitigation of potential problems.

6.5.2 Good working practices can be employed on the site to reduce contamination to a minimum. Should contamination occur by an accidental spillage in an area of low contamination risk immediate cleaning will occur.

6.6 Maintenance Dredging

6.6.1 Dredging will be required during the construction phase of the transfer station in order to provide a sufficiently deep sea lane for the container vessel. The potential impacts are described in the Construction Impact Assessment Report. During operation of the plant is anticipated that maintenance dredging will be required although the extent of this is not yet known. Recent changes in the tidal flow patterns may have resulted from the recent nearby reclamation. An estimated removal of 10,000 tonnes of material every 2 years was given in the contract documentation. It is not anticipated that this amount of material will result in any long term impacts or significant short term impacts.

7

TRAFFIC IMPACT

7 TRAFFIC IMPACT

7.1 Traffic Movements

7.1.1 During normal operation of the transfer station the waste throughput will be about 1 200 t d-1. Since each RCV will have a payload of 4 - 4.5 t, a total of between 240 and 300 vehicles will enter and leave the transfer station daily. Peak hour vehicle movements are estimated to be about 44 vehicles per hour. During abnormal conditions, such as the period immediately following Chinese New Year, the station may process a much higher waste throughput, but this will not significantly affect the peak hour RCV movements. During that holiday period, traffic in the surrounding industrial area will be dramatically reduced.

7.1.2 The peak hour RCV movements coincide with the end of the shift at 1400 - 1500 hours and not the peak hour for all other road traffic. Moreover, the existing road traffic flows on Chai Wan Road already include RCVs travelling to the site. Therefore, in the peak hour the traffic flow increase caused by commissioning of the new transfer station will be of less significance than the figures suggest. In the peak hour, the increase in vehicle movements is expected to be approximately 32 vehicles per hour, taking the worst case assumption that the future peak hour RCV movements coincide with the normal traffic peak and that 10% of existing daily RCV movements occur in the peak hour. The 1990 peak hour flow on Sun Yip Street was 322 vehicles per hour (including RCVs). Consequently, the increase in traffic flow on Sun Yip Street in the peak hour will be less than 10% of the current total.

7.2 Assessment of Impacts

7.2.1 Sun Yip Street is a wide street not normally subject to congestion. An increase in the peak hour flow of vehicles of 10% will not increase the possibility of congestion significantly. The flows on Chai Wan Road will, likewise, be relatively unaffected by the additional RCV movements. The reclamation at Siu Sai Wan and the planned industrial, G/IC and Commercial/Residential developments will affect the traffic regimes in the area to a much greater extent. Their principal potential effects are likely to be on the junctions between Sun Yip Street and On Yip Street and Sun Yip Street and Chai Wan Road. These are to be the subject of further study by others.

7.2.2 There are no noise sensitive receivers on Sun Yip Street. Consequently, traffic noise impacts are not of concern. The exposure to traffic noise of the noise sensitive receivers on Chai Wan Road will be influenced to a much greater degree by the additional traffic generated by the new developments at Siu Sai Wan than by transfer station traffic. The 1990 peak hour flow on Chai Wan Road is 748 vehicles per hour. An additional 32 RCVs per hour is equivalent to 4.3% of base flow. This incremental increase in heavy vehicle movements would cause an increase in the peak hour L_{10} noise level of 0.3 dB(A). This is of little significance.

8

VISUAL IMPACT

8 VISUAL IMPACT

8.1 Nature of Impacts

8.1.1 The potential aesthetic impacts of the transfer station derive from the external appearance of the site and buildings, and the visibility of the operations. The visual appearance is in accordance with the recommendations of the Environmental Review of the project and is generally considered to improve the general appearance of the area. Visibility of operations is limited only to the movement of vehicles; the entire transfer operation, vehicle wash, wastewater treatment and maintenance facility are located internally. These aspects were therefore not considered to be key issues.

8.1.2 Since the transfer station will continue operations after nightfall, site lighting is required for the external container transfer operation. This was highlighted as a key issue in the Initial Assessment report.

8.2 Assessment

8.2.1 A floodlight system will be in operation in the evenings at the transfer station. It can be assumed that the lighting within the transfer station will be unnoticeable and the only potential effects of the lighting scheme will be from a lighting system outside the main building necessary to illuminate the crane used to transfer containers. Many assumptions need to be made in order to calculate the number of lights required which will depend upon the floor area to be illuminated and the lighting system to be employed. The position of the temporary housing area however will result in the shielding of the floodlight system by the transfer building. The glare effect on the residential building adjacent to the Chai Wan swimming pool is assumed to be insignificant because of the long distance from the transfer station.

8.2.2 The design has ensured that there are no lighting installations positioned above roof level. This will minimise the effect of lighting on any future sensitive land use in the vicinity.

9

MONITORING AND AUDIT

9 MONITORING AND AUDIT

9.1 General

9.1.1 Document 29 of the Invitation to tender sets down the minimum monitoring requirements for various parameters. These parameters are summarised in Table 9.1 and elaboration of these together with additional recommendations appear in the following sections.

9.2 Air Quality

Dust

9.2.1 The requirements of the Tender Documents are clear. TSP and RSP are to be measured at the site boundary once weekly for a year and monthly thereafter, subject to approval by DEP. Since these sample positions correspond to ambient air, the monitoring should be of 24 hour averages to facilitate comparison with the statutory AQOs. The sample positions should on each occasion be as close to due downwind at the start of sampling, as is possible given the physical constraints and availability of power supply.

9.2.2 Dust should also be monitored once weekly for a year and monthly thereafter (if approved) in the tipping apron, consistent with protecting the equipment against damage.

Odour

9.2.3 The Environmental Review sets out a requirement to monitor odour at the site boundary once weekly for a year and monthly thereafter. A compliance failure will be counted if the limit of 2 odour units is exceeded at any time. Clearly, the monitoring frequency is insufficient to determine compliance and the appropriate analytical method, involving dynamic olfactometry in a laboratory equipped for the purpose introduces a delay into the analytical chain so that results are not obtained in real time. Therefore, after discussion with EPD, it has been decided that the Contractor will undertake daily odour patrols around the site perimeter and will, if an odour is detected, seek out the source and rectify any problem. The results of the odour patrol are to be reported to the site representative of the employer who is responsible to determine whether or not an odour panel should be conducted. The 2 odour unit remains a licence condition and as such, EPD may, at any time, undertake an odour panel to determine compliance.

9.2.4 It is not the intention to comment extensively on the Authority's role in checking compliance. It is, however, reasonable to assert that once weekly sampling over, say, a five minute period at one position is not likely to provide a reasonable assessment of nuisance potential. It is therefore recommended that the operator mounts daily odour patrols around the entire site perimeter and records and archives the reports. The environmental auditors would then be in a position to compare data on odour obtained by different means and take a view on the odour nuisance potential at audit stage.

Vehicle Exhaust Gases

9.2.5 NO_2 and CO should be monitored inside the tipping hall once weekly for a year and monthly thereafter. The appropriate position is close to, but not interfering with, the dust monitor. The control limits are 8 hour time-weighted averages and the monitoring results

should be reported in consistent format.

9.3 Noise

9.3.1 The Tender Documents required noise monitoring at the site boundary and at the nearest noise sensitive receiver once weekly at night and once weekly during the day for a year, with reduced frequency thereafter. The Environmental Review did not establish the basis for setting a limit for noise levels at the site boundary. This should therefore be reviewed as part of the environmental audit.

9.3.2 Noise monitoring at the nearest sensitive receiver at the same frequency is required. This Study can find no justification for this, for the following reasons:

- There is no direct line of sight to the receiver and the ambient noise environment indicates high background levels. Recording of such high levels cannot be attributed to the transfer station.
- If noise levels attributable to the transfer station could be measured at the receiver then measurement at the site boundary would be redundant. If noise levels could be measured at the site boundary, but not easily at the sensitive receiver, extrapolation of these levels to the sensitive receiver would be relatively straightforward and monitoring at that position would be redundant.
- The assessment shows that adverse noise impacts will not occur provided that the plant and machinery conforms to the Tender Specification; it is relatively straightforward to confirm such conformity.

9.3.3 It is therefore recommended that no noise monitoring is undertaken at the existing sensitive receivers. The operator should, however, make provision to comply with the Tender Specification until the audit is finalised.

9.4 Wastewater Discharge

9.4.1 The discharges from the site will be subject to the provisions of the Water Pollution Control Ordinance and under a recent amendment will require licensing. The parameters to be monitored in accordance with the Tender Documents will form the basis for monitoring under the new control. The Authority will use the Standards in the Technical memorandum as guidance for setting licence conditions. Clearly, monitoring of all parameters specified in the licence is appropriate.

9.4.2 It is appropriate to comment on the sampling and recording. The plant to be used is a fill and draw type system and it is therefore inappropriate to adopt continuous monitoring and recording of flow, pH and temperature. Indeed, there will be no continuous flow. It is considered more appropriate to test each batch of effluent immediately prior to discharge. The volume of the discharge would also be recorded. In this way, the database would record total daily discharge, flow weighted daily concentration (i.e. sum of loads divided by total daily discharge) and concentrations and loads in each discharge. This is easy to implement for all parameters, which can be determined in individual samples, except suspended solids, because stratification in a quiescent condition is possible. The contractor will provide the necessary monitoring equipment.

9.4.3 Stormwater discharges are required to be monitored monthly for BOD, COD, oil and grease. This requirement may be modified on granting of a licence to discharge.

9.5 Audit Requirements

9.5.1 The requirements for environmental auditing of the facility, as stated in the environmental review, is that reports should:

"include all environmental monitoring data, compliance with regulatory requirements and policies and standards and any remedial works required to redress unacceptable, consequential or unanticipated environmental impacts."

This is a clear indication that the operator is to be responsible for a compliance audit, as distinct from an operations audit or a materials and waste audit. The latter type of audit is inappropriate, because the facility does not use raw materials for manufacture nor does it produce waste (with the exception of the effluent discharge). Audits not falling into the category of compliance audits are normally driven by economic factors: in this case there are no apparent cost savings to be gained by carrying out a materials/waste audit on selected elements of the facility.

9.5.2 The audit reports, containing the information specified in paragraph 9.5.1 are to be submitted on a monthly basis to DEP in a format approved by him. A full compliance audit, requiring by implication comprehensive compliance monitoring, in effect places the burden for the regulatory function almost entirely on the operator. This requirement for self regulation is consistent with the stated objectives of Government's White Paper but inconsistent with the fundamental principle of auditing as adopted by financial regulators, that the audit should be undertaken by professionally qualified specialists having a corporate existence entirely separate from the audited company and the regulatory agency or authority. It is not, however, recommended that an independent audit of the facility should be conducted with the same or similar frequency as the monthly compliance audits. A frequency of not less than yearly would be appropriate, unless severe impacts are identified by the compliance audit, in which case Government or the operator may commission an independent audit. The EIA findings are that since significant adverse impacts are unlikely to occur, this would be an equally unlikely scenario.

9.5.3 It is particularly recommended that an independent audit should critically review the monitoring requirements to ensure validity and utility of data. It should recommend where monitoring should be increased and where it should be decreased or discontinued. The Environmental Review indicated that any revisions to the monitoring schedule would be permissible with DEP's approval after one year of operation. This would therefore be the ideal time for an independent audit. Prior to that time, the schedule is fixed according to the tender specification and any additional requirements arising out of this EIA.

Table 9.1 Summary of Monitoring Requirements

Parameter	Location	Type of Sample	Frequency
TSP	Site boundary (downwind)	24 hour average	Once weekly for a year
	Tipping hall (between pushpits)	24 hour average	Once weekly for a year
RSP	Site boundary (downwind)	24 hour average	Once weekly for a year
Odour	Site boundary (downwind).	Single sample to report no. of odour units.	Once weekly for a year.
Noise	Site perimeter.	L_{10}, L_{90} and L_{eq}.	One hour per week during the day and one hour per week during the night for a year.
Pretreated final effluent:	At point of discharge		
Flow		Continuous*	
pH		"	
Temperature		"	
BOD_5		Individual samples of effluent	Once weekly for a year
COD		"	
Suspended solids		"	
Grease and oil			
(plus additional parameters specified in licence)			(and/or as licence conditions require)
Stormwater:			
BOD_5	Point of discharge	Individual samples	Monthly
COD	"	"	"
Grease and oil	"	"	"
Nitrogen dioxide	Tipping hall (between pushpits)	8-hour time weighted average	Once weekly for a year
Carbon monoxide	Tipping hall (between pushpits)	8-hour time weighted average	Once weekly for a year

** Required by Tender Documents; flow will in fact be intermittent.*

10

CONCLUSIONS AND RECOMMENDATIONS

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

10.1.1 There are no sensitive receivers in proximity to the site. The nearest receivers are at least 150 metres distant and will be shielded by non-sensitive buildings. Adverse operational impacts are highly unlikely.

10.1.2 The transfer station is designed to comply with all statutory environmental quality limits, planning standards and guidelines and specific requirements of the Tender Documents.

10.1.3 Levels of dust arising from the transfer station operations will meet all requirements for internal and external air quality. The odour control system is technologically advanced and covers the entire internal transfer operation such that no external odour impact is anticipated. The ventilation rate within the transfer station has been verified to be more than sufficient to maintain air quality criteria for diesel exhaust pollutants.

10.1.4 Conservative estimates of noise levels under worst case conditions indicate that Acceptable Noise Levels at sensitive receivers will not be exceeded. In reality, noise levels at these receivers will be indistinguishable from the general background noise, which is high.

10.1.5 Wastewater treatment and drainage proposals are in accordance with tender requirements. The new standards made under an amendment to the Water Pollution Control Ordinance can be achieved by the treatment system, the design of which makes provision for maximum operational flexibility.

10.1.6 The additional road traffic generated by the transfer station will not cause noticeable increases to traffic noise levels at sensitive receivers. The small incremental change in overall traffic flows is not considered to pose significant risks of congestion on access roads or junctions.

10.1.7 Comprehensive monitoring requirements have been described. These include both the requirements of the Tender Specification and additional measures arising from this assessment.

10.2 Recommendations

10.2.1 No further assessment or major design changes are considered necessary. Minor adjustments to operational practices may be made following commissioning and in response to compliance audit reports.

10.2.2 It is recommended that in addition to monthly compliance audits, less frequent independent audits should be carried out. These would be more comprehensive and address the particular issue of modifications to monitoring and audit requirements.

APPENDIX A

BASELINE NOISE AND DUST MONITORING RESULTS

REPORT ON DUST AND NOISE MONITORING AT CHAI WAN REFUSE TRANSFER STATION - PRE-CONSTRUCTION STAGE

(Project No. : 1A 09368)

Environmental Management Division
Hong Kong Productivity Council

25th June, 1991

REPORT ON DUST AND NOISE MONITORING AT CHAI WAN REFUSE TRANSFER STATION - PRE-CONSTRUCTION STAGE

(Project No. : 1A 09388)

1. BACKGROUND

As Swire BFI Waste Services Ltd. (BFI) planned to gather the background Noise and Total Suspended Solid (TSP) Level of the Chai Wan Refuse Transfer Station before the construction of the transfer station, the Company commissioned the Council to conduct the measurements of TSP for ten (10) days and ambient noise level for one (1) day. The results of measurement are given in this report.

2. TSP MONITORING

2.1 Methodology of TSP Measurements

In carrying out the monitoring work, the TSP was measured by a General Metal Work Model GMWL 2000 High Volume Sampling System. During operation, TSP was sampled by drawing air through a piece of pre-weighted filter paper inside the high volume sampler. The filter paper with the retained particulate was brought back to the Council's laboratory for analysis by gravimetric method. The TSP level was calculated from the ratio of the mass of particulate retained in the filter paper to the total volume of air sampled.

The monitoring work was carried out from June 5 to June 14, 1991 continuously. The location of the TSP sampling point selected by the client is shown in Appendix I. A total of nine 24-hour average TSP samples were collected during the monitoring period. No sample was collected on the last day of measurement due to the power failure.

2.2 Result of Particulate Measurement

The results of the TSP measurements are summarized in Table 1.

As can be seen from the results, all the measured TSP levels during the sampling period are less than the local air quality objectives for 24-hour average TSP (260 $\mu g/m^3$). Except for the first day of measurement, the level of TSP for the rest of the sampling period is between 29 - 55 $\mu g/m^3$.

3. NOISE MONITORING

3.1 Methodology of Noise Monitoring

The noise monitoring was carried out using a B&K type 2231 Modular Precision Sound Level Meter and data recorded by a B&K type 2318 Graphics Printer. The parameters measured were A-weighted L_{eq}, L_{90} and L_{10} at 1 hour intervals.

The monitoring work was conducted continuously for 1 day from 11:30 a.m. June 13 to 11:30 a.m. June 14, 1991 (24 hours). The location of the noise measurement point was at least 2 m away from any reflecting surface and is shown in Appendix I.

3.2 Results of Noise Monitoring

The results of the noise monitoring are summarized in Table 2.

In summary, the measured L_{eq} values for different time periods are 65.4 - 76.1 dBA during day-time (7 a.m. - 7 p.m.), 65.8 - 68.2 dBA during evening-time (7 p.m. - 11 p.m.) and 62.5 - 68.2 dBA during nigh-time (11 p.m. - 7 a.m.).

4. LIMITATION OF MEASUREMENT

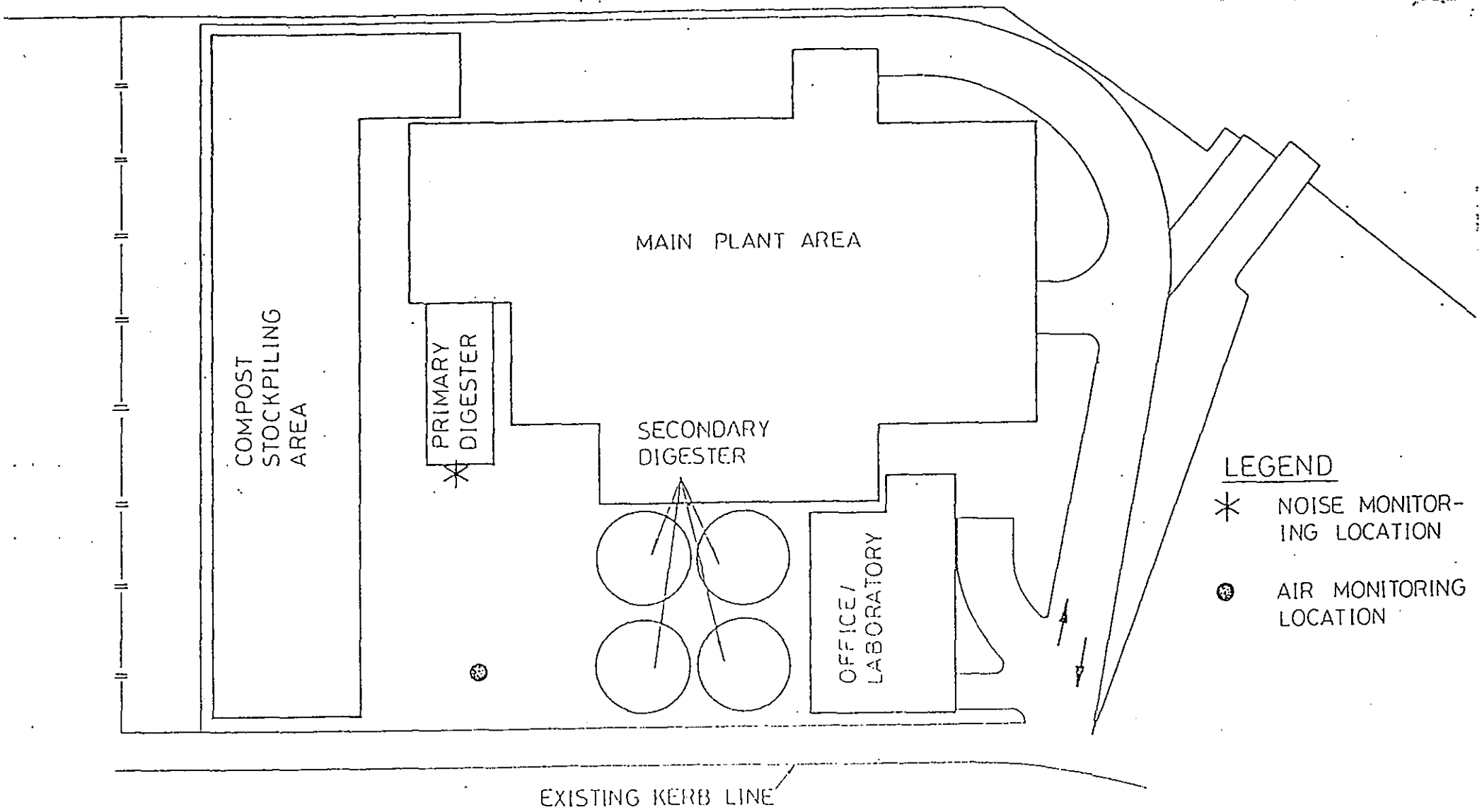
The results of noise and particulate measurements obtained in this monitoring programme can only be used as a reference over the specified sampling period. The results should not be used to extrapolate for the noise level and the particulate concentration in other time.

Environmental Management Division
Hong Kong Productivity Council

25th June, 1991

APPENDIX I

Sampling Location for TSP and Noise Monitoring



Appendix I : Sampling Location for TSP and Noise Monitoring

TABLES

Table 1 : Results of the TSP Measurement

Date (time) to Date (time)		24 hr Average TSP ($\mu g/m^3$) at 25°C	Weather Condition
5.6.91 (11:10)	6.6.91 (11:30)	114	Sunny - Sunny
6.6.91 (12:30)	7.6.91 (11:10)	55	Sunny - Sunny
7.6.91 (11:15)	8.6.91 (11:30)	50	Sunny - Rainy
8.6.91 (11:15)	9.6.91 (11:25)	31	Rainy - Rainy
9.6.91 (11:30)	10.6.91 (11:10)	29	Rainy - Rainy
10.6.91 (11:20)	11.6.91 (11:20)	33	Rainy - Sunny
11.6.91 (11:15)	12.6.91 (11:40)	38	Sunny - Cloudy
12.6.91 (11:45)	13.6.91 (11:10)	41	Cloudy - Sunny
13.6.91 (11:25)	14.6.91 (11:25)	39	Rainy - Sunny
14.6.91 (-)	15.6.91 (-)	N.A. *	N.A. due to no power supply

* N.A. Stands for Not Available

Notes : The Hong Kong Air Quality Objectives for 24-hr average TSP is 260 $\mu g/m^3$.

Table 2 : Results of Noise Monitoring

Period (1 hour intervals)	A-weighted Parameters (dBA)		
	L_{eq}	L_{90}	L_{10}
11:30 a.m. - 12:30 p.m. on 13/6	69.3	65.3	72.3
12:30 p.m. - 1:30 p.m.	73.3	68.8	75.8
1:30 p.m. - 2:30 p.m.	75.9	71.3	77.8
2:30 p.m. - 3:30 p.m.	76.1	70.8	76.8
3:30 p.m. - 4:30 p.m.	74.6	72.3	76.3
4:30 p.m. - 5:30 p.m.	73.9	70.8	74.3
5:30 p.m. - 6:30 p.m.	68.5	65.3	72.3
6:30 p.m. - 7:30 p.m.	67.9	64.3	68.8
7:30 p.m. - 8:30 p.m.	67.0	63.8	66.3
8:30 p.m. - 9:30 p.m.	65.8	63.3	66.3
9:30 p.m. - 10:30 p.m.	66.9	62.8	64.8
10:30 p.m. - 11:30 p.m.	68.2	62.8	65.8
11:30 p.m. - 0:30 a.m. on 14/6	63.9	62.3	63.8
0:30 a.m. - 1:30 a.m.	62.5	61.8	63.3
1:30 a.m. - 2:30 a.m.	62.7	62.3	63.3
2:30 a.m. - 3:30 a.m.	62.6	62.3	63.3
3:30 a.m. - 4:30 a.m.	62.5	61.8	63.3
4:30 a.m. - 5:30 a.m.	63.3	61.8	64.3
5:30 a.m. - 6:30 a.m.	63.7	61.8	65.3
6:30 a.m. - 7:30 a.m.	65.4	62.3	67.3
7:30 a.m. - 8:30 a.m.	70.0	64.8	72.3
8:30 a.m. - 9:30 a.m.	73.7	67.3	75.8
9:30 a.m. - 10:30 a.m.	72.7	67.3	75.8
10:30 a.m. - 11:30 a.m.	70.6	65.8	73.3

1ST MONTHLY (SEPTEMBER) REPORT ON

DUST AND NOISE MONITORING AT CHAI WAN

REFUSE TRANSFER STATION

- CONSTRUCTION PERIOD

(Project No. : 1A 09446)

Environmental Management Division
Hong Kong Productivity Council

12th September, 1991

1ST MONTHLY (SEPTEMBER) REPORT ON DUST AND NOISE MONITORING AT CHAI WAN REFUSE TRANSFER STATION - CONSTRUCTION PERIOD

(Project No. : 1A 09446)

1. INTRODUCTION

In order to monitor the background particulate and noise level at the construction site of Chai Wan Refuse Transfer Station during the construction period, the client commissioned the Council to conduct 24-hour particulate and noise level monitoring on weekly basis for a continuous period of six months. The results of the 1st to 5th measurements in the 1st month are given in this report.

2. DATE OF MEASUREMENT

This 1st monthly report contains results of the 1st to 5th 24-hour dust and noise monitoring conducted on the following date:

Table 1 : Date of Particulate and Noise Measurement

Measurement	Start Date	End Date
1st	31.7.91	1.8.91
2nd	7.8.91	8.8.91
3rd	14.8.91	15.8.91
4th	21.8.91	22.8.91
5th	28.8.91	29.8.91

3. LOCATION OF MEASUREMENT

The locations selected by the client for particulate and noise level monitoring are shown in Figure 1 of Appendix I.

4. PARTICULATE MONITORING

4.1 Methodology

In carrying out the monitoring work, the TSP was measured by a General Metal Work Model GMWL 2000 High Volume Sampling System. On operation, TSP was sampled by drawing air through a piece of pre-weighted filter paper inside a high volume sampler. The filter paper with the retained particulate was brought back to the Council's laboratory for analysis by gravimetric method. The TSP level was calculated from the ratio of the mass of particulate retained in the filter paper to the total volume of air sampled.

The RSP was measured by a Model GMWL 2000 High Volume Sampling System fitted with a Model 1200 HVPM10 Size selective inlet. By definition, RSP is the suspended particulate of size less than 10 μm. The operation principle of RSP sampler is similar to TSP sampler except the former is equipped with an additional PM10 assembly which screens off all the particulate larger than 10 μm. The filter paper therefore only retains particulate of size 10 μm and below and the gain in weight is then used to calculate the RSP concentration.

Both TSP and RSP have been measured for 24 hours. In order to ensure adequate sampling time has been provided, the sampling period has been cross-checked with the internal clock of each equipment. In addition, the samplers have been regularly inspected or calibrated to assure maximum accuracy.

4.2 Results of Particulate Monitoring

The results of the first to fifth particulate measurement are summarised in Table 2 as below:-

Table 2 : Result Summary for Particulate Measurement

Measurement	Parameter	Particulate Loading ($\mu g/m^3$)
1st	TSP	61
	RSP	40
2nd	TSP	61
	RSP	42
3rd	TSP	175
	RSP	63
4th	TSP	132
	RSP	74
5th	TSP	116
	RSP	61

Notes : (i) All units are expressed in $\mu g/m^3$ at 25°C.

(ii) The Hong Kong Air Quality Objectives for 24-hour average TSP and RSP are 260 $\mu g/m^3$ and 180 $\mu g/m^3$ respectively.

5. NOISE MONITORING

5.1 Methodology

Each time noise monitoring was carried out using a B&K type 2231 Modular Precision Sound Level Meter and data recorded by a B&K type 2318 Graphics Printer. The parameters measured were A-weighted L_{eq} & L_{90} at 30 minutes intervals. During the measurements, the microphone position was approx. 1.2 m above ground level. Both before and after each measurement, the system was calibrated using a B&K type 4220 Pistonphone.

5.2 Results of Noise Monitoring

The results of the 1st to 5th noise monitoring are summarized in Appendix III.

In summary, the measured L_{eq} and L_{90} values for different time period are as follows:-

Table 3 : Result Summary for Noise Measurement

Measurement	Parameter	Noise Level (dBA) at Different Time Period		
		Day-time 7am - 7pm	Evening 7pm - 11pm	Night-time 11pm - 7am
1st	L_{eq} L_{90}	63.3 - 80.5 57.8 - 67.3	61.7 - 67.2 56.8 - 58.3	58.0 - 66.3 57.3 - 58.8
2nd	L_{eq} L_{90}	61.4 - 83.5 55.8 - 68.3	62.0 - 66.1 55.3 - 57.8	55.5 - 65.9 54.8 - 57.8
3rd	L_{eq} L_{90}	60.5 - 76.5 55.8 - 66.8	63.5 - 69.8 56.8 - 60.3	56.0 - 66.6 54.8 - 56.8
4th	L_{eq} L_{90}	61.6 - 77.6 57.8 - 64.8	62.9 - 69.1 59.8 - 60.8	55.6 - 67.3 55.3 - 60.8
5th	L_{eq} L_{90}	63.2 - 79.5 57.8 - 66.8	62.2 - 67.0 57.8 - 58.8	55.4 - 67.2 54.8 - 58.3

6. LIMITATION OF MEASUREMENT

The results of noise and particulate measurements obtained in this monitoring programme can only be used as a reference over the specified sampling period. The results should not be used to extrapolate for the noise level and the particulate concentration in other time.

Environmental Management Division
Hong Kong Productivity Council

12th September, 1991

APPENDIX I

Locations for Particulate and Noise Monitoring

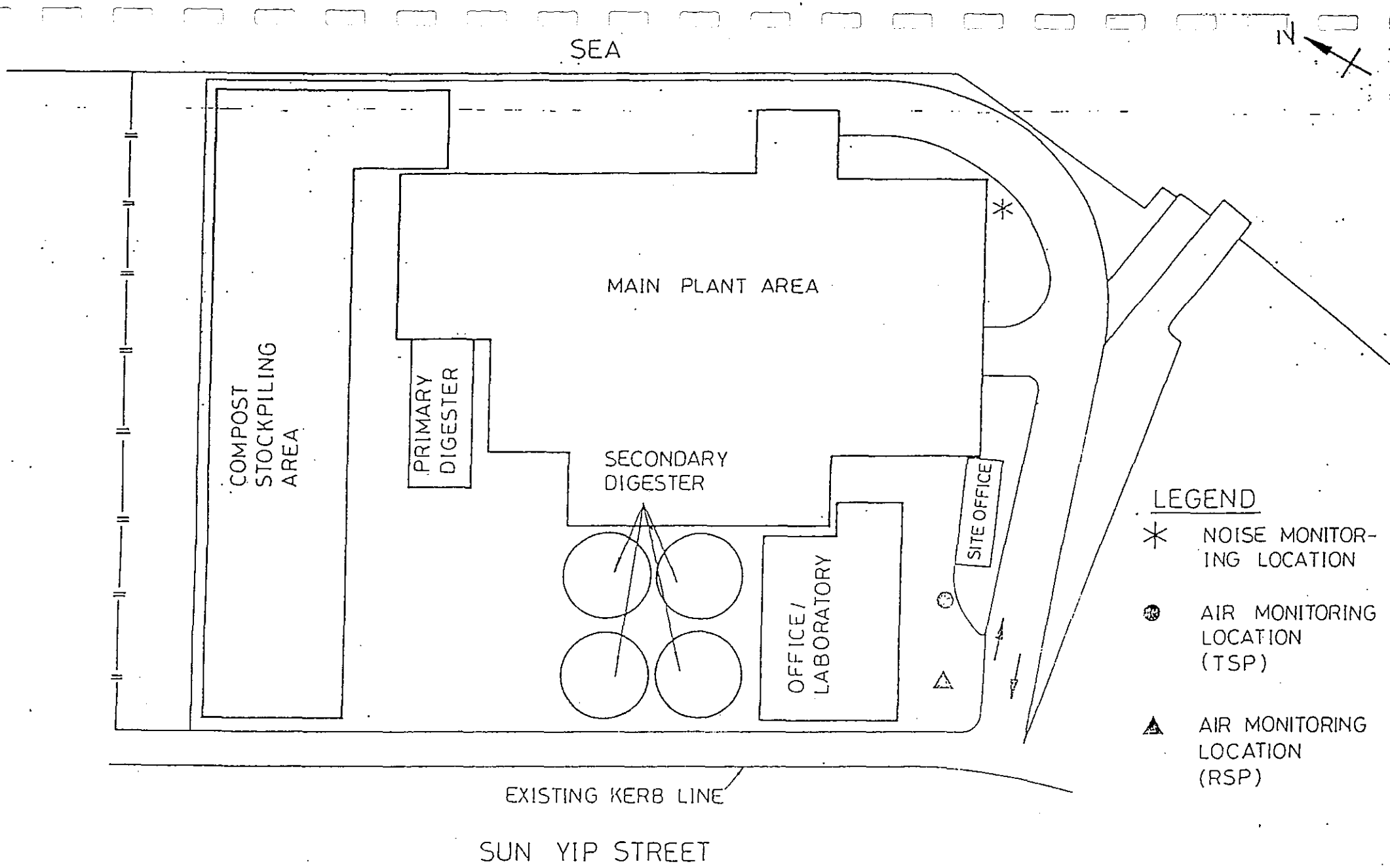


Figure 1 : Location for Particulate and Noise Monitoring

APPENDIX II

Results of the 1st to 5th Particulate Measurement

Table A1 : Particulate Measurement Details for August, 1991

Sample Number	1	2	3	4	5	6	7	8	9	10
Parameter	TSP	RSP	TSP	RSP	TSP	RSP	TSP	RSP	TSP	RSP
Start Time	31.7.91 11:15	31.7.91 11:15	7.8.91 10:40	7.8.91 10:40	14.8.91 11:40	14.8.91 10:40	21.8.91 11:20	21.8.91 11:20	28.8.91 11:40	28.8.91 11:40
Stop Time	1.8.91 11:00	1.8.91 11:15	8.8.91 11:00	8.8.91 11:00	15.8.91 10:30	15.8.91 10:30	22.8.91 11:20	22.8.91 11:20	29.8.91 11:55	29.8.91 11:55
Temperature (°C) (Initial/Final)	32/32	32/32	33/34	33/34	30/26	30/26	33/34	33/34	31/27	31/27
Weather Condition (Initial/Final)	Cloudy/ Cloudy	Cloudy/ Cloudy	Clear/ Clear	Clear/ Clear	Cloudy/ Rainy	Cloudy/ Rainy	Cloudy/ Clear	Cloudy/ Clear	Cloudy/ Rainy	Cloudy/ Rainy
Wind Direction (Initial/Final)	W/SW	W/SW	SW/SW	SW/SW	NE/NE	NE/NE	SW/SW	SW/SW	SW/ undefined	SW/ undefined
Wind Speed (Initial/Final)	Windy/ Windy	Windy/ Windy	Windy/ Windy	Windy/ Windy	Windy/ Very Windy	Windy/ Very Windy	Windy/ Windy	Windy/ Windy	Windy/ Calm	Windy/ Calm
Weight of Filter (mg) (Initial/Final)	2.8447/ 3.0106	2.7714/ 2.8402	2.7673/ 2.9432	2.7490/ 2.8112	2.9322/ 3.4163	2.9509/ 3.0540	2.6871/ 2.8070	2.8017/ 3.1356	2.7655/ 3.1009	2.7949/ 2.8891
Flow Rate Reading (cfm) (Initial/Final)	68/68	45/43	76.5/73	42/39	73/73	43/43	64/64	42.5/40	66.5/66.5	41.5/42.5
Volume of Air Sampled at 25 °C (m^3)	2721	1724	2877	1499	2763	1631	2527	1629	2709	1711
Weight gain of filter (mg)	165.9	68.8	174.9	62.2	484.1	103.1	333.9	119.9	315.4	104.2
Particulate Level ($\mu g/m^3$)	61	40	61	42	175	63	132	74	116	61

APPENDIX III

Results of the 1st to 5th Noise Monitoring

Table A2 : Noise Measurement Details for August, 1991

(i) Results of 1st Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
31.7.91	12:00 noon	12:30 pm	66.3	59.3	
	12:30 pm	1:00	67.2	60.8	
	1:00	1:30	69.2	62.3	*
	1:30	2:00	70.2	62.3	
	2:00	2:30	69.9	64.3	
	2:30	3:00	71.3	63.3	
	3:00	3:30	70.5	63.3	
	3:30	4:00	73.0	61.8	*
	4:00	4:30	76.5	64.8	*
	4:30	5:00	73.5	60.8	*
	5:00	5:30	68.6	60.3	
	5:30	6:00	68.5	60.8	
	6:00	6:30	66.9	58.8	
	6:30	7:00	67.3	58.8	
	7:00	7:30	66.3	57.8	
	7:30	8:00	63.0	57.8	
	8:00	8:30	61.7	57.8	
	8:30	9:00	67.2	58.3	
	9:00	9:30	65.0	57.8	
	9:30	10:00	65.5	57.3	
	10:00	10:30	65.0	56.8	
	10:30	11:00	65.0	56.8	
	11:00	11:30	66.3	58.8	
	11:30	0:00 am	60.9	58.8	
1.8.91	0:00 am	0:30 am	65.2	57.8	
	0:30	1:00	58.0	57.3	
	1:00	1:30	58.0	57.3	
	1:30	2:00	58.0	57.3	
	2:00	2:30	58.0	57.3	
	2:30	3:00	57.9	57.3	
	3:00	3:30	58.0	57.3	
	3:30	4:00	58.2	57.3	
	4:00	4:30	58.2	57.3	
	4:30	5:00	58.3	57.8	
	5:00	5:30	58.7	57.8	
	5:30	6:00	61.7	57.8	
	6:00	6:30	60.7	57.3	
	6:30	7:00	58.7	57.3	
	7:00	7:30	63.3	57.8	
	7:30	8:00	71.1	63.8	
	8:00	8:30	70.3	63.8	
	8:30	9:00	72.7	66.3	
	9:00	9:30	80.5	67.3	
	9:30	10:00	78.2	65.8	
	10:00	10:30	74.2	66.3	
	10:30	11:00	73.2	65.8	
	11:00	11:30	67.0	59.3	
	11:30	12:00 noon	67.3	59.3	

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

(ii) Results of 2nd Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
7.8.91	12:00 noon	12:30 pm	78.2	61.3	
	12:30 pm	1:00	62.0	58.3	
	1:00	1:30	63.8	59.3	
	1:30	2:00	74.7	64.3	
	2:00	2:30	68.6	64.3	
	2:30	3:00	68.7	62.3	
	3:00	3:30	67.9	63.3	
	3:30	4:00	66.3	60.8	
	4:00	4:30	67.4	61.3	
	4:30	5:00	69.3	62.3	
	5:00	5:30	68.4	62.3	
	5:30	6:00	66.6	59.8	
	6:00	6:30	68.2	59.3	
	6:30	7:00	68.3	61.8	
	7:00	7:30	64.4	57.8	
	7:30	8:00	63.5	56.8	
	8:00	8:30	62.8	56.3	
	8:30	9:00	64.4	55.8	
	9:00	9:30	62.6	55.3	
	9:30	10:00	62.0	55.3	
	10:00	10:30	66.1	55.8	
	10:30	11:00	65.0	55.3	
	11:00	11:30	63.1	55.3	
	11:30	0:00 am	65.9	56.3	
8.8.91	0:00 am	0:30 am	61.9	57.8	
	0:30	1:00	56.9	55.8	
	1:00	1:30	56.8	55.8	
	1:30	2:00	57.0	55.3	
	2:00	2:30	55.5	54.8	
	2:30	3:00	58.2	55.3	
	3:00	3:30	56.3	55.3	
	3:30	4:00	56.1	55.3	
	4:00	4:30	56.5	55.3	
	4:30	5:00	56.2	55.3	
	5:00	5:30	58.1	57.3	
	5:30	6:00	57.7	55.8	
	6:00	6:30	57.6	55.3	
	6:30	7:00	56.5	54.8	
	7:00	7:30	61.4	55.8	
	7:30	8:00	62.7	56.3	
	8:00	8:30	68.4	62.3	
	8:30	9:00	83.5	65.8	
	9:00	9:30	83.3	63.3	
	9:30	10:00	81.6	65.8	
	10:00	10:30	68.1	63.3	
	10:30	11:00	77.2	65.3	
	11:00	11:30	82.1	68.3	
	11:30	12:00 noon	77.7	57.8	

(iii) Results of 3rd Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
14.8.91	11:00 am	11:30 am	71.7	68.8	
	11:30	12:00 noon	71.5	61.8	*
	12:00 noon	12:30 pm	68.2	58.8	
	12:30 pm	1:00	65.0	58.3	
	1:00	1:30	73.4	58.8	*
	1:30	2:00	76.5	67.8	*
	2:00	2:30	74.3	65.3	
	2:30	3:00	75.8	66.3	
	3:00	3:30	76.1	66.3	
	3:30	4:00	75.3	61.3	
	4:00	4:30	72.1	62.8	
	4:30	5:00	72.2	63.8	
	5:00	5:30	72.9	63.8	
	5:30	6:00	68.2	60.8	
	6:00	6:30	66.2	59.3	
	6:30	7:00	68.7	59.8	
	7:00	7:30	67.5	60.3	
	7:30	8:00	68.6	58.8	
	8:00	8:30	63.9	56.8	
	8:30	9:00	64.9	56.8	
	9:00	9:30	63.5	56.8	
	9:30	10:00	64.7	56.8	
	10:00	10:30	65.1	58.8	
	10:30	11:00	69.8	60.3	
	11:00	11:30	68.3	55.8	
	11:30	0:00 am	68.6	55.8	
15.8.91	0:00 am	0:30 am	58.1	56.8	
	0:30	1:00	56.9	55.3	
	1:00	1:30	57.2	55.8	
	1:30	2:00	56.0	54.8	
	2:00	2:30	56.8	55.8	
	2:30	3:00	57.6	56.3	
	3:00	3:30	56.9	55.3	
	3:30	4:00	57.2	56.3	
	4:00	4:30	57.5	55.8	
	4:30	5:00	58.3	55.8	
	5:00	5:30	58.1	56.3	
	5:30	6:00	57.5	55.3	
	6:00	6:30	59.2	55.3	
	6:30	7:00	60.3	54.8	
	7:00	7:30	60.5	55.8	
	7:30	8:00	63.5	57.3	
	8:00	8:30	68.5	59.8	
	8:30	9:00	71.3	60.3	
	9:00	9:30	66.9	61.3	
	9:30	10:00	71.5	62.3	
	10:00	10:30	68.0	60.3	
	10:30	11:00	70.1	63.3	

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

(iv) Results of 4th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
21.8.91	12:30 pm	1:00 pm	77.6	59.8	
	1:00	1:30	67.7	59.8	
	1:30	2:00	67.8	59.3	
	2:00	2:30	67.0	59.8	
	2:30	3:00	71.3	62.3	
	3:00	3:30	68.3	61.3	
	3:30	4:00	71.2	63.3	
	4:00	4:30	71.7	62.8	
	4:30	5:00	71.7	64.3	
	5:00	5:30	68.2	62.3	
	5:30	6:00	76.6	61.3	
	6:00	6:30	65.7	59.3	
	6:30	7:00	67.6	58.8	
	7:00	7:30	69.1	59.8	
	7:30	8:00	63.7	59.8	
	8:00	8:30	66.4	60.8	
	8:30	9:00	67.0	60.8	
	9:00	9:30	64.3	60.3	
	9:30	10:00	62.9	60.3	
	10:00	10:30	68.0	59.8	
	10:30	11:00	68.6	60.3	
	11:00	11:30	67.3	60.3	
	11:30	0:00 am	63.9	60.8	
22.8.91	0:00 am	0:30 am	61.8	56.3	
	0:30	1:00	56.7	55.8	
	1:00	1:30	56.3	55.8	
	1:30	2:00	57.0	56.3	
	2:00	2:30	56.9	56.3	
	2:30	3:00	56.3	55.8	
	3:00	3:30	56.6	56.3	
	3:30	4:00	56.1	55.3	
	4:00	4:30	55.6	55.3	
	4:30	5:00	56.7	55.3	
	5:00	5:30	57.9	55.8	
	5:30	6:00	57.3	55.8	
	6:00	6:30	58.1	55.3	
	6:30	7:00	58.7	55.8	
	7:00	7:30	61.6	57.8	
	7:30	8:00	65.7	58.3	
	8:00	8:30	69.4	62.8	
	8:30	9:00	68.0	63.3	
	9:00	9:30	75.0	63.3	
	9:30	10:00	71.7	64.8	
	10:00	10:30	66.8	62.3	
	10:30	11:00	65.5	61.8	
	11:00	11:30	63.4	58.8	
	11:30	12:00 noon	62.4	57.8	
	12:00 noon	12:30 pm	64.7	58.3	

(v) Results of 5th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

NG5

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
28.8.91	11:30 am	12:00 noon	78.0	64.8	*
	12:00 noon	12:30 pm	68.1	57.8	
	12:30 pm	1:00	64.2	57.8	
	1:00	1:30	79.5	59.8	
	1:30	2:00	68.9	63.3	
	2:00	2:30	68.8	61.8	
	2:30	3:00	72.3	63.3	
	3:00	3:30	68.8	60.3	
	3:30	4:00	75.0	60.3	
	4:00	4:30	68.7	60.8	
	4:30	5:00	74.7	62.3	*
	5:00	5:30	67.7	60.8	
	5:30	6:00	75.8	59.8	*
	6:00	6:30	67.0	59.3	
	6:30	7:00	66.6	59.3	
	7:00	7:30	65.9	58.8	
	7:30	8:00	62.2	58.3	
	8:00	8:30	63.1	58.3	
	8:30	9:00	62.5	57.8	
	9:00	9:30	64.8	57.8	
	9:30	10:00	64.6	57.8	
	10:00	10:30	67.0	57.8	
	10:30	11:00	66.4	57.8	
	11:00	11:30	67.2	58.3	
	11:30	0:00 am	61.9	57.3	
29.8.91	0:00 am	0:30 am	58.1	57.3	
	0:30	1:00	58.0	57.3	
	1:00	1:30	58.0	57.3	
	1:30	2:00	57.7	55.3	
	2:00	2:30	55.5	54.8	
	2:30	3:00	55.4	54.8	
	3:00	3:30	55.5	55.3	
	3:30	4:00	55.6	55.3	
	4:00	4:30	55.8	55.3	
	4:30	5:00	56.3	55.3	
	5:00	5:30	57.4	55.8	
	5:30	6:00	57.7	55.8	
	6:00	6:30	58.2	55.3	
	6:30	7:00	62.8	55.3	
	7:00	7:30	63.2	58.3	
	7:30	8:00	71.5	61.8	
	8:00	8:30	68.3	62.3	
	8:30	9:00	74.1	65.8	
	9:00	9:30	70.9	63.3	
	9:30	10:00	73.5	65.3	
	10:00	10:30	76.4	66.8	*
	10:30	11:00	76.6	65.8	
	11:00	11:30	66.9	59.3	

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

2nd MONTHLY (OCTOBER) REPORT ON

DUST AND NOISE MONITORING AT CHAI WAN

REFUSE TRANSFER STATION

- CONSTRUCTION PERIOD

(Project No. : 1A 02446)

Environmental Management Division
Hong Kong Productivity Council

21st October, 1991

2nd MONTHLY (OCTOBER) REPORT ON DUST AND NOISE MONITORING AT CHAI WAN REFUSE TRANSFER STATION - CONSTRUCTION PERIOD

(Project No. : 1A 09446)

1. INTRODUCTION

In order to monitor the background particulate and noise level at the construction site of Chai Wan Refuse Transfer Station during the construction period, the client commissioned the Council to conduct 24-hour particulate and noise level monitoring on weekly basis for a continuous period of six months. The results of the 6th to 9th measurements in the 2nd month are given in this report.

2. DATE OF MEASUREMENT

This 2nd monthly report contains results of the 6th to 9th 24-hour dust and noise monitoring conducted on the following date:

Table 1 : Date of Particulate and Noise Measurement

Measurement	Start Date	End Date
6th	4.9.91	5.9.91
7th	11.9.91	12.9.91
8th	18.9.91	19.9.91
9th	25.9.91	26.9.91

3. LOCATION OF MEASUREMENT

The locations selected by the client for particulate and noise level monitoring remain unchanged and are shown in Figure 1 of Appendix I.

4. PARTICULATE MONITORING

4.1 Methodology

In carrying out the monitoring work, the TSP was measured by a General Metal Work Model GMWL 2000 High Volume Sampling System. On operation, TSP was sampled by drawing air through a piece of pre-weighted filter paper inside a high volume sampler. The filter paper with the retained particulate was brought back to the Council's laboratory for analysis by gravimetric method. The TSP level was calculated from the ratio of the mass of particulate retained in the filter paper to the total volume of air sampled.

The RSP was measured by a Model GMWL 2000 High Volume Sampling System fitted with a Model 1200 HVPM10 Size selective inlet. By definition, RSP is the suspended particulate of size less than 10 μm. the operation principle of RSP sampler is similar to TSP sampler except the former is equipped with an additional PM10 assembly which screens off all the particulate larger than 10 μm. The filter paper therefore only retains particulate of size 10 μm and below and the gain in weight is then used to calculate the RSP concentration.

Both TSP and RSP have been measured for 24 hours. In order to ensure adequate sampling time has been provided, the sampling period has been cross-checked with the internal clock of each equipment. In addition, the samplers have been regularly inspected or calibrated to assure maximum accuracy.

4.2 Results of Particulate Monitoring

The results of the 6th to 9th particulate measurement are summarised in Table 2 as below:-

Table 2 : Result Summary for Particulate Measurement

Measurement	Parameter	Particulate Loading ($\mu g/m^3$)
6th	TSP	119
	RSP	53
7th	TSP	249
	RSP	152
8th	TSP	N/A
	RSP	N/A
9th	TSP	193
	RSP	88

Notes : (i) All units are expressed in $\mu g/m^3$ at 25°C.

(ii) The Hong Kong Air Quality Objectives for 24-hour average TSP and RSP are 260 $\mu g/m^3$ and 180 $\mu g/m^3$ respectively.

(iii) No data were recorded for the eighth measurement because regular power supply was not available.

(iv) There was no power supply between about 12:00 am and 6:30 am on 26.9.91. The total sampling time was therefore about eighteen hours only.

5. NOISE MONITORING

5.1 Methodology

Each time noise monitoring was carried out using a B&K type 2231 Modular Precision Sound Level Meter and data recorded by a B&K type 2318 Graphics Printer. The parameters measured were A-weighted L_{eq} & L_{90} at 30 minutes intervals. During the measurements, the microphone position was approx. 1.2 m above ground level. Both before and after each measurement, the system was calibrated using a B&K type 4220 Pistonphone.

5.2 Results of Noise Monitoring

The results of the 6th to 9th noise monitoring are shown in Appendix III.

In summary, the measured L_{eq} and L_{90} values for different time period are as follows:-

Table 3 : Result Summary for Noise Measurement

Measurement	Parameter	Noise Level (dBA) at Different Time Period		
		Day-time 7am - 7pm	Evening 7pm - 11pm	Night-time 11pm - 7am
6th	L_{eq} L_{90}	58.9 - 74.2 56.3 - 66.3	63.6 - 68.3 57.3 - 61.3	56.4 - 67.2 55.3 - 60.3
7th	L_{eq} L_{90}	65.2 - 83.7 59.3 - 73.3	61.3 - 67.9 56.3 - 61.3	56.2 - 67.7 55.8 - 59.3
8th	L_{eq} L_{90}	61.0 - 80.6 56.8 - 73.8	63.3 - 67.5 60.3 - 61.8	56.8 - 69.8 55.3 - 60.3
9th	L_{eq} L_{90}	65.4 - 89.5 57.8 - 84.3	61.3 - 67.6 56.3 - 59.8	56.3 - 67.3 54.5 - 56.8

6. LIMITATION OF MEASUREMENT

The results of noise and particulate measurements obtained in this monitoring programme can only be used as a reference over the specified sampling period. The results should not be used to extrapolate for the noise level and the particulate concentration in other time.

Environmental Management Division
Hong Kong Productivity Council

21st October, 1991

APPENDIX I

Locations for Particulate and Noise Monitoring

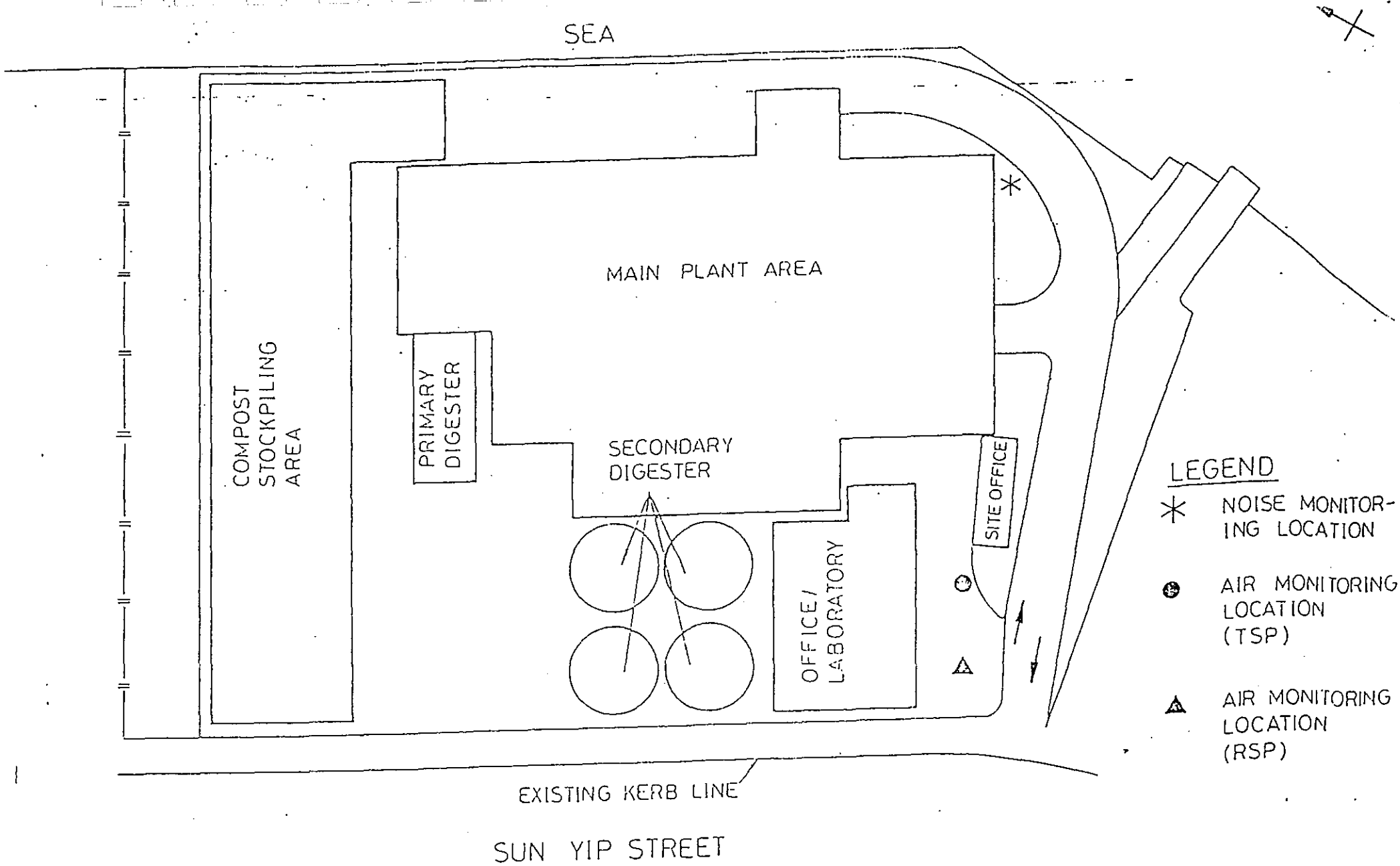


Figure 1 : Location for Particulate and Noise Monitoring

APPENDIX II

Results of the 4th to 9th Particulate Measurement

Table A1 : Particulate Measurement Details for September, 1991

Sample Number	1	2	3	4	5	6	7	8
Parameter	TSP	RSP	TSP	RSP	TSP	RSP	TSP	RSP
Start Time	4.9.91 11:25	4.9.91 11:30	11.9.91 11:10	11.9.91 11:10	18.9.91	18.9.91	25.9.91 11:27	25.9.91 11:28
Stop Time	5.9.91 11:26	5.9.91 11:30	12.9.91 11:25	12.9.91 11:35	No sample was taken because the removal electricity supply from electricity company was cut shortly before the day of sampling		26.9.91 11:10	26.9.91 11:10
Temperature (°C) (Initial/Final)	31.5/33	31.5/33	37/37	37/37			36/34	36/34
Weather Condition (Initial/Final)	Cloudy/ Cloudy	Cloudy/ Cloudy	Clear/ Clear	Clear/ Clear			Clear/ Clear	Clear/ Clear
Wind Speed (Initial/Final)	Calm / Windy	Calm/ Windy	Calm/ Calm	Calm/ Calm			Clam/ Clear	Clear/ Clear
Wind Direction (Initial/Final)	N.A./NW	N.A./NW	NW/NW	NW/NW			NE/SE	NE/SE
Weight of Filter (mg) (Initial/Final)	2.8755/ 3.1633	2.8886/ 2.9678	2.9333/ 3.4772	2.9391/ 3.1557			2.6591/ 2.9763	2.6694/ 2.7599
Flow Rate Reading (cfm) (Initial/Final)	62/61	36/36	44/44	36/36			46/44	36/36
Volume of Air Sampled at 25°C (m^3)	2418	1493	2188	1421			1640	1023
Weight gain of filter (mg)	287.8	79.2	543.9	216.6			317.2	90.5
Particulate Level ($\mu g/m^3$)	119	53	249	152			193	88

Remarks : N.A. stands for not available. No wind direction was found because the wind speed was too slow.

APPENDIX III

Results of the 6th to 9th Noise Monitoring

Table A2 : Noise Measurement Details for September, 1991

(i) Results of 6th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
4.9.91	11:30 am	12:00 noon	68.3	61.8	
	12:00 noon	12:30 pm	66.9	60.3	
	12:30 pm	1:00	66.3	59.8	
	1:00	1:30	67.7	61.8	
	1:30	2:00	73.3	65.8	
	2:00	2:30	73.8	64.3	
	2:30	3:00	74.2	66.3	
	3:00	3:30	69.8	60.3	
	3:30	4:00	69.7	60.3	
	4:00	4:30	69.3	62.8	
	4:30	5:00	68.1	62.8	
	5:00	5:30	67.3	62.3	
	5:30	6:00	68.1	62.8	
	6:00	6:30	68.2	61.3	
	6:30	7:00	69.5	61.3	
	7:00	7:30	68.8	61.3	
	7:30	8:00	64.5	60.3	
	8:00	8:30	63.7	59.8	
	8:30	9:00	63.6	59.8	
	9:00	9:30	66.3	60.3	
	9:30	10:00	64.6	57.3	
	10:00	10:30	67.1	57.3	
	10:30	11:00	68.2	59.3	
	11:00	11:30	67.2	59.3	
	11:30	0:00 am	63.2	58.8	
5.9.91	0:00 am	0:30 am	60.2	58.8	
	0:30	1:00	61.2	59.8	
	1:00	1:30	60.4	59.8	
	1:30	2:00	60.8	60.3	
	2:00	2:30	60.3	59.3	
	2:30	3:00	58.1	55.8	
	3:00	3:30	56.6	55.8	
	3:30	4:00	56.4	55.8	
	4:00	4:30	57.0	55.8	
	4:30	5:00	56.7	55.8	
	5:00	5:30	56.9	55.8	
	5:30	6:00	57.3	56.3	
	6:00	6:30	60.3	56.3	
	6:30	7:00	58.6	55.3	
	7:00	7:30	58.9	56.3	
	7:30	8:00	64.9	59.3	
	8:00	8:30	66.7	62.3	
	8:30	9:00	68.0	64.3	
	9:00	9:30	65.7	62.8	
	9:30	10:00	65.2	62.8	
	10:00	10:30	68.8	62.8	
	10:30	11:00	69.1	61.8	
	11:00	11:30	64.7	59.8	

(11) Results of 7th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
11.9.91	11:30 am	12:00 noon	73.4	66.3	*
	12:00 noon	12:30 pm	67.0	59.8	
	12:00 pm	1:00	65.3	59.3	
	1:00	1:30	66.3	60.3	
	1:30	2:00	76.3	66.3	
	2:00	2:30	80.2	70.8	
	2:30	3:00	80.9	73.3	
	3:00	3:30	79.0	61.8	
	3:30	4:00	67.2	61.8	
	4:00	4:30	73.0	66.8	
	4:30	5:00	69.7	64.3	
	5:00	5:30	79.0	62.8	*
	5:30	6:00	83.7	61.8	*
	6:00	6:30	66.2	61.3	
	6:30	7:00	65.2	61.3	
	7:00	7:30	67.1	61.3	
	7:30	8:00	64.0	60.8	
	8:00	8:30	65.2	60.3	
	8:30	9:00	65.0	59.8	
	9:00	9:30	64.3	59.3	
	9:30	10:00	61.8	58.3	
	10:00	10:30	67.6	56.8	
	10:30	11:00	67.9	57.8	
	11:00	11:30	67.3	58.8	
	11:30	0:00 am	67.7	58.8	
12.9.91					
	0:00 am	0:30 am	59.5	58.3	
	0:30	1:00	59.2	58.8	
	1:00	1:30	59.5	58.8	
	1:30	2:00	59.5	58.8	
	2:00	2:30	59.1	58.3	
	2:30	3:00	58.8	55.8	
	3:00	3:30	56.4	55.8	
	3:30	4:00	56.5	55.8	
	4:00	4:30	56.2	55.8	
	4:30	5:00	56.7	55.8	
	5:00	5:30	56.9	55.8	
	5:30	6:00	62.9	56.8	
	6:00	6:30	61.1	56.3	
	6:30	7:00	66.5	59.3	
	7:00	7:30	79.2	68.8	
	7:30	8:00	74.6	65.8	
	8:00	8:30	71.6	65.3	
	8:30	9:00	75.4	67.3	
	9:00	9:30	71.8	61.8	
	9:30	10:00	65.7	61.8	
	10:00	10:30	67.7	62.3	
	10:30	11:00	75.6	67.3	*
	11:00	11:30	77.0	72.8	*

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

(iii) Results of 8th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
18.9.91	11:30	12:00 noon	78.9	73.8	
	12:00 noon	12:30 pm	70.9	61.3	
	12:30 pm	1:00	65.8	61.3	
	1:00	1:30	67.9	62.3	
	1:30	2:00	74.1	69.8	
	2:00	2:30	72.9	68.8	
	2:30	3:00	72.2	69.3	
	3:00	3:30	71.2	67.8	
	3:30	4:00	69.2	65.8	
	4:00	4:30	69.6	66.3	
	4:30	5:00	69.8	66.8	
	5:00	5:30	79.0	68.8	
	5:30	6:00	79.9	66.3	
	6:00	6:30	70.6	61.3	
	6:30	7:00	67.7	60.8	
	7:00	7:30	66.4	61.8	
	7:30	8:00	65.7	61.3	
	8:00	8:30	63.6	60.8	
	8:30	9:00	67.5	60.8	
	9:00	9:30	64.3	60.8	
	9:30	10:00	66.0	60.8	
	10:00	10:30	63.3	61.3	
	10:30	11:00	67.5	60.8	
	11:00	11:30	69.8	60.8	
	11:30	0:00 am	67.9	57.8	
19.9.91	0:00 am	0:30 am	58.2	57.3	
	0:30	1:00	57.7	57.3	
	1:00	1:30	57.6	57.3	
	1:30	2:00	57.7	57.3	
	2:00	2:30	57.7	57.3	
	2:30	3:00	57.6	57.3	
	3:00	3:30	57.7	57.3	
	3:30	4:00	58.0	57.3	
	4:00	4:30	58.3	57.8	
	4:30	5:00	58.4	57.8	
	5:00	5:30	59.3	58.3	
	5:30	6:00	56.8	55.3	
	6:00	6:30	57.0	55.3	
	6:30	7:00	57.4	55.3	
	7:00	7:30	62.6	56.8	
	7:30	8:00	61.0	58.3	
	8:00	8:30	71.9	67.3	
	8:30	9:00	72.9	69.3	
	9:00	9:30	72.7	69.8	
	9:30	10:00	78.4	70.8	
	10:00	10:30	76.6	70.3	
	10:30	11:00	78.7	71.8	*
	11:00	11:30	80.6	67.8	*

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

(iv) Results of 7th Noise Monitoring

Dynamic Range of Sound Level Meter : 40.8 - 113.8 dB

Table A2 : Noise Measurement Details for August, 1991

Date	Measurement Period (30 min. intervals)		Noise Level (dBA)		Remarks
	Start	Finish	L_{eq}	L_{90}	
27.9.91	11:00 am	11:30 am	89.0	70.3	
	11:30	12:00 noon	82.8	65.3	
	12:00 noon	12:30 pm	67.4	59.3	
	12:30 pm	1:00 pm	66.6	58.8	
	1:00	1:30	87.4	60.3	
	1:30	2:00	89.5	84.3	*
	2:00	2:30	84.4	62.8	
	2:30	3:00	86.4	68.8	
	3:00	3:30	86.2	61.8	*
	3:30	4:00	70.0	60.3	
	4:00	4:30	89.5	77.8	
	4:30	5:00	70.0	62.8	
	5:00	5:30	67.5	62.8	
	5:30	6:00	65.4	60.3	
	6:00	6:30	66.7	60.3	
	6:30	7:00	67.5	59.8	
	7:00	7:30	65.8	59.8	
	7:30	8:00	64.1	58.8	
	8:00	8:30	61.0	58.8	
	8:30	9:00	64.9	57.3	
	9:00	9:30	65.1	57.3	
	9:30	10:00	63.6	56.3	
	10:00	10:30	63.1	56.8	
	10:30	11:00	67.6	56.8	
	11:00	11:30	67.3	56.8	
	11:30	0:00 am	66.5	56.3	
26.9.91	0:00 am	0:30 am	57.7	56.8	
	0:30	1:00	57.4	56.8	
	1:00	1:30	57.4	56.8	
	1:30	2:00	57.2	56.8	
	2:00	2:30	57.4	56.8	
	2:30	3:00	57.2	56.8	
	3:00	3:30	56.9	56.3	
	3:30	4:00	56.3	55.8	
	4:00	4:30	56.5	55.8	
	4:30	5:00	56.5	55.8	
	5:00	5:30	58.1	56.3	
	5:30	6:00	56.3	54.8	
	6:00	6:30	57.8	54.8	
	6:30	7:00	60.5	55.3	
	7:00	7:30	66.6	57.8	
	7:30	8:00	65.9	59.3	
	8:00	8:30	70.5	64.3	
	8:30	9:00	70.9	63.8	
	9:00	9:30	68.4	64.3	
	9:30	10:00	89.0	69.8	
	10:00	10:30	87.7	66.3	
	10:30	11:00	82.9	69.8	

Remarks : * Overloading of sound level meter occurred during the indicated measurement period. This may be due to heavy vehicles passing by, hammering on steelworks by workers nearby, sudden rain, etc.

APPENDIX B

RESPONSES TO COMMENTS

APPENDIX B

RESPONSES TO COMMENTS ON DRAFT KEY ISSUES REPORT NO. 2

IMPACTS OF OPERATION

Note : the comments and their responses have been numbered for ease of reference.

	Comments	Response
1.	I would like to point out that the definition of a failure to comply with the environmental requirements for the IETS project, as given in Section L and Document 30 of the Contract Document, is very much different from the KBTS project which CES has obviously made its reference from. For KBTS, failure to comply would be judged by less than 80% compliance with the standard, measured on a minimum of 5 consecutive daily samples. However, this is not the case for IETS which has adopted a completely different approach in contrast to the failure/compliance definition as has defined in Section 7.3 of the previous report.	Noted.
2.	Para. 3.1.5 - In the last sentence, it is stated that "a failure to comply would be counted if a total of four consecutive samples taken at one hour intervals exceed the 2 odour unit limit." This applies to KBTS but not IETS. Under the IETS contract, any odour count above 2 odour units will be taken as a failure and there is no requirement to take 4 consecutive samples.	Noted.
3.	Table 5.2 on page 10 - This table should read Table 3.6 - Standards for Effluents Discharged to Foul Sewer.	Noted and amended.
4.	Para. 4.2.1 - It appears to me that the Tender Documents have made no reference to 1.5mg/cu m dust levels and 1000 odour units. If those levels are the consultant's predicted levels, the consultants should know whether the expected levels are derived from static conditions or under equilibrium conditions.	These levels are not predicted by the Consultants. They were obtained from the system designers and are the best available estimates. The reference should have been to the Tender Submission, not the Tender Documents.

5.	Para. 4.2.2 - It is not totally true to state that the Temporary Arrangements have no detectable diverse results in terms of dust and odour. When the wind is blowing to the inland direction, the operator has to keep spraying with a hose while the refuse is being discharged onto an open top barge in order to minimize the dust nuisance. Also, odour (sometimes strong) can be detected near the IETS site office.	Noted. Odour detectable within the site need not necessarily be considered on adverse effect however. A water hose is used because the Contractor volunteers to wash the tailgates of USD RCVs; this is not primarily a dust-suppressing procedure.
6.	Para. 4.3.23 - The waste water treatment plant is separated from the compactor hall by four walls. Apart from the two entrance doors which I believe, should normally be closed during normal operation, no other openings for fresh air inlet has been indicated in the Contractor's design. If that is the case, it is doubtful that the fans proposed can provide sufficient air changes to the waste water treatment plant.	
7.	Para. 5.3.1 - It is true that the concrete boundary wall can act as a noise barrier.	Noted.
8.	Section 6.1 - Under which group should the effluent of the vehicle wash be classified?	The bleed-off from the vehicle wash water treatment system is fed to foul sewer (Group 4).
9.	Para. 6.2.3 - The first flush of Group 2 effluent is required to be treated by the waste water treatment plant. In other words, Group 2 effluent will normally be treated except during heavy storm, when the excessive flow will be overflown to a storm water system.	Noted.
10.	Para. 6.3.2 - As stated above, the IETS Contract requires the first flush of Group 2 effluent be treated as for Group 1 effluent.	Noted.
11.	Para. 6.4.2 - Shouldn't the reference to monitoring be Section 9.4 instead of Section 6.4?	Yes. This will be amended.
12.	Section 6.4 - Should this section also address the sludge disposal process, treatment for wasted water from the vehicle wash?	Response to follow.
13.	Para. 9.2.3 - Contract compliance implies odour level being less than 2 odour units at any time. It is not necessary for the odour nuisance to persist for several hours before a failure is counted.	Noted and amended.

14.	9.4.2 - The recommendation for the operator to count daily odour patrol around the site is supported. However, this has to be done in addition to the regular odour monitoring.	Noted and agreed.
15.	9.4.2 - If continuous monitoring of flow, pH and temperature is inappropriate, the contractor will have to provide suitable monitoring equipment to measure and record these parameters whenever the waste water treatment plant is in operation.	Noted. Appropriate reference will be made in the final report.
16.	S.3.1.7 - Appendix A is not given in the Report.	Apologies for the omission. Appendix A is an updated version of Appendix A of Key Issues Report No.1. It will be included with the final report.
17.	S.4.3.3 - The Consultants should further elaborate why the control systems will not require to remove the NO_2 and CO from the exhaust air. As the Air Quality Objectives have stipulated the required ambient level of these two pollutants, the Consultants should assess whether or not there would be NO_2 and CO air quality impact to adjacent users. Please note that the Consultants have agreed to provide detailed assessment in relevant Key Issue Report in response to further comments for the Initial Assessment Report.	A fuller explanation, which will appear in the final report, is as follows: The mass balance calculations in paragraph 4.2.3 can be used to estimate the concentrations of NO_2 and CO in the exhausted air from the transfer station tipping hall. The relevant AQOs are the one hour averages shown in Table 3.1. Based on an analysis time of one hour, the average number of RCVs in the tipping hall is estimated to be not more than 3.6, although the tipping hall can itself accommodate 15 vehicles simultaneously. The NO_2 emission from this number of vehicles is 53.6 ghr^{-1} and the CO emission is 188 ghr^{-1} (see para. 4.3.22) and the NO_2 hourly-average concentration in the exhausted air is 233 μgm^{-3}. This is less than the hourly average AQO. The equivalent concentration for CO is 816 μgm^{-3}, equivalent to only 3% of the AQO. Since the exhausted air is vented at roof level it undergoes further dilution and dispersion. It is therefore highly unlikely that the discharge could cause exceedance of the AQO at sensitive receivers or in the ambient air beyond the site boundary.
18.	S.4.3.12 - Regarding odour abatement, it relies on both prevention is concerned, "Elgin" is only is specialized mechanical sweeper which is designed mainly for the sweeping and not for washing. Thus, in addition, tipping floor, access road, etc. should be washed with effective washing facilities such as the street washing vehicle with strong spray heads.	The Elgin sweeper both sprays and sweeps: the machine used has additional, non-standard, spray heads. Supplementary washing (e.g. in the tipping hall) is by manual means.

19.	S.9.2.1 and Table 9.1 - As commented previously, the minimum requirement for TSP and RSP monitoring are once every six days instead of once weekly.	The earlier comment stated "*In general* the minimum requirement is ..... once every six days". This was noted, but our response indicated that the ER and the Contract Documentation required monitoring once weekly. Please clarify whether it is the Employer's intention to vary the contractual requirements.
20.	S.3.1.4, 9.2.3 and 9.2.4 - Concerning the odour monitoring, sampling should also be conducted once every six days instead of weekly. The compliance criterion suggested by the Consultants is definitely unacceptable since odour nuisance can be momentary and odour perception is an instantaneous response. Sampling at hourly interval for 4 consecutive hours would defeat the purpose of spotting the real odour level. Sampling should aim at capturing the most odourous parcel of air that would most likely to give rise to odour nuisance to the public. Therefore, the most appropriate location to take air sample is at the spot where odour is expect to be strongest. In general, this would be in the downwind position during the peak operation hour of the plant. Air sample should then be taken at the moment when odour is sensed to be most obvious. A compliance failure should be counted if the measured odour level exceeds the 2 odour units standard at any one time. Under normal circumstance, two samples should be taken according to the above principle. Any one of the results exceeding 2 odour units (determined by an odour panel) is considered to be a compliance failure.	Response to follow.
21.	S.9.2.4 - I agree that mounting daily informal odour patrol is useful and necessary as a supplement to the routine odour formal sampling and odour panel. It's recommended that the odour patrol be conducted during the peak operational hour of the plant and by a person not normally working on the site.	Response to follow.
22.	S.9.2.3 - Please note that the Authority is to check there is a suspected breach of the contract terms or when needs arise. Routine self-monitoring should be conducted by an independent body approved by DEP. Thus, please delete the last sentence of S.9.2.3.	Noted.

23.	S.9.5 - It is not mentioned whether any action would be taken in event of non-compliance. As a result, an action plan for non-compliance monitoring should be submitted.	Undoubtedly, there would be action taken in the event of non-compliance, especially where this led to exercise of the default payment provisions in the contract. It is surely appropriate that the action taken should depend on the cause of non-compliance, which cannot be known in advance. It is possible only to define the means of communication of the non-compliant result to these with the responsibility to take action.
24.	Para. 3.2.4 The design noise criteria for 1 m and 6 m contradicts to each other. The later is more stringent than the former. Please clarify which is the preferred criterion.	The consultant has no preference. These criteria were specified in the Tender Documents and Environmental Review which, presumably, were endorsed by the Client. They are copied verbatim from the ER document.
25.	Para. 3.2.1 Presume the "existing NSRs" refers to those indicated in figure 2.3, I have no objection to the ASR assignment of "C" to the THA site. However, ASR for NSR at Siu Sai Wan should be "B". It should be noted that the determination of ASR depends on individual condition of the NSR and the degree to which the NSR is affected by any Influencing Factors (IFs) at the time of day under consideration.	Noted.
26.	Para. 3.2.5 Appendix was not found in the report. The background noise should refer to the L90. What is the conclusion of the assessment with respect to the compliance of NCO?	Apologies for the omission. Table 3.5 will be modified to show the L_{90} values. It is considered unlikely that compliance with the NCO is achieved at the existing NSR. The assessment is summarised in paragraph 5.2.10 which shows that the transfer station operation will not be cause of exceedance when it is commissioned.
27.	Para. 9.3.1 The last statement is supported.	Noted.
28.	Para 9.3.2 There is no RCV routing proposed in the report, the THA located near the junction of ON Yip Street and Fung Yip Street may subject to RCV noise in the early morning and late evening. Noise monitoring at this NSR station is of importance for future reference. While monitoring at the site boundaries could give indication of the actual activities noise at the source.	RCV routing is not proposed because the contractor can exert no control. It is likely that RCVs will prefer to access the station from the south, along Sun Yip Street.
29.	Para. 9.3.3 9.3.2 is relevant. Noise monitoring at NSR and site boundaries should remain as required by the Tender Document.	Noted and amended.

29.	Para. 9.3.3 9.3.2 is relevant. Noise monitoring at NSR and site boundaries should remain as required by the Tender Document.	Noted and amended.
30.	Sections 4.3.15 to 4.3.17 How often is it required to re-new the Purafil? What parameters would be determined to test whether the chemisorbent is still effective for odour removal? Would it be possible to recycle and then re-use Purafil? What is the cost implication?	Purafilis disposed of at the landfill. Please refer to IAR comments and responses. Frequency of replacement is determined on the chemical testing of permanganate residuals.
31.	Clause 2.3.3 and 2.3.4 Please provide some information on the carrying capacities of the specially designed vessel. Have you considered other alternatives of the marine transport and carried out cost comparison on them?	Section 2.3.3 indicates that the carrying capacity is 85 containers per vessel. Consideration to the fundamental planning and system design issues raised here and in the following comment (32) was given by the contractor before Tender submission, by Government in Tender Evaluation and now forms part of the Contract.
32.	Clause 2.3.4 What are the estimated numbers of hired-in tractors and trailers required? Could they be available immediately on request? What is the storage capacity of the transfer station?	The storage capacity of the transfer station is not a material consideration because it is not designed as a storage facility for safety, environmental and operational reasons and every effort will be made to transfer the waste on a daily basis.
33.	Clause 6.3 What are the impacts on the existing foul sewer and stormwater drainage systems during the operation of the transfer station? Would there be some improvement work on the existing pipe lines.	Compared with the former composting plant, there is no significant incremental impact and there will be no improvement works. We understand that the Sewerage Master Plan Study for the area will examine these issues.
34.	Clause 6.6 Opening contractor has to consult EPD on the disposal of the dredged material arising from the maintenance work.	Noted.
35.	Clause 7.2.1 and 10.1.16 The conclusion on the risk of congestion on the junctions could not be drawn in the report as mentioned in Clause 7.2.1. Further study is needed.	Please see the comment(51) by PM/UA, advising that this issue is better addressed through the Traffic Study and the comment (52) by TD advising that the increase in peak hour traffic flow is tolerable.

36.	The site drainage system should be designed such that Group 2 waters (as defined in section 6.1.3) can be readily contained in the event that they become contaminated. As noted in section 6.5, the principal mitigation measure for control of these waters will result from effective site management and maintenance of Good Working Practice. The consultants could usefully elaborate on the detail of this 'on-site mitigation' to which they refer.	These issues will be clarified in the final report. Briefly, the Group 2 wastewaters will normally be treated whether contaminated or not.
37.	The reference to direct discharge to coastal waters (section 6.3.1) is rather confusing and requires clarification by the consultants. The report infers that only uncontaminated stormwater will drain to coastal waters. This discharge would not be governed by the terms of the Technical Memorandum, beyond the requirement that any contaminated effluent must be prevented from entering the storm drain. The report states that all other waste water (following pretreatment as appropriate) will be discharged to foul sewer and thus subject to the effluent standards specified by Table 1 of the Technical Memorandum.	Noted and amended.
38.	The collection and handling of drainage arising from the vehicle washing bay have not been discussed.	The system consists of a sump and separators together with a Kirton recycling process. Appropriate reference will be made in the final report.
39.	Since the roads and ramp travelled by vehicles would be contaminated by refuse leachate and that frequent washing would be applied, this arising of wash water must be dealt with. The handling of the "Group 3" effluents (Section 6.3.3) should be detailed. Is settlement alone going to remove the BOD? It should be noted that discharge made to the stormwater drainage should only contain un-polluted water.	Noted and amended.
40.	The routing and treatment of the "Group 2" effluent also need to be clarified by the consultants. Is this going to be fed into the wastewater treatment system? Are there measures to exclude rainwater from getting into the sewerage system, such as by roofing these areas? This would greatly affect the sizing of the treatment plant.	The Group 2 effluent will normally be treated in the wastewater treatment plant except during heavy storm conditions.

41. Many site specific factors at IETS differ from those at KBTS. While the wastewater arising is assumed on that basis, what flexibility in design capacity is allowed for in the wastewater treatment system so that the quality of the treated effluent is not affected? For example if the arising becomes $40m^3$/day, how would the system cope?

IETS is actually quite similar to KBTS. Certainly the proposed wastewater treatment plant is much more flexible in terms of its loadings because it operates as a sequencing batch system.

42. For the 2 years between the commissioning of the IETS and the improvement of the local sewerage system at Chai Wan, is there adequate sewer capacity to accommodate the flow from IETS?

Compared with the former composting plant no significant incremental impacts on the system are expected.

43. The functional requirements with target, trigger and action levels, event/action plans for environmental monitoring and audit should also be provided in Chapter 9 of the report for all environmental parameters. Preferably an "Operating Manual" or "EM&A Manual" developed based on these information should also be submitted.

The concept of target trigger and action levels is at variance with the contractual requirements. These define limits not to be exceeded and monitoring frequencies for checking of compliance. The target levels are equivalent to the target and action levels. It is not possible to define an action plan if the cause of non-compliance is not known, except to say that action to detect and rectify the problem is required. It is the contractors responsibility to take the appropriate action and the existence of the default payment arrangements should prove sufficient inducement to do this. The action plan should therefore focus on the means of communication of non-compliance to those with responsibility to rectify it.

44. The Operating/EM&A Manual should give a detailed, comprehensive and systematic monitoring and audit programme which should enable the station operators/environmental team to pick it up and run with it. The manual should include at least: comprehensive coverage of the task for construction and operation phases, suggested criteria for audit purposes as target, trigger and action levels, event/action plans for early identification of remedial measures, proforma sheets for data entry and record purposes etc.

Noted. The three-tier criteria concept (target, trigger and action levels) is, however, considered to be inappropriate in this particular instance because it is entirely inconsistent with the contractual obligations of the operator. Comment (22) indicates that routine monitoring should be undertaken by an independent body approved by DEP. It is also our recommendation that infrequent independent audits should be conducted. The extent to which "comprehensiveness" is required is limited by these considerations.

45.	As regards the submission of "monitoring data" to EPD, the submission should be in the form of a "monitoring and audit report" which should include at least: a) monitoring data, (Monitoring data in floppy disk may also be required. Details/ format should be agreed with EPD.) b) audit/review of the environmental monitoring data to identify compliance with regulatory requirements, policies and standards, and c) any remedial works taken/required to redress adverse impacts. The frequency of submission of the report should be agreed with EPD.	The contents of the report are noted and agreed. The frequency of submission is defined in the contract and is as stated in para 9.5.2 of the report. Please clarify whether it is DEP's intention to vary this.
46.	Some sections of the report refer to environmental auditing. Section 9.3.3 states that " . . . until the audit is finalised." When will be the first environmental audit that the consultants recommend to be carried out?	It was indicated in Section 9.5.3 that the ideal time for such an audit would be on the expiry of the contractual requirement for fixed monitoring after one year.
47.	Section 10.2.2 of the "Recommendations" states that ". . . less frequent independent audits should be carried out." What is the consultants recommended frequency?	The timing of each independent audit would be a recommendation of the previous audit. One may be enough.
48.	The above comments also apply to the Initial Assessment Report.	Noted.
49.	Presumably, para 2.4 and Figure 2.3 "Location of Sensitive Receivers" was based on the superseded Chai Wan Outline Zoning Plan (OZP) Plan No. S/H20/4.	Yes. The assessment was substantially complete before the latest OZP was gazetted. Reference will, however, be made to the latest OZP.

50.	Please note that the OZP will be further revised to redesignate sites to the east of the IETS from industrial to low-rise government uses, open space, sport ground as well as residential uses. Attached please find a copy of the Siu Sai Wan Outline Development Plan (ODP) extract showing the proposed uses. While the location of the sites may be subject to minor changes before it is approved by the Development Progress Committee, the land use budget will remain basically unchanged. This revision is required to accord with the ExCo. approved Metroplan Selected Strategy's concept and to provide residential sites to meet the requirements of the Long Term Housing Strategy and to make available sites for district facilities. As shown on the plan, the shortest distance between the proposed residential development and the IETS will be about 150m. As the 'DO' and sport ground adjacent to the IETS are open air facilities, any inconvenient nuisance generated should be reduced to the minimum.	The ODP is noted and will be taken into account in the final report.
51.	I have no comment to make on the various environmental impact assessments in the report except that I suggest the traffic impact can be more comprehensively examined under the Island East Traffic Study currently carried out by T.D.	Noted and agreed.
52.	As there will be only 32 additional vehicles per hour generated by the proposed transfer station during operation, the increase of traffic flow on Sun Yip Street in peak hours is considered tolerable. I therefore have no comments on the assessment of the traffic impact in principle.	Noted.
53.	However, as stated in para. 2.3.2 of the report, RCVs entering the main transfer building to a weighbridge and a ramp leading to the tipping hall will be regulated by a traffic light controlled system near the vehicular entrance floor. Adequate waiting spaces in front of this weighbridge and the tipping hall should be provided within the development for RCVs waiting to use the weighbridge, and calculations should also be submitted to prove the ensure that no waiting vehicles will queue back onto the adjoining public road.	Noted. The queuing issue was throroughly addressed before Contract award and is covered by a default payment clause. Please see also response to comment 38 of the 2 March 1992 on the Final Initial Assessment Reprot.

54.	Moreover, RCVs will have to be washed after depositing refuse and being driven onto the second weighbridge. It is required to demonstrate that such operations will not cause any significant delay to the following RCVs to enter the tipping hall and the transfer station.	Separate lanes and weighbridges are used for incoming and outgoing traffic, so that the vehicles passing through the vehicle wash do not interfere with vehicles entering the site.
55.	6.2.3 and 6.3.2 - a) If Group 2 flows are not estimated and correspondingly allowed for in the design capacity of the wastewater treatment facility, how could such extra flows be handled should it be required that Group 2 flows should be discharged to the treatment facility, as stated in 6.3.2?	The first flush of Group 2 effluent is to be treated and this is allowed for in the design capacity calculation.
56.	Presumably, the water quality of Group 2 flows will be monitored at regular intervals to determine if such flows should be discharged to the treatment facility and a by-pass pipe arrangement with suitable penstocks will be provided as part of the proposed works to allow the Group 2 flows to be conveyed to the treatment facility as and when required.	Group 2 effluent will be treated as a matter of course except under heavy storm conditions. This monitoring is not therefore necessary.
57.	6.4.2 - The max design flow of $20m^3$/day quoted appears to correspond to the estimated Group 1 wastewater flows stated in 6.2.1. Hence there may not be spare capacity in the treatment facility to cater for any extra flow from Group 2 wastewater and this may lead to pollution of the stormwater system.	The maximum design flow has been fixed at m^3/day. This is adequate to receive all flows.
58.	From the occupational health point of view the proposed dilution ventilation system is considered acceptable on condition that it will maintain, other than NO_2 and CO, the possible airborne hazards that may arise from the wastes being handled, within the respective health limits.	Noted. It will also maintain acceptable suspended particulate levels.
59.	Should existing trees be felled for the construction, details of the would-be-affected trees should be provided for consideration.	This comment was raised in the relevant Key Issues Report and the response indicated that there would be no such felling.

60. USD has the experience that there is constantly a misty atmosphere within the Kowloon Bay Transfer Station tipping hall and up to now this is still the constant source of complaint of poor ventilation by the drivers of the refuse collection vehicles. So whatever Dust Control System is used in IETS, it should be effective in removing the fumes and mist within the tipping hall. It necessary, the frequency of air change should also be increased to more than 8 times per hour so as to promote a better ventilation within the tipping hall.

It is our belief that the mist is not caused by suspended particulates. Results of TSP monitoring inside the tipping hall bear this out. It is far more likely that the mist consists of condensed water vapour originating from vehicle exhaust emissions discharging into a highly humid atmosphere. We understand that there appears to be a loose correlation between haze/mist and ambient humidity. When the humidity is high, no amount of additional ventilation will reduce the mist. From an occupational health standpoint the situation is not cause for concern. It is of interest to note that at Kowloon Bay Transfer Station EPD conducted measurement of CO, SO_2, NO and NO_2 during peak hours on two successive days in November 1991 and the results showed that air quality within the tipping h all was perfectly satisfactory. Since the IETS system has duct intakes positioned directly above discharging RCVs air quality is likely to be even better.

61. Please include the following conditions in your design of the IETS:

a) Existing watermains/waterworks reserve are effected. No development will be allowed which will require resiting of watermains/ waterworks reserve.

b) Details of site formation work shall be approved by Water Supplies Department prior to commencement of works.

c) No structures shall be built or material stored within the Waterworks Reserve or 6 metres from the centre line of any watermains. Free access shall made available at all times of staff of the Water Supplies Department or their contractor to carry out inspection, operation, maintenance and repair works.

d) A 5.3m headroom shall be maintained at all times over the existing Waterworks Reserve.

All conditions are noted.

61.	e) No percussive piling shall be carried out within the Waterworks Reserve or 6m of the centre line of any water main. In case where piling is necessary outside the above limits and in the vicinity of our existing Waterworks Installations, the maximum particle velocity and amplitude of ground movement at the installations as measured by a vibrograph shall be restricted to 25mm/sec and 0.2mm respectively.	Noted.

RESPONSES TO OUTSTANDING COMMENTS FROM F4574 DATED 13/3/92

	Comment	Response
23	How could the refuse delivered by the private RCVs be inspected before they are disposed into the tipping bay? Would there be some access facilities for inspecting the refuse?	The point of the question as an environmental issue is not clearly understood. It is anticipated that, if and when, private sector deliveries are accepted, then contractors will be "account customers", using IETS on a regular basis. Relevant extracts from the Contract are enclosed: Tender Document - Section L3-15, Tender Submission - Section U.
25	Liquid Waste Project	
	It would be helpful if a preliminary building layout plan showing the various facilities as well as some drawings on sketches showing the schematic layout of the facilities are included in the Report.	Registered Design drawings of the general layout are enclosed, drawing nos. 7A/A/002 and 003.
26	Please indicate the position of the wastewater treatment plant and the connection into the sewer.	The effluent connection from the wastewater treatment plant is shown in Drawing No. 20B/D/001 (Rev. D), extract attached. The connection leads to a foul water manhole and into the foul water drainage system.
	From Appendix B re Draft Key Issues Report No. 2	
6	Para. 4.3.23	
	The waste water treatment plant is separated from the compactor hall by four walls. Apart from the two entrance doors which I believe, should normally be closed during normal operation, no other openings for fresh air inlet has been indicated in the Contractor's design. If that is the case, it is doubtful that the fans proposed can provide sufficient air changes to the waste water treatment plant.	The Design provides for make-up air to be ducted directly to the wastewater treatment plant via a 2m x 0.5m louvre located above a roller shutter at the external face of the building. This intake is equipped with an axial fan rated to achieve the necessary air changes on a 24-hour basis.
12	Section 6.4	
	Should this section also address the sludge disposal process, treatment for wasted water from the vehicle wash?	Vehicle wash water is included in Group 1 which is pretreated in the onsite waste water treatment plant before discharge to foul sewer. The vehicle washing water places no additional or specific demands upon the waste water treatment plant than the other Group 1 components and therefore was not discussed further in Section 6.4

Treatment of sludge is as shown in the attached Schematic Diagram CEL/IETS/004 (Rev. F). In summary, effluent is pumped to a filter press. Clarified filtrate is returned to the influent sump pit and sludge is removed to be co-mingled with solid waste and transported to the landfill.

20 S.3.1.4, 9.2.3 and 9.2.4

Concerning the odour monitoring, sampling should also be conducted once every six days instead of weekly. The compliance criterion suggested by the Consultants is definitely unacceptable since odour perception is an instantaneous response. Sampling at hourly interval for 4 consecutive hours would defeat the purpose of spotting the real odour level. Sampling should aim at capturing the most odourous parcel of air that would most likely to give rise to odour nuisance to the public. Therefore, the most appropriate location to take air sample is at the spot where odour is expect to be strongest. In general, this would be in the downwind position during the peak operation hour of the plant. Air sample should then be taken at the moment when odour is sensed to be most obvious. A compliance failure should be counted if the measured odour level exceeds the 2 odour units standard at any one time. Under normal circumstance, two samples should be taken according to the above samples should be taken according to the above principle. Any one of the results exceeding 2 odour units (determined by an odour panel) is considered to be a compliance failure.

In Section 9.2.3 and 9.2.4, the Consultants stated that the monitoring frequency specified in the Environmental Review was not sufficient to determine compliance and also that the compliance criteria specified in the Environmental Review were inconsistent with the fact that odour nuisance may occur when the limit is exceeded for a very short time. Why are you telling us that the compliance Criterion is unacceptable when it was presented to us as part of the Tender Documentation by the Government and we have already stated that we did not believe that the monitoring frequency and measurement methodology was adequate?

We do however, stand by our statement that a daily odour patrol around the entire site perimeter would be more effective than air sampling over 5 minutes in a week as part of an odour panel and that the operators could then act upon the findings because results from sampling are not available in real time. We acknowledged that odour patrols will not quantify odour level. In terms of remedial action, is odour quantification as important as odour identification since the patrol will almost certainly identify odour more often than once every 6 day panel/sampling procedures.

We agree that downwind in peak hour operation will generally be the location where odours could be detected and therefore we would recommend that the odour patrol be undertaken during this time.

21 S.9.2.4

I agree that mounting daily informal odour patrol is useful and necessary as a supplement to the routine odour formal sampling and odour panel. It's recommended that the odour patrol be conducted during the peak operational hour of the plant and by a person not normally working on the site.	We agree that the odour patrol should be conducted during the peak operational hour and that this data (i.e. compliance/non compliance) should be compared with results from the requisite odour sampling procedure particularly with a view to modifying the sampling procedure where necessary at audit stage. However, there is no standard method in Hong Kong for undertaking an odour panel (given the carcinogenicity of screening chemicals) and EPD are the only organisation who have the sampling/testing equipment that we are aware of.
Comments on first responses	**Consultants' 2nd Responses**
i) Project Management	
a) Comments on Draft Key Issues Report No. 2	
2) The report needs to be revised accordingly.	Noted.
5) It is correct that the provision of a water hose is primarily for the washing of tailgates. However, during the dry and windy weather, it is used for dust-suppressing because it is not uncommon to find that the operator keeps hosing at the refuse mass during the discharge operation.	Noted. Please see previous response. The point being made was as follows: in contrast to the comprehensive air quality protection measures to be incorporated into IETS, under the Temporary Arrangements where up to 700 tonnes of loose waste are received each day (with or without a single hosepipe as the sole means of mitigation), there are no adverse results detectable off-site.
6) No response is given.	
8) The bleed-off from the vehicle wash water treatment system should not be classified as Group 4. In Section K.9.2.2 of the tender document, Group 4 effluents are defined as discharges from accommodation only. The bleed off from the vehicle wash water treatment system can be discharged into foul sewer provided that the effluent is treated to a standard equal or above the discharge standard stated in Document 27 of the tender document.	Please see attached responses where this comment is addressed. Apologies, previous comment should have read Group 1, which is pretreated in the on site waste treatment plant before discharge to foul sewer.

b) Comments on IAR

9) The logic that the Consultants contend that there is no odour problem at KBTS from this source is questionable. No complaint does not necessarily mean that there is no odour problem. Most people tend not to complain on minor problems simply because they do not want to spend time on the issue. However, they will, when the problems persist for a long time or become more intense. Although no odour complaints (vehicle wash effluent) have been received from the public, verbal complaints have been received from the RCV drivers with respect to the odour given off from the recycled water. It is correct that no default payment has been deducted due to exceedance of the appropriate limit set out in the KBTS Contract. Again, this does not necessarily mean that there is no odour nuisance generated from the recycled water because under the KBTS contract, an odour failure can only be counted if a total of four consecutive samples taken at one hour interval exceed the 2 odour unit limit and default payment can only be deducted when the number of failures in a month exceeds 5. Under the IETS contract, this procedure will change and any odour count above 2 odour unit will constitute a failure. As the vehicle wash is located near the exit of the station, I find it hard to accept that detectable odour from this source is not in itself problematic unless the Consultants can quantity its odour level and demonstrate that it will be below 2 odour units.

EPD are well aware that odour level from the vehicle washing plant cannot be quantified at this stage. Nor can we demonstrate that it will be below 2 odour units. We can however state that if odour is detectable from recycled water that the ratio of recycle to water bled from the wash system would have to be reviewed. This is clearly an operating procedure. The Client is also aware of the degree of odour level compliance that has been called for in the Tender.

Project Management Group were responsible for evaluating the Tender, negotiating the Contract and giving Consent to each of the detailed design drawings.

ii) **Air Quality/Odour Impact**
Comments on Draft Key Issues Report No. 2

a) Response 17 on S.4.3.3
It's still not clear, on what basis, how the Consultants could arrive in the figure that the average number of RCVs in the tipping hall is estimated to be not more that 3.6. Doesn't it mean that the tipping hall would be over-designed? Please clarify and resubmit calculations.

The number of RCVs entering the station at peak hour is 44. They spend an average of 12 minutes on site. 44 ÷ 12 = 3.6. Questions on the size of the station were surely addressed at Tender stage.

b) Response 19 on S.9.2.1 and Table 9.1
My view on the response is that the Consultants should take note of the under-meaning of monitoring at once every 6 days instead of once weekly and recommend appropriate monitoring frequency to be carried out in the operation of IETS. Blindly following something proposed in the ER stage is not appropriate approach of an environmental impact assessment.

Firstly, we are well aware of the reason for monitoring on a once in six days vs once in seven days basis. In this case, because the latter was specified in the Environmental Review, a Government Report forming part of the Tender Documentation, we saw no reason to change this since in this context we do not believe that there is a significant risk of repeatability error. However, if so required we have no objection to the monitoring being undertaken on a once in six days basis and will state so in the EIA as well as noting that this is a contract variance. Secondly, the Brief for this project stated that the Work undertaken in the Environmental Review was not to be repeated. Given the two issues above, we take exception to the rude tone of this comment as previously stated on our telephone conversation Hosking/Ng.

c) Responses 20 & 21 on S.3.1.4, S.9.2.3 and S.9.2.4
I am still waiting for the Consultants' responses.

Please see additional responses attached in which this comment is addressed.

iii) **Noise Impact**
Comments on IAR
Para. 4.1.1 (last sentence) - No.11
It should be noted that construction noise is now under the abet of NCO which repealed the S.O.O. Reference made to S.O.O. would be misleading.

Noted. The reference will be removed.

Comments on Draft Key Issues Report No. 2

a) Para. 3.2.4 (No. 24)
This should refer to our same comment made in the final ER report in '89, your then response/ explanation should be incorporated in this report to clarify these criteria.

We did not produce the Environmental Report.

b) Para. 9.3.2 (No. 28)
Noise monitoring at the nearest NSR i.e. the THA is required.

As discussed in our telephone conversation Hosking/Poon the requested noise monitoring is to ascertain whether traffic noise from the RCVs (at the start of the operational day of IETS before normal traffic peak hour) adversely affects residents of the THA. As previously stated, the IETS operators have no control over the vehicle route that the RCV drivers take.

However, in the interest of identifying whether there is a problem or not, although we believe that the RCV drivers will probably not use these roads, noise monitoring could be undertaken over a month on a once every six days basis and if RCV noise adversely impacts upon the residents the RCV drivers should be told to use different routes by DUS. The monitoring period would have to be no less than one hour each assessment time. As also previously discussed, there is no point monitoring for operational noise at the THA and given that EPD's concerns primarily relate to the traffic noise alone, the recommended noise monitoring at the site boundary may also be reduced from one hour/week of the day and night for the first year to one hour/month of the day and night. We await your advice.

iv) **Waste Management**
Comments on Draft Key Issues Report No. 2

a) Regarding item 30 (section 4.3.15 to 4.3.17), it seems that the Consultant should elaborate the possibility of recycling/reusing of the Purafil and its associated cost implication.

Recycling of chemisorbent materials is impractical because the scrubbing process is made up of chemical reaction as well as physical adsorption. Reusing activated carbon beds is typically undertaken because it relies on physical adsorption alone. Where there is a chemical reaction, as is the case with oxidisers like Permanganate, the reversible reaction, if possible, is often highly energy inefficient, requiring steam. From an environmental viewpoint, regeneration of a scrubber also generates a liquid waste stream.

b) It is advisable to refer to the existing KBRTS for the frequency of replacement of the chemisorbent.

As at Kowloon Bay Transfer Station, stocks of replacement chemisorbent are imported and held in store and utilised as and when necessary.

v) **Solid Waste Control**
Comments on Draft Key Issues Report No. 2

No. 32 (clause 2.3.4)
Although the transfer station is not designed as a storage facility, it is necessary to consider a contingency plan of marine/road transport and temporary storage facilities to cater for an adverse marine environment or a temporary break down of the specially designed vessel. I anticipate an impact on the waste delivery and RCVs' routing if such circumstances are not meditated.

As explained in Clause 2.3.4, a contingency plan for road transportation is a contractual obligation. This will also form part of the Performance Tests.

vi) **Liquid Waste Control**
Comments on IAR
Item No. 30 (Appendix 4.2.1) - Since the liquor is highly polluting, please clarify the followings:

a) Where is the liquor finally disposed of?

b) What quantity is involved? How often is it pumped out of the barge?

c) What is the specification under the contract?

d) Is the liquor discharge under a licence issued by Junk Bay Water Control Zone?

As explained in Appendix 4 Clause 2.1, all the leachate is reabsorbed by the refuse in the barge and thus discharged at the tip face of Tseung Kwan O Landfill. This is "the best practicable means" called for in the Tender Documents and has been employed staisfactorily since mid-1991.

General Comment

1. I would like to point out that there is no policy to close KTIP when IERTS becomes operational.

Noted. References to closing KTIP will be removed from the EIA, but please be reminded that "Environment Hong Kong 1991" states in Chapter 4, Paragraph 4.25 that "Upon the commissioning of the transfer station, now expected in late 1992, the Kennedy Town Incinerator will be closed down."

2. In order to obtain the agreement of the Urban Council to the adoption of the Waste Disposal Plan, the retention of two waste disposal points on each the side of the Harbour was promised. This agreement must be adhered to. I should be grateful if the report is amended to reflect this.

The agreement can be upheld by the retention of the refuse barging point adjacent to KTIP. This currently receives an average of 300 tonnes (rising to 400 tonnes) of unprocessed refuse per day and could continue to do so until the commissioning of the Island West Transfer Station.

Comments on IAR

Paras. 36 and 37
In August, 1991 well before the rezoning of the nearby 'I' and "G/IC" sites for the open space, sport ground and housing developments, this office has already requested for detailed proposal for visual impact as it is considered any operation within the station, including container loading will be visually intrusive. It is strongly requested that any operation within the station, especially the container loading should not be seen from any directions from landward side. The proposed chain-link fence is not acceptable.

Please note that the Contract was signed in April 1991, tender preparation and evaluation having been conducted in 1990.

No operation within the Station building is visible. The only activity that may be visible from land to the East is the exchange of containers from the vessel. This is not objectionable. If future building development were to include high-rise structures, it is difficult to envisage how sight of the vessel activity could be prevented.

Comments on Draft Key Issues Report No. 2

Para. 50

(i) What is the purpose of the final report ?

To incorporate comments on the draft report such as have previously been made and responded to.

(ii) It is considered necessary to take into account of the new planning proposals contained in the draft Siu Sai Wan ODP No. D/H22A/1C (circulated to you before) as early as possible. Please ensure adequate measures will be provided to reduce to the minimum the environmental nuisance caused to the adjacent planned potential sensitive receivers.

Please see answer to comments on Paras. 36 and 37 above.

Comments on Draft Key Issues Report No. 2

a) 55 & 56
What is meant by "first flush of Group 2 effluent" ? If this means that not all Group 2 effluent will be treated, the response to 56 that "Group 2 effluent will be treated as matter of course except . . ." may appear misleading.

The first flush refers to the first 5 mins of a storm of intensity 250 mm/hr.

b) 57
The design flow is not printed in the response. Please provide together with a break down of the max design flow adopted to illustrate the Consultant's response that "this is adequate to receive all flows".

Notwithstanding the description given in Clause 6.2.3, the calculation of volumes in Group 1 (contaminated) and Group 2 (potentially contaminated), being a total of 20 cubic metres per day, was derived from experience gained from operating KBTS and on a comparison with the waste volumes and methodologies at IETS.

1. I cannot lend my support to the Consultant in saying that the misty atmosphere within the KBTS tipping hall is only a result of condensation of water vapour originated from vehicle exhaust emissions.

As has been repeatably commented upon, the EIA has found that the AQOs and specific air quality requirements pertaining to this project are complied with and that the proposed ventilation rate more than adequately serves to maintain this condition. In addition, air quality measurements taken at KBRTS also verify that the AQOs are complied with at that station even though the drivers have made complaints. Subjective views of RCV drivers cannot be assessed in any other way with the current AQO criteria.

2. The tipping hall is a place where the transfer of reduce (from RCVs to the push pit) takes place. The mist observed by our RCV drivers is in fact a mixture of water vapour, vehicle exhaust and dust particles from the push pit and they are afraid that their health will be at stake if they have to work in such a working environment everyday. It is therefore believed that a ventilating system with greater air change will help get rid of this mixture more quickly and efficiently.

Please see the above response.

3. It is evident that the humidity of the tipping hall is constantly on the higher side than that outside as a result of:

   (a) frequent hosing down of the tipping hall ground surface;

   (b) water vapour from the sprinkler system above the push pit;

   (c) the relatively high moisture content of domestic waste delivered for disposal.

   I do have reservation on the Consultant's remark that additional ventilation to draw in more drier air from outside will in no way reduce the "mist". I also do not agree that it is correct to address that the workers are working in healthy environment which is persistently moist and damp.

Yes, the humidity inside the Tipping Hall may be higher than that outside. However, do DUS really believe that bringing in drier air perhaps of 95% humidity rather than 96% humidity will help?

3RD RESPONSES TO COMMENTS ON INITIAL ASSESSMENT REPORT AND DRAFT KEY ISSUES REPORT NO. 2 FOR ISLAND EAST TRANSFER STATION

Comment	Response
	The following responses reflect the conclusions drawn by the consultants, CES, at the Wednesday 3rd June 1992 meeting attended by EPD, DPO/HK, Swire BFI and CES.
1 Environmental Protection Department Air Quality/Odour Impact Comments on Draft Key Issues Report No. 2, S.3.1.4, 9.2.3 and 9.2.4	
a. The Consultants appears to have mixed up "odour monitoring" with "compliance criterion". I agree that in terms of remedial action, odour patrol is of significant importance in taking prompt action. However, without quantification of odour by means of odour panel, there is no way to check the 2 odour units compliance that stipulated in the Tender Document section K.9.1.2. Thus, I would like to reiterate my previous comment that formal odour panel should be supplemented by daily patrol.	There are three issues to be resolved in relation to odour. Resolution of these issues is the responsibility of the Client and the Contractor as they are contractual. As such, the following statements indicate the Consultants' beliefs and should not further delay distribution of the EIA. The three issues are: 1. Determining whose responsibility it is to assess odour compliance; 2. The methodology to be used to assess odour compliance; 3. The frequency or condition at which odour is to be assessed. Odour panels are the only assessment procedure that can be used to determine compliance with the 2 odour unit site boundary limit. The consultants believe however, that although not impossible, an odour panel test is extremely impractical and is not a suitable compliance evaluation criteria to be performed on a regular basis. Instigation of odour panels would firstly require identification of someone who can undertake the panel. The Consultants know of no company that is prepared to undertake odour panels. It is believed that EPD have the only equipment in Hong Kong to undertake odour panels. Large sample volumes would be required and it would be difficult to establish conditions under which such a sample could be taken. For example, influencing factors such as smelly RCVs could not be in close proximity to the testing area.

The panel results are subjective and it is the Consultants' belief that two different odour panels may not be in agreement using the same air sample. The Consultants are also checking whether odour panel results are recognised in a court of law given their subjective nature. Therefore, this procedure is not suited for evaluating contractual compliance with an associated payment penalty for non-compliance.

Notwithstanding resolution of contractual compliance, the Consultants believe that it is far more important to resolve odour problems than questionably quantify them. We maintain that daily odour patrols are a useful tool and that, if the Employer on inspecting the site, smells an odour, then the source and the means of reducing the nuisance should be jointly sought by the Employer and the Contractor.

If there was a practical, real time testing procedure that provided repeatable results, then the Consultants would endorse quantifiable odour "monitoring".

b. Concerning the Compliance Criterion specified in section 9.2.3 of the Draft Key Issue Report No. 2 (a compliance failure will be counted if four consecutive samples taken at non-overlapping hourly intervals exceed the limit of 2 OU), I cannot figure out from neither the Environmental Review nor the Tender Document (section L.9). it was also confirmed by SPG/EPD that any exceedance of 2 OU would be counted as non-compliance for the Island East Transfer Station contract.

Noted, this criterion as presented, was in error. The mistake will be rectified in the final KIR No.2.

c. With respect to the odour sampling and assessment method, EPD is presently adopting the "Australian EPA (Victoria)" method. I don't think it is an excuse for not conducting a formal odour panel assessment for the reason that no sampling/testing equipment is available.

Please refer to response to 1 a. above.

S.9.2.1 and Table 9.1

d. I don't know why the Consultants still do not believe that there might be repeatability error of collecting the sample over the same day of a week if the monitoring is carried out at a frequency of once weekly.

Frequency of particulates monitoring has been resolved. For one year, monitoring will be undertaken once every seven days, the day of the week being varied and recorded in a log.

Please note that the once every six days measurement frequency is the minimum frequency stipulated in the USA Title 40 CFR Chapter 1 (Part 58).

e. Secondly, it had stated very clearly in the Environmental Review and the Tender Document that the monitoring frequency should be subjected to review by EPD and I do not think that the work undertaken in the ER was repeated.

No further comment is warranted.

2. Waste Management
Item (iv) (B) of Draft Issues Report No.2

a. It seems that the frequency of the replacement of the chemisorbent should be systematically established for KBTS, IETS as well as for other RTSs in order to avoid possible discrepancy in human perception (especially between the Contractor and the supervising staff of the Department).

To date, replacement of the chemisorbent at KBTS has been undertaken on an as needed basis. No pattern has been established, so replacement frequency cannot be predicted.

The Contractor has indicated that they will prepare a general "self audit" programme by the time IETS is operational. This programme willl consist of the means used at KBTS to determine when replacement of chemisorbent is required and chemisorbent will be reviewed and improved once IETS is operational, using operational information gained at IETS.

b. It would be appropriate to set out certain standard or guidelines for the replacement frequency for different types of chemisorbent materials with respect to the odour control (in terms of odour unit) with a view to maintain the environmental standard of the proposed development.

3. Project Management

a. Appendix B : Draft Key Issues Report No.2

Section 6.4 - One of the objectives of the Report is to address environmental issues likely to be affected by the operation of the proposed installation. The sludge treatment process not only in terms of the process itself, but also include issues such as the suitability of using a filter press in minimising environmental nuisance, the suitability of having sludge co-mingled with refuse, the environmental problems and precautions associated with the co-disposal of sludge with refuse, the extent of dewatering before sludge can be co-mingled with refuse (if considered suitable) etc.

This section of the KIR No. 2 will be expanded, to include the following information:

The activated sludge process will be subject to variation and will require close monitoring to ensure that changing conditions are accommodated. Up to 15 cubic metres per day of wet sludge may be produced, depending upon the quality and quantity of the influent.

A filter press has been included in the system with the objective of increasing the solid content of the final sludge to 30 per cent. The filtrate is returned for reprocessing through the SBR system.

	The final sludge will be disposed of, ultimately to landfill. The most appropriate form of transportation is for the sludge to be co-mingled with incoming solid waste. Municipal solid waste is, of course, the source from which the sludge is derived. Co-mingling will be achieved, wholly within the envelope of the main building, by introducing quantities of sludge into absorbent refuse in the pushpits. Human judgement will be exercised to ensure that sludge is discharged only into suitable waste and only in appropriate volumes that can be readily absorbed. Sludge may be conveyed to the pushpit either by an on-site tanker or by a direct piping arrangement.
b. Comments on IAR One of the objectives of the Key Issues Report is to identify methods and measures to mitigate environmental impacts arisen from the plant operation and reduce them to acceptable levels. If it can be established that odour from the vehicle wash is of concern, this should be addressed in the Report. The mitigate measures are not restricted to design changes nor should it be limited to the operating procedures. The Consultant's suggestion to adjust the ratio of recycle to water bled from the wash system should be included in the Report.	Odour arising from the recycling plant of the vehicle wash was of initial concern at KBTS. For IETS as a result, the water mixing (fresh: recycled) plant was moved inside the main building, as was the waste water treatment plant, so that the odour control units in the transfer station building could reduce odour from these sources. Therefore, it is not expected that odour from the vehicle washing plant will be the concern that it might have been at KBTS. The ratio adjustment recommendations will be included in the report as indication of other operational means available to mitigate odour.
4. Noise Impact Comments on Draft Key Issues Report No.2	
a. Para 3.2.4 (No. 24) To avoid confusion of the dual standards, please employ only the 65 dB at 6 metre design criteria.	Noted.
b. Para 9.3.2 (No. 28) The proposed noise monitoring regularity is satisfactory.	Noted.
5. DPO/HK Comments on Draft Key Issues Report No.2	
a. Para 34 "According to Chapter 9: Environment of the HKPSG, Consideration should be given to the provision of fully enclosed station".	A description of the proposed transfer station operation was provided for DPO/HK at the June 3 meeting. The IETS design is an enclosed refuse transfer station.

Is the present proposed partial enclosed station acceptable to the Environmental Protection Department?"

While responses from EPD or the consultant are still pending, it is considered that all operations in relation to refuse transfer within the land allocation for this purpose should be enclosed for environmental protection and visual impact reasons.

The only activities occurring outside are those that cannot be covered over, such as container transfer to sea vessel. When the containers leave the transfer station building they are closed. No refuse can be seen outside the transfer station building.

b. Paras 36 and 37

Loading refuse from land to vessels is considered as one of the most nuisance part of the refuse transfer operations. This nuisance operation can be screened from landward side, to a great extend, by:

i) to provide a cover on land for this operation and

ii) to provide opaque wall

A 2 metre solid (concrete) wall around the site perimeter near the current Temporary Refuse Transfer Arrangements area will not provide any significant visual impact benefit. Only empty containers are to be stored in the vicinity, and these, as well as the sea vessel loading operations will be able to be seen above a 2 m wall. A 2 m wall would provide some noise attenuation for persons standing at ground level immediately outside the site but not for any receivers above this height. Landscaping alternatives would be preferred visually. However, the Consultants do not believe that the container transfer or container storage operations themselves constitute a negative visual impact, given the site location.

c. Para 50

i) My comments on Paras. 36 and 37 are on the visual impact of the IETS. My comment on Para 50 is to request you to include the new planning intentions for Siu Sai Wan reclamation area into your environmental impact assessment. As such your responses to my comments on Paras. 36 and 37 are not applicable to that on Para. 50.

As discussed in the June 3 meeting, District Open Spaces and a sports ground are not classified as sensitive receivers. Residential developments on the reclaimed land are protected by the same provisions as the existing sensitive receivers, both from HK legislation and site boundary contractual obligations.

ii) The report assumes the sensitive receivers are at the existing Siu Sai Wan public housing estates. As new residential, sport ground and open space will be developed adjacent to the station, please ensure the nuisance control measures are adequate to cope the new sensitive receivers. Details on the new land uses proposals have been forwarded to you.

6. DUS

Comments on Draft Key Issues Report No.2

a. The dust level measurements at KBTS quoted by the consultant were taken at a 24-hour mean and I have no idea of its applicability and corrections during the peak hours which grasp our concern. Nevertheless, we have enlisted the assistance of Occupational Health Consultant of Labour Department to take air samples at the tipping hall of KBTS for analysis of the air-borne contaminants.	Noted.

RESPONSES TO COMMENTS ON AIR QUALITY/ODOUR IMPACT

EPD REF EP2/H20/02/III DATED 17/7/92

Comment	Response
Air Quality/Odour Impact EPD ref EP2/H20/02/III dated 17/7/92	
The Consultants point out that the resolution of contractual issues are the responsibility of the client and Contractor. This point is agreed.	We note your decisions on odour panel assessment and these requirements will be incorporated in the EIA. With regard to the daily odour patrols, there is no indication of the length of time over which daily patrols are to be undertaken. As presented in Document 29, reduction of environmental monitoring frequencies is scheduled after the first year of operation. In accordance with this procedure, daily odour patrols will be undertaken for the first year and the odour patrol frequency should be reduced by agreement between the Employer and the Contractor after this time. However, notwithstanding any reduction in frequency of odour patrols, the Contractor will be responsible for instigating an odour patrol at any time if there is cause to believe that there are odours emanating from the site.
The Consultants carry on advising that Odour Panels are the only assessment procedure that can be used to determine compliance with the 2 odour unit level but also pointing out the difficulties and restrictions in performing the odour test. However, the difficulties cannot be taken as an excuse or reason for not conducting the Odour Panel as long as the Odour Panel test is a Workable method.	
It is understood by both the Employer and the Contractor at the outset that odour cannot be quantified in exact scientific values and the results of Odour Panels with respect to 2 odour units is the only subjective means to determine the odour level. The giving of assurance that the odour level at site boundaries will be controlled to below 2 odour units is also based on the understanding that the Odour Panels results, although subjective, will be taken as a method of checking compliance. It is also understood that if the Odour Panels results confirm non-compliance with respect to odour control, certain portion of the operating charge will be deducted from the contractor's payment which the Contractor should not be entitled to as a result of not fulfilling his obligation under the Contract or not performing his duties in full. The deduction of payment is not meant to be "an associated payment penalty for non-compliance" as described by the Consultants. Whether or not the above deduction is enforceable under law, it is not up to the Consultants to decide at this stage. For the commissioning of the plant the contractor will have to comply with the requirements laid down under the contract.	There are no other issues in your letter requiring further action on our part. In our previous letter of 10 June 1992, ref CES/NFH/94610/ EC/L2060 we requested acknowledgement of the acceptability of the final responses to comments. We would appreciate confirmation that there are no outstanding issues and that submission of the Final Reports can proceed.

After a number of discussions, we have come up with the following odour monitoring requirements:-

a) Failure to achieve at the site boundary of the transfer station of the 2 odour units requirement as determined by an odour panel will be counted as a non-compliance. The odour panel is to be organised by EPD for compliance checking after the plant is operational.

b) Daily odour patrol at peak operation hours of the transfer station has to be conducted by the contractor. The results of the odour patrol has to be reported to the site representative of the employer who is responsible to determine whether or not an odour panel should be conducted.

For the "Acceptance Testing" of the transfer station, it's solely the Contractor's responsibility to demonstrate to the client the compliance of relevant environmental standards.

On the other hand, in view of DPO/HK's strong concern, a wall around the site perimeter near the current Temporary Refuse Transfer Arrangement area is supported from both visual impact the noise point of view.

RESPONSES TO COMMENTS ON
ISLAND EAST TRANSFER STATION
EPD REF 63 EP2/H20/02 III DATED 17/8/92

	Comment	Response
i)	Length of Time I think you are referring to the number of times of odour patrol during a day instead of the length of time of an odour patrol exercise as human could response to odour in a very short period of time. I suggest to have 2 no. of patrols daily during the first year (i.e. morning peak and afternoon peak) and 1 daily patrol thereafter subject to the Employer's approval. If the patrol find odour during an odour patrol exercise, he/she should report to the operator to tackle the problem. Afterward, it's obvious that another odour patrol should be conducted to see whether or not the odour is still persisting.	Neither. Length of time referred to the period over which daily patrols were to be performed before a review of the frequency of patrols was undertaken.
ii)	Document 29, Environmental Monitoring Schedule The odour monitoring frequency stipulated in this document was originally intended to be used for odour panel exercise. As odour panel is not required for self-monitoring, this frequency is no longer applicable. For the frequency of odour patrol, please refer to paragraph (i) above. As the odour patrol is a very essential tool to check whether or not the transfer station is causing odour nuisance to the surrounding uses, it is a very simple task and is merely like a good house-keeping exercise of the station, I do not think the above frequency should be reduced in any case.	Noted.
iii)	All the agreed amendments should be incorporated into the Final Report instead of simply inserting the 'comments' and 'responses to comments' as appendixes to the Report.	